YEAR I
SEMESTER - II

ENGINEERING MATHEMATICS II
BEG102 SH

Year I **Semester II**

Teaching Schedule Hours/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	-	3	80			20		100	

COURSE OBJECTIVES: The basic objective of the course is to provide a sound knowledge of vectors, 3-D analytical geometry, infinite series and ordinary differential equations.

S.N.	Chapter	Lecturer Hours	No. of questions	Marks
1	Analytic Geometry of 3-D	14	5	25
	Planes: *(4 hrs, 1 question, 5 marks)* Linear Equation, Definition and Equation of intercept form, Reduction of general equations of the plane to normal form, Angle between two plane, Plane through the three points, Plane through four points and coplanar condition, Plane through intersection of two planes about two sides of a plane, perpendicular distance of the point (X_1, Y_1, Z_1) from of plane, Plane in normal form, Plane in general form, Equations of planes bisecting the angles between the planes Straight lines: *(4 hrs, 2 question, 10 marks)* Representation of a straight line, Equation of line in symmetric form, Line join in two point, Length of perpendicular from a point to a line, Transformation of the equation of the line from the general form to the symmetric form, Angle between line and plane, Condition for the line to the parallel to the plane, Condition for a line to lie in the plane, Plane containing a line, Condition for the lines to be Co-plainer, When one line is in symmetric form and other line in general form, When both lines are in general form, About shortest distance, To find the magnitude and the equation of the line of shortest distance between to given lines The Sphere: *(3 hrs, 1 question, 5 marks)* The standard equation of sphere , General equation of sphere, Sphere through four given points, About plane			

	section of sphere, Equation of sphere as diameter form, Intersection of two sphere, Sphere through a given circle, Equation of tangent plane Cylinder and Cone: *(3 hrs,1question, 5 marks)* Definition, Cone with given vertex at origin, Condition for the general equation of the second degree to represent a cone, Equation to cone with a given vertex and a given conic as base, Write circular cylinder and its related problem.			
2	Infinite Series: Introduction, Range of a sequence, Bounded sequence, Monotonic sequence, Limit of a sequence, Convergent and Divergent of a sequence Infinite series and sequences, convergence, ratio root and integral tests, absolute convergence, power series, radius of convergence, Interval of the convergent series.	6	2	10
3	Plane Curves and Polar Coordinates: Plane curves, parametric equations, polar coordinates, integral in the polar coordinates	4	1	5
4	Vector Analysis: Differentiation and Integration of vectors: ***(2 hrs, 1question,5 marks)*** Review of vector analysis, Vector function of a scalar variable, Limit of a vector functions, Continuous of a vector function, Differentiation of a vector functions, Derivability implies continuities, Every Derivable vector function is continuous, Geometrical interpretation of a derivative of a vector function of a scalar variable, Successive derivative (First and Second derivatives), Physical interpretation of a First and Second derivatives of a vector function of a scalar variables, Constant vectors, Derivatives of a constant vector is 0, Derivatives of sum of the derivable vector functions, Derivatives of the product of the derivable scalar and vectors functions, Derivative of a scalar products of the two derivable scalar and vectors functions, The necessary and sufficient condition for the vector function $\vec{a}$ of scalar variable t to have a constant magnitude is $\vec{a}.\frac{d\vec{a}}{dt}=0$, The necessary and sufficient condition for the vector function $\vec{a}$ of scalar variable t to have a constant direction is $\vec{a}\times\frac{d\vec{a}}{dt}=0$, Derivative of a vector product of two differential vector function, Derivative of the vector triple product, Partial derivative of vector function**,** Important results of vector functions, Change acceleration velocity in to vector function	8	3	15

	Gradients, Divergence and Curl: (6 hrs, 2 questions,10 marks) Point function scalar point function, Vector point function, Vector differential operator, Gradient of a scalar function, Divergent of scalar function, Solenoidal, Curl of a vector function, Irrotational, Level surface, Directional derivatives, The directional derivatives of a scalar point function along the coordinate axis, Geometrical interpretation of a gradient of a scalar function, Physical concept of the divergent of a vector function, Physical concept of curl of vector function, Identities involving first order differential operator, Use of vector differential operator for the product functions, Second order differential operators**.** (Theorem is Compulsory)			
5	Differential Equations: First order differential equation, variable separation, homogeneous and non-homogeneous differential equations, linear and Non-Linear differential equation, exact differential equation. Second order differential equations, linear equations with constant coefficient, homogeneous equation with constant coefficients, general solutions, initial value problems, solutions in series, Legendre and Bessel equations	13	5	25
6	**Total**	**45**	**16**	**80**

CHEMISTRY
(BEG 104 SH)

Semester II **Year I**

Teaching Schedule Hours/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	2	3	80	3	25	10	10	125	

COURSE OBJECTIVES: This course will develop the basic concepts of Physical Chemistry, Inorganic Chemistry and Organic Chemistry relevant to problems in engineering.

