L: 3	***MA301 Mathematics III***
T: 1	**Theory: 100 marks**
P: 0	**Sessional: 50 marks**
	Time: 3 hours

Unit I: Linear Algebra **40 Marks**

Some special type of matrices like Symmetric and skew-Symmetric, Hermitian and skew-Hermitian, Idempotent, Nilpotent, Involuntary, Orthogonal, Unitary and their properties. Triangular and Echelon form. Pivote elements, Trace, Differentiation and Integration of matrices. Inverse of a matrix. Theorems on inverse, elementary operations and elementary matrices, equivalent matrices, computation of inverse by elementary transformation. Reduction of matrices to triangular form and normal form. Inverse by partitioning. Rank of a matrix, evaluation of rank, theorems on rank.

Vector spaces and subspaces, linear independence, basis and dimension, row space, column space, null space, left null space, row rank, column rank, equality of row and rank of a matrix.

Solution of a system of non-homogenous linear equations, solution of system of homogenous linear equations. Consistency of a system of linear equations. Orthogonality, inner products, orthogonal vectors, orthogonal matrices, Gram-Schmidt Orthogonalization.

Unit 2: Statistics **40 Marks**

Probability, probability distributions and characteristics. Dispersion, skewness and kurtosis, random experiments and sample space. Definition of probability. Laws of probability, Baye's theorem, random variables. Probability distributions of a distcrete random variable, Mean and Variance of a discrete random variable. Probability distribution of a continuous random variable. Expectation and moments. Binomial distribution, Poisson's distribution and Normal distribution.

Elementary sampling theory. Sampling with and without replacement. Sampling distribution of mean proportion, sum and difference. Central limit theorem.

Statistical estimate theory. Biased and un-biased estimates, efficient estimate, point and interval estimates. Confidence limits for the estimates of mean, proportion, difference and sum.

Statistical decision theory. Statistical hypothesis. Null hypothesis. Test of significance involving normal distribution.

Unit 3: Laplace-Transformation **20 Marks**

Laplace transformation of elementary functions, inverse Laplace transform, Linearity, Laplace transform of derivatives and integrals, shifting Theorems, Laplace transform of unit step function, Dirac-delta function, Differentiation and integration of transforms, convolution, Application to differential equations.

Texts/References:

1. Advanced Engg. Maths, E. Kreyszig. Wiley Eastern Ltd.
2. Advanced Engg. Maths, Peter V. O. Neil. Thomson Books.
3. A Text Book on Engg. Maths, Bali, Tyenger. Laxmi Publishers.
4. Higher Engg. Maths, B.S. Grewal. Khanna Publishers.
5. Linear Algebra and it's Applications, Gilbert Strang. Thomson Books.
6. Linear Algebra, K. H. Hoffmaan. Prantice Hall.
7. Probability, Statistics & Queuing Theory, P. Kandasamy, K. Thilagavathi & K. Gunavathi. S. Chand.
8. Introduction to Probability & Statics, P. L. Meyer. Addison-Wesley.

L: 3	***ET 363 Network Theory-I***
T: 1	***Theory: 100 marks***
P: 3	**Sessional: 50 marks**
	Practical: 50 marks
	Time: 3 hours

Ohm's law and Kirchoff's laws

Application of the laws to circuit analysis; Mesh and Nodal method for formulation of network equations; Matrix methods of solving loop and node equations.

Sinusoidal Voltages and Currents

Representation in frequency domain; The phasor concept; Impedance, Admittance and their phasor diagram, Steady state response.

Network Theorems

Star and Delta conversion, Thevenin's and Norton's Theorem, Superposition and Maximum power transfer Theorem, Compensation Theorem, Reciprocity Theorem, Telegan's Theorem.

Fourier Analysis of Periodic Waveforms

Trigonometric and exponential series, Line spectrum, Analysis of common waveforms, Symmetry, R.M.S. value.

Two port Network

General principles; Z,Y and hybrid parameters, ABCD parameters, Network in tandem.

Transient Phenomena

Forcing functions--- impulse, step and ramp waveforms, solution of simple circuits using Laplace Theorem.

Coupled Circuits

Resonance- Series and parallel; Q factor; Analytical procedure for solving coupled circuits, Mutual Inductance, Co efficient of coupling; single tuned and double tuned circuits, Effects of over coupling and selectivity curves; Ideal transformer.

L: 3	***ET 364 Electronic Devices***
T: 1	***Theory: 100 marks***
P: 