GROUP A (Physical Chemistry)

1.0 Review lectures on Bohr theory and Summer field's theory .

(8 -hours, one long quations-16 or 24 marks)

1.1 Derivation of de Broglie equation and its significance.

1.2 Heisenberg's uncertainty principle and its significance.

1.3 Wave Mechanical Model of an atom. Derivation of Scrodinger equation.significance of ψ and ψ^2.

1.4 Quantum numbers and their significance.

1.5 Aufbou principle, shapes of s,p & d orbitals

1.6 Paulis excellesion principle. Hund's Rule of Maxm multipli-city electronic confn of elements using s,p,d and forbitals.

1.7 Stability of half falled and completely fooled orbitals.

Books:

1. Seleted topics of physical chemistry. By Motikaji staphit

2.0 *Chemical Bounding: (6 hrs*)

2.1 Electrovalent, covalent and coordinate covalent bond

2.2 Hybridization(sp,sp2,sp3) ,Metallic bond(Drude and Lorentz theory), hydrogen bonding, (types and consequences)VSEPR(postulates and application)

2.3 Theory. Vander waal's forces truss, covalent Net-working

2.4 Crystal lattice, types of crystal.

(One short question-8 marks)

Books:

1. Selected topics of physical chemistry. By Motikaji staphit

3.0 Electrochemistry: (10 hrs)

3.1 Strong and weak electrolytes

3.2 Derivation of Ostward's dilution law and its limitations

3.3 p^H and p^H scale

3.4 Common ion effect in ionic equilibria

3.5 Boffer and p^H of buffer(Hendesion equation and its significance)

3.6 Electrolytic cell and galvanic cell,Salt bridge and its application.

3.7 Single electrode potential and normal hydrogen electrode, electro chemical series.

3.8 Derivation of Nernst equation and determination of electrode potential and cell potential under non Standard conditions.

3.9 Corrosion of metals and its prevention

(One long question-16 marks)

Books:

1. Selected topics of physical chemistry. By Motikaji staphit

4.0 Introductory Thermodynamics (8 hrs)

4.1 Internal energy, enthalpy, first law of thermodynamics

4.2 Relation between enthalpy change and change in internal energy.

4.3 Enthalpy of a reaction

4.4 Exothermic and endothermic reaction

4.5 Hess's law of constant heat summation and its application

4.6 Enthalpy change from bond energy

4.7 Molar heat capacities , relation between Cp & Cv

4.8 Variation of heat of rx^a with temp (kirchoff's equations)

4.9 Calorific values of foods and fuels

(One long question-16 or 24 marks)

Books:

1. Selected topics of physical chemistry. By Motikaji staphit

GROUP-B (Inorganic)

5.0 Co-ordination Complex : (5 hrs)

5.1 Double salt and complex salt

5.2 Postulates of Werner's theory of coordination compounds.

5.3 Nomenclature of co-ordination complexes

5.4 Electronic interpretation in co-ordination

5.5 Bonding in coordination complexes only valence bond theory

5.6 Application of valence bond theory octahedral complexes. tetrahedral complexes and square planer complexes

5.7 Application of co-ordination complexes

(One long question-16 marks)

Books:

1. Advanced Inorganic chemistry- Satyaprakash, R.D.Madan, G.D.Tuli

6.0 Transition Elements: (6 hrs)

6.1 Transition elements and their position in periodic table
d-block and Transition elements

6.2 Characteristics properties of 3^d -transition metals with reference to

(a) Electron configuration

(b) Metallic Character

(c) Variable Valency

(d) Complex Function

(e) Magnetic Properties

(f) Alloy formation

(g) Catalytic activity

(h) Colour

(One long question-16 marks)

Books:

1. Advanced Inorganic chemistry- Satyaprakash, R.D.Madan, G.D.Tuli

7.0 Chemistry of Silicons:(preparation,properties and uses):1 hrs
(One long question-8 marks)

Books:

1. Advanced Inorganic chemistry- Satyaprakash, R.D.Madan, G.D.Tuli

8.0 Environmental Chemistry: (4 hrs)

8.1 Introduction to environment

8.2 Types of pollution - Air, Water, Soil and noise & their possible remedies.
(One long question-8 marks)

Books:

1. Advanced Inorganic chemistry- Satyaprakash, R.D.Madan, G.D.Tuli
(One long question-8 marks)

GROUP C (Organic)

9.0 Types of Organic Reaction (4 hrs)

9.1 Substitution Reaction (SN1 and SN2 type)

9.2 Additional reaction

9.3 Elimination Reaction (E1 and e2 Reaction)

9.4 Rearrangement Reaction
(One long question-16 marks)

Books:

1. Organic Chemistry - B.S. Bahl

10.0 Stereochemistry (3 hrs)

10.1 Types of Stereo Isomerism

10.2 Optical and Geometrical Isomerism.
(One long question-8 marks)

Books:

1. Organic Chemistry - B.S. Bahl

11.0 Organometallic Compounds: Preparation, Properties and uses of Grignard's Reagent (1 hrs)
(One long question-8 or 16 marks)

Books:

1. Organic Chemistry - B.S. Bahl

12.0 Explosives (1 hrs)

12.1 Simple idea about low and high explosives

12.2 TNT & TNG and nitro cellulose preparation and uses
(One long question-8 marks)

Books:

1. Organic Chemistry - B.S. Bahl

13.0 Polymers and Polymerization (3 hrs)

13.1 Types of polymerization Reaction

13.2 Types of polymers

13.3 Synthetic fibres polystyrene teflon, terylene or dacrou
(One long question-8 or 16 marks)

Books:

1. Organic Chemistry - B.S. Bahl

BASIC MECHANICAL ENGINEERING
(BEG143 ME)

Semester II **Year I**

Teaching Schedule Hours/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	3	3	80	-	-	20	50	150	

COURSE OBJECTIVE: To make the students familiar with theoretical and applied field of mechanical engineering.

1. WORKSHOP TECHNOLOGY

1.1 Introduction & History of workshop **2**

1.2 Safety

1.2.1 Personal Protective Equipments (PPE)
1.2.2 Industrial health safety
1.2.3 Occupational health safety and its importance

1.3 Measuring and measuring tools **2**

1.3.1 Hand Tools
1.3.1.1 Ruler's scales
1.3.1.2 Depth gage
1.3.1.3 Micrometer
1.3.1.4 Vernier caliper
1.3.1.5 Dial indicators
1.3.1.6 STEEL TAPE
1.3.1.7 TRY SQUARE
1.3.1.8 "L" SQUARE
1.3.2 Accuracy and precision of measurement
1.3.3 Error and tolerance of measurement

1.4 Basic tools and Hand operations **5**

1.4.1 Introduction to bench work and bench tools
1.4.2 Basic Tools
1.4.2.1 Hammer
1.4.2.2 Screw drivers
1.4.2.3 Punches
1.4.2.4 Chisels
1.4.2.5 Files
1.4.2.6 Pliers
1.4.2.7 Wrenches
1.4.2.8 Hacksaws
1.4.2.9 Bench Vices
1.4.2.10 Hand Drills
1.4.2.11 Tap & Dies

1.4.3 Selection method of tools according to job

1.4.4 Methods of bench work

1.4.4.1 Sawing

1.4.4.2 Cutting

1.4.4.3 Folding

1.4.4.4 Filling

1.4.4.5 Bending

1.4.4.6 Marking

1.4.5 Safety

1.5 Machine Tools

1.5.1 Introduction to machining process

1.5.2 Lathe

1.5.2.1 Working principle

1.5.2.2 Operations

1.5.2.3 Lathe tools

1.5.2.4 Lathe Accessories

1.5.2.5 Types of Lathe

1.5.2.6 Feed, velocity and depth of cut

1.5.2.7 Modes of operation

1.5.3 Drilling

1.5.3.1 Working principle

1.5.3.2 Operations

1.5.3.3 Accessories

1.5.3.4 Types

1.5.3.5 Drill bits

1.5.3.6 Selection of proper drill bit for different w/p

1.5.3.7 Nomenclature of drill bit

1.5.4 Milling

1.5.4.1 Introduction

1.5.4.2 Working principle

1.5.4.3 Types

1.5.4.4 Operations

1.5.5 Introduction to Shapers and Grinders

1.5.6 Precautions and safety

1.6 Metal joining process **3**

1.6.1 Introduction to metal joining, purpose and scope

1.6.2 Methods of metal joining

1.6.2.1 Soldering

1.6.2.1.1 Principle

1.6.2.1.2 Uses

1.6.2.2 Brazing

1.6.2.2.1 Principle

1.6.2.2.2 Uses

1.6.2.3 Welding

1.6.2.3.1 Principle

1.6.2.3.2 Uses

1.6.2.3.3 Types
1.6.2.3.3.1 Gas welding
1.6.2.3.3.2 Arc welding
1.6.3 Precaution and safety

2 Applied Mechanics **14**

2.1 Introduction to Mechanics
2.2 Newton's laws and interpretation
2.3 Statics
2.3.1 Concept of particle, rigid body
2.3.1.1 Principles of forces, free body diagram
2.3.1.2 Equilibrium in two dimension
2.3.1.3 Moment of force
2.3.1.4 Calculation of reaction forces in two dimension
2.3.2 Centre of gravity
2.3.2.1 Centroid of lines, areas and volumes
2.3.2.2 C.G. of solids
2.3.3 Friction
2.8.3.1 Laws of friction

3 Angle of friction

3.1 Dynamics
3.1.1 Kinematics
3.1.1.1Rectilinear and curvilinear motion of particles
3.2 Kinetics

4 Work, Power, Energy, Conservation of Energy, Momentum

5 MECHANICS OF MATERIALS AND INTRODUCTION TO STRUCTURES 14

5.1 Introduction
5.1.1 Stress
5.1.2 Strain
5.1.3 Hooke's law
5.1.4 Stress-strain diagram
5.1.5 Axial deformation of bars
5.1.6 Poisson's ratio
5.1.7 Bulk Modulus
5.1.8 Thermal stress
5.1.9 Principal Stresses
5.1.9.1 Introduction to Principal stresses, principal planes and maximum shear stresses
5.1.9.2 Analytical and Graphical solutions-Mohr's circle
5.2 Torsion
5.2.1 Introduction
5.2.2 Torsion formula
5.2.3 Power transmitted by shaft
5.3 Bending
5.3.1 Introduction

5.3.2 Theory of simple bending
5.3.3 Position of NA
5.3.4 Flexure formula

5.4 Introduction to structures

5.4.1 Truss

5.4.1.1 Introduction
5.4.1.2 Types of truss
5.4.1.3 Stability and Determinacy of force on member of truss
5.4.1.4 Force calculation in truss members
5.4.1.5 Representation of force in each member of truss with direction.

5.4.2 Beam

5.4.2.1 Introduction & types of beam
5.4.2.2 Bending moments and shearing forces
5.4.2.3 Relation between shear force, bending moments and load
5.4.2.4 Shearing force and bending moment diagrams

Evaluation Scheme:

Chapter	***Sub-Chapter***	***Lecture hours***	***No. of questions***	***Marks***
Workshop Technology	Introduction, Safety	2	1	4
	Measuring and Gauging	2	1	4
	Basic tools and Hand operations	5	2	8
	Machine Tools	5	2	8
	Metal joining process	3	2	8
Applied mechanics	Concept of particle, rigid body and Forces	5	2	8
	Centre of gravity & Friction	4	2	8
	Kinematics	2	1	4
	Kinetics	3	1	4
Mechanics of Materials and Introduction to structures	Stress, Strain etc	4	2	8
	Torsion	2	1	4
	Bending	2	1	4
	Introduction to structures	6	2	8
Total		45	10*2=20	80

****There will be one extra question on short notes.***

ELECTRO-ENGINEERING MATERIALS

[BEG122 EL]

Semester II **Year I**

Teaching Schedule Hours/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	-	3	80			20		100	

COURSE OBJECTIVES: The objectives of this course to understand the properties of dielectric materials in static and alternating fields, to understand the properties of insulating and magnetic materials, and to understand the properties of conductors and semiconductors.

1.0 Theory of Metal:

1.1 Elementary Quantum Mechanical Ideas:

1.1.1 Brief Introduction of quantum mechanics
1.1.2 Meaning of Wave particle Duality
1 1.2.1Introduction of De Broglie's Equation
1.1.3 Introduction of Einstein's Equation
1.1.3.1 Introduction of Planck's equation
1.1.4 Introduction of Heisenberg's Uncertainty Principle

1.2 Energy Well Model of a Metal

1.2.1 Definition of Wave function
1.2.1.1Significance of wave function
1.2.1.2Meaning of probability density function
1.2.2 Schrodinger's Wave equation
1.2.3 Derivation of Schrodinger's time independent equation in one dimensional form and expressing it in three dimensional
1.2.3.1 Derivation of Schrodinger's time dependent equation in one dimensional form and expressing it in three dimensional
1.2.3.2 Normalization and Normalized wave function
1.2.3.2.1 Meaning of observables
1.2.3.2.2 Limitations of Schrodinger's wave equation
1.2.3.2.3 Operator Notation
1.2.3.2.3.1 Linear momentum operator
1.2.3.2.3.2 Energy operator
1.2.3.2.3.3 Position operator

1.3. Application of Schrodinger's equation :

1.3.1 Derivation of energy of an electron that is confined in an infinite potential well
1.3.2 Finite potential barrier:Formula for reflection and transmission coefficient for finite potential barrier
1.3.3 Tunneling

1.4. Free Electron Theory:General Concepts

1.4.1 Defination and Derivation of Fermi Energy
1.4.2 Meaning of degenerate state and Density of states
1.4.3 Derivation of density of states function
1.4.4 Formula for Fermi-Dirac Distribution Function
1.4.5 Meaning of Thermionic Emission and Work Function
1.4.6 Richardson—Dushman Equation (Derivation not required)
1.4.7 Introduction of Field Assisted Emission

1.4.8 Meaning of Schottky Effect
1.4.9 Meaning of contact potential
1.4.10 Meaning of Seebeck Effect

2.0Free Electron Theory of Conduction in Metals

2.1 Introduction to Crystalline structure

2.2.1Introduction to simple cubic structure and packing density
2.2.2 Introduction to face centred cubic structure and packing density
2.2.3 Introduction to Body Centerred Cubic structure and packing density
2.2.4 Band Theory of Solids :General Introduction
2.2.5 Derivation of Effective mass of an Electron
2.2.6 Thermal velocity of Electron
2.2.7 Expression for Electron mobility ,conductivity and resistivity
2.2.8 Tabular form for Physical properties of Some Common Metals

3.0 Conduction in Liquids and Gases

3.1 Mechanism of ionic conduction in electrolytes

3.1.1Relation that gives the dependence of ionic conductivity on the inverse of temperature
3.1.2Mechanism of electrical conduction in gases
3.1.2.1Townsend's primary current growth equation
3.1.2.2Townsend's secondary current growth equation
3.1.3 Electric Breakdown in Gases

4.0 Magnetic Materials and Superconductivity

4.1 Introduction of Magnetic Materials

4.1.1 Meaning of Magnetisation of Matter
4.1.2 Meaning of Magnetic Dipole Moment
4.1.3 Expression of Atomic Magnetic Moment
4.1.4 Expression of Magnetization vector
4.1.5 Magnetizing field or Magnetic Field Intensity
4.1.6 Magnetic Permeability and Susceptibility

4.2 Magnetic Materials Classification

4.2.1 List of Magnetic Materials
4.2.1.1 Short description of Ferromagnetism
4.2.1.2 Short description of Antiferromagnetism
4.2.1.3 Short description of Ferrimagnetism
4.2.1.4 Short description of Paramagnetism
4.2.1.5 Short description of Diamagnetism
4.2.2 Short description of Magnetic Domain Structure
4.2.3 Short description of Magnetic Domain
4.2.4 Short description of Domains Walls
4.2.5 Short description of Domain wall motion
4.2.6 Meaning of Soft and Hard Magnetic Materials: Their Examples and Application

4.3 Introduction to Superconductivity

4.3.1 Characteristic properties of superconductors
4.3.1.1.1 Electric properties: zero resistance

4.3.1.1.2 Magnetic properties: Meissner Effect
4.3.2. Short description of Critical magnetic field
4.3.3 Short description of Critical current density
4.3.4 Types of Superconductor
4.3.4.1 Type I superconductor
4.3.4.2 Type II superconductor

5.0 Dielectric Materials

5.1 Introduction of Dielectric Materials , Matter Polarisation and Relative Permittivity

5.1.1 Macroscopic Approach: Relative Permittivity
5.1.2 Introduction to Dipole Moment and Electronic Polarisation
5.1.3 Expression for Polarisation Vector P
5.1.4 Local Field E_{LOC} and derivation of Clausius–Mossotti Equation

5.2. Different Polarisation Mechanism

5.2.1.1 Short notes on : Electronic Polarisation
5.2.1.2 Short notes on : Ionic Polarisation
5.2.1.3 Short notes on : Orientational Polarisation
5.2.1.4 Short notes on : Interfacial Polarisation
5.2.1.5 Short notes on : Total Polarisation

5.3. Dielectric Strength and Breakdown

5.3.1.1 Introduction to Dielectric Contract
5.3.1.2 Introduction to Dielectric Losses Frequency and Temperature Effects

5.4. Dielectric Strength and Breakdown

5.4.1 Introduction to Dielectric Strength
5.4.2 Meaning of Dielectric Breakdown and Partial Discharge in Gases
5.4.3 Meaning of Dielectric Breakdown and Partial Discharge in Gases
5.4.4 Meaning of Dielectric Breakdown in Solids
5.4.5 Short notes on Ferro-Electricity and Piezoelectricity

5.5. Properties of Common Dielectric Materials like Glass, Porcelain, Polythene, PVC, Nylon, Bakelite, Mica, Transformer Oil, Paper etc in tabular form

6.0 Semi-Conducting Materials

6.1. Introduction of Semiconductor

6.1.1 Introduction of Electrons and Holes Conduction in Semiconductor
6.1.2 Electron and Hole Concentration

6.2. Expression for Fermi level and law of mass action and intrinsic carrier concentration

6.3 Derivation of the expression for Electron Concentration in intrinsic semiconductor

6.4 Derivation of the expression for Hole Concentration in intrinsic semiconductor

6.5 Introduction to Extrinsic Semiconductor: N-Type Semiconductor& P-Type Semiconductor,

6.6 Concept of Compensation Doping

6.7 Energy Band Diagram for Uniformly Doped and Graded P and N Type materials

6.8 Concept of Generation and Recombination of Electrons and Holes

6.9 Concept of Lifetime

6.10 Short introduction of Diffusion and Conduction Equations Mobility and Diffusion Coefficients of Electron and Holes, Steady State Diffusion and Continuity Equations

6.11 Ideal PN Junction: Introduction to the No Bias, Forward Bias and Reverse Bias PN Junction with Band Diagram

6.12 Introduction to Metal Semiconductor Contract

Reference Books:

1.0 R.A. Colcaser and S. Diehl-Nagle, "Materials and Devices for Electrical Engineers and Physicists", McGraw-Hill, New York, 1985

2.0 R.C. Jaeger, "Introduction to Microelectronic Fabrication—Volume IV", Addison—Wesley Publishing Company, Inc, 1988

3.0 S.O. Karsap, "Principle of Electrical Engineering Device", McGraw Hill, 2000

4.0 Bhadra Prasad Pokharel and Nava Raj Karki ,"Electrical Engineering Materials" Narosa Publishing House,2007

Evaluation Scheme

There will be 8 questions out of 9 to be attempted; covering all the chapters in the syllabus. Each question carries 10 marks including theory and numerical. The ninth question will be of short notes on any topic from the syllabus. The evaluation scheme for the questions will be as indicated in the table below:

Chapter	Hours	Mark distribution
Theory of Metal	10	20
Free Electron Theory of Conduction in Metals and Conduction in Liquids and Gases	8+3	10/15
Magnetic Materials and Superconductivity	11	20
Dielectric Materials	8	10
Semi-Conducting Materials	5	20/15

COMPUTATIONAL SYSTEM & DATABASE CONCEPT.
BEG170 CO

Semester II **Year I**

Teaching Schedule Hrs.s/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	2	3	80			20	50	150	

COURSE OBJECTIVES: After finishing this course, students will be able to design database systems, SQL language and other Matlab computational operation.

Chapter 1: Introduction to Mat lab (4hrs.)

1.1 Mat lab as {best} calculator
1.1.1 What is MATLAB?
1.1.2 Operations done on MATLAB
1.1.3 Scientific Calculator
1.2 Standard Mat lab windows
1.2.1 Basic
1.2.2 MATLAB Desktop
1.2.2.1 Command Window
1.2.2.2 MATLAB Prompt
1.2.2.3 Current Directory Pane
1.2.2.4 (File) Detail Pane
1.2.2.5 Work Space Pane
1.2.2.6 Command History Pane
1.2.3 Figure Window
1.2.4 Editor Window
1.2.5 MATLAB file types
1.3 Operations with variables
1.3.1 Naming Variables
1.3.2 Types of variables
1.3.3 Checking existence
1.3.5 Clearing Operations Application, Benefits of using OOP & Induction of the OOP
1.3.6 Using Help Command

Chapter 2: Arrays (4hrs.)

2.1 Introduction
2.1.1 Create row and column vectors (linspace, logspace)
2.1.2 Indexing (or subscripting)
2.2 Dimension
2.2.1 Size and length command, transpose
2.2.2 Delete and append row and columns
2.3 Operations
2.3.1 Arithmetic operations (array)
2.3.2 Left Division
2.3.3 Relational operators
2.3.4 Logical operators
2.3.5 Trigonometric, Exponential and complex functions
2.4 Special functions (eye, zeros, rand, ones, diag, randn, rot90, fliplr, flipud, tril, triu etc)

Chapter 3: Writing Script Files and Functions (4hrs.)

3.1 Revise MATLAB files and types of m files
3.2 Naming conventions
3.3 Script files vs function files
3.4 Logical variables and operators
3.5 Loops, branches and control flow
3.5.1 For loop and while loop
3.5.2 If and compound if
3.5.3 switch
3.5.4 break and return
3.6 Input/ output arguments
3.6.1 Different cases of executing function with input/ output arguments
3.7 Function visibility, path with example
3.8 Types of Functions
3.9 Interactive input (input, menu and error)

Chapter 4: Simple Graphics (4hrs.)

4.1 Introduction and importance of graphics
4.2 2D Plots
4.2.1 Style options
4.2.2 Labels, title, legend and other text objects
4.2.3 Axis control, zoom in and zoom out
4.2.4 Modifying plots with plot editor
4.2.5 Overlay plots
4.2.6 Specialized 2D plots (area, bar, barh, fill, fplot, hist, pie, polar, contour etc)
4.3 Introduction to 3D plot with some examples
4.4 Figure and sub plots
4.5 Creating Plots
4.5.1 Computing and Plotting Time Response
4.5.1.1 Root Locus Plots
4.5.1.2 Frequency domain plot
4.5.1.3 Bode Plot

Chapter 5: Data and Data Flow in MATLAB (5hrs.)

5.1 Data types
5.1.1 Matrix, string
5.1.2 Creating, accessing elements and manipulating of data of different types
5.2 File Input Output
5.2.1 Different File types (Matlab files, Text files, Binary files and Mixed text-binary files
5..2.2 Input output functions (fopen, fclose, fread, fgets, fscanf, fprintf etc)
5.3 Communication with external devices
5.3.1 Serial port and parallel port
5.3.1.1 Data Acquisition tool box and other tool box
5.3.1.2 Other functions: addline, digitalio, putvalue etc.

Chapter 6: Handle Graphics and user interface (6hrs.)

6.1 Predefined Dialogs (dialogs, warndlg, msgbox, printdlg etc)
6.2 Handle Graphics and Graphic objects
6.2.1 The object hierarchy
6.2.2 Object handle and object properties
6.3 Menu-driven programs
6.3.1 Pop-up menu, push button, radio button etc
6.4 Control and interactive graphics
6.5 large program logic flow

Chapter 7: Introduction to DBMS (3 hrs.)

7.1 Definition of database & database system
7.1.1 Data and information
7.1.2 Attributes of information
7.1.3 File based processing vs. database processing
7.2 Characteristics of database approach
7.3 Advantages and disadvantages using DBMS

Chapter 8: Concept of Database systems (5 hrs.)

8.1Schemas and Instances
8.1.1 Types of schemas
8.1.2 Organization and structure of DBMS
8.2 Database language and interfaces
8.2.1 Data Manipulation language
8.2.2 Data Definition Language
8.2.3 Front End Design (User interface)
8.2.4 Back End Design (DB design)
8.3 E-R model
8.3.1 Types of database models
8.3.2 Relational data model and RDBMS
8.3.3 Symbols used in ER diagram
8.3.4 ER diagrams with examples
8.4 Entity types Attributes, Keys, Relationship Types
8.4.1 Keys: Primary Key, Foreign Key
8.4.2 Relationship types: 1 to 1, 1 to many and many to many

Chapter 9: SQL & Normalization Steps (10 hrs.)

9.1 Introduction to SQL
9.1.1 SQL commands
9.1.1.1 DDL (Create, Alter, Drop)
9.1.1.2 DML (select, update, insert, delete)
9.2 Set operation
9.2.1 Union
9.2.2 Intersection
9.2.3 Except
9.3 Null values
9.4 Queries, Values
9.5Join relation
9.6 Pitfalls of relational model
9.7 Functional dependencies (1NF, 2NF, 3NF, BCNF)

Evaluation Scheme:

Chapter	Lecture Hours	No. of Questions	Mark distribution
Introduction to Mat lab	4	1	8
Arrays	4	0.5	4
Writing Script Files and Functions	4	1	8
Simple Graphics	4	1	8
Data and Data Flow in MATLAB	5	1	8
Handle Graphics and user interface	6	1	8
Introduction to DBMS	3	0.5	4
Concept of Database systems	5	1	8
SQL & Normalization Steps	10	2	16
Total	**45**	**10**	**70+10* =80**

* There will be one question on **short notes** from any topic in the syllabus.

Digital Logic
(BEG 139 EC)

Semester II **Year I**

Teaching Schedule Hours/Week			Examination Schedule						Total Marks	Remarks
			Final				Internal Assessment			
			Theory		Practical		Theory Marks	Practical Marks		
L	T	P	Duration	Marks	Duration	Marks				
3	1	2	3	80			20	50	150	

COURSE OBJECTIVES: To provide fundamental of Digital electronics digital computer design and application of digital devices .

1. **Numbering Systems: [Marks Weightage : 5%]**
   - 1.1 Introduction to the various number systems
     [1Hr]
     - 1.1.1 Binary Numbers
     - 1.1.2 Decimal Numbers
     - 1.1.3 Octal Numbers
     - 1.1.4 Hexadecimal Numbers
     - 1.1.5 BCD , ASCII, Gray code, Error Detection Code
   - 1.2 Comparison between Analog and Digital system
     [1Hr]
     - 1.2.1 Overview of digital systems
     - 1.2.2 Difference between analog and digital systems
     - 1.2.3 Disadvantage of Digital Systems
   - 1.3 Number Conversion
     [1 Hr]
     - 1.3.1 Number base Conversion between numbers systems as mentioned in section 1.1
     - 1.3.2 Fractional number in decimal system to binary form, octal form and vice versa
     - 1.3.3 r's and (r-1)'s Complement of Binary Numbers
   - 1.4 Binary Arithmetic
     [2 Hr]
     - 1.4.1 Addition of Binary Numbers
       - 1.4.1.1 Unsigned Numbers
       - 1.4.1.2 Signed Numbers (Using r's Complement Method)
       - 1.4.1.3 Fractional Numbers
     - 1.4.2 Multiplication of Binary Numbers
       - 1.4.2.1 1.4.2.1 Unsigned Numbers
       - 1.4.2.2 Signed Numbers
       - 1.4.2.3 Fractional Numbers

2. **Boolean Algebra and Logic Gates: [Marks Weightage 5-10%]**
   - 2.1 Logic Functions and Gates
     [1 Hr]
     - 2.1.1 Definition to binary logic [AND, OR, NOT] with graphic symbol, algebraic function, and truth table
     - 2.1.2 NAND, NOR, Ex-OR, Ex-NOR gate function with graphic symbol, algebraic function, and truth table
     - 2.1.3 Timing diagram implementation examples using logic gates

2.2 Boolean Algebra Basic Theory and Properties

[1 Hr]

2.2.1 Postulate 2, 3(cumulative), 4(distributive)

2.2.2 Theorems (1-6) [theorem 5 as De Morgan Theorem]

2.2.3 Proof of theorems(1-6)

2.3 Boolean functions

[1 Hr]

2.3.1 Definition of Boolean functions, its implementation using binary variables and logical operators

2.3.2 Truth Table implementation of Boolean function

2.4 Logical operations

[2 Hr]

2.4.1 Simplification of given Boolean functions into minimum no. of literals

2.4.2 De Morgan's theorem for extended no of variables

2.4.3 Concept of Min terms and Max terms

2.4.4 Product of Sum and sum of Product

2.5 Application of gates

[1 Hr]

2.5.1 Implementation of Boolean functions using logic gates

3. Simplification of Boolean Function [Marks Weightage 5-10%]

3.1 K-Map

[1Hr]

3.1.1 Introduction

3.2 Two, three and four variable maps

[1Hr]

3.2.1 Some examples without Don't care condition

3.2.2 Some examples with Don't care condition

3.3 Product of sum and sum of product simplification

[2Hr]

3.4 NAND and NOR implementation

[1Hr]

3.4.1 Implementation of Boolean function using NAND gate

3.4.2 Implementation of Boolean function using NOR gate

3.4.3 NAND and NOR as universal gate

4. **Combinational Logic: [Marks Weightage 25-30%]**

4.1 Design Procedure

[1Hr]

4.1.1 Introduction to combinational logic

4.1.2 Steps involving in designing a combinational logic

4.1.3 Some design examples

4.2 Adders

[1Hr]

4.2.1 Half adder: Truth table, Boolean function, and logic diagram

4.2.2 Full adder: Truth table, Boolean function, and logic diagram
4.2.3 Full adder implementation using half adder

4.3 Subtractors
[1Hr]
4.3.1 Half subtractors: Truth table, Boolean function, and logic diagram
4.3.2 Full subtractors: Truth table, Boolean function, and logic diagram

4.4 Binary Parallel Adder
[1Hr]
4.4.1 Introduction with block diagram
4.4.2 Some design examples

4.5 Decimal Adder
[1Hr]
4.5.1 BCD adder and its block diagram

4.6 Magnitude Comparator
[1Hr]
4.6.1 Design of 4-bit magnitude comparator

4.7 Decoders and Encoders
[2Hr]
4.7.1 Introduction to n-bit decoders and encoders, their truth table and logic diagram
4.7.2 Some design examples

4.8 Multiplexers and Demultiplexer
[2Hr]
4.8.1 Introduction, truth table and logic diagram of MUX, De-MUX
4.8.2 Some design examples

4.9 Read Only Memory
[1Hr]
4.9.1 Introduction, block diagram and logic diagram
4.9.2 Some Design Examples

4.10 Programmable logic array
[1Hr]
4.10.1 Introduction and block diagram
4.10.2 PLA table

5. Sequential Logic [Marks Weightage 15-20%]

5.1 Flip flops
[3hr]
5.1.1 Introduction to sequential logic
5.1.2 RS,D,JK and T flip flops with their operations, truth table and logic diagram
5.1.3 Latch

5.2 Triggering of flip flops
[2hr]
5.2.1 Positive and negative edge triggering
5.2.2 Master slave flip flop
5.2.3 Edge- Triggered Flip flop

5.3 Timing Diagram of flip flops
[2hr]

5.3.1 Timing diagram of RS,D,JK and T flip flop

6. Registers, Counters and Memory unit. [Marks Weightage 10-15%]

6.1 Registers : Introduction

[1Hr]

6.2 Shift Registers

[1Hr]

6.2.1 Serial in serial out shift registers with timing diagram

6.2.2 Serial in parallel out shift registers with timing diagram

6.2.3 Parallel in serial out shift registers with timing diagram

6.2.4 Parallel in parallel out shift registers with timing diagram

6.3 Ripple Counters

[1Hr]

6.3.1 Binary ripple counter

6.3.2 BCD ripple counters

6.4 Synchronous Counter

[2Hr]

6.4.1 Binary counter

6.4.2 Binary up down counter

6.4.3 BCD counter

6.4.4 Binary Counter with parallel load

6.4.5 Some design examples

6.5 Memory Unit

[1Hr]

6.5.1 Overview and block diagram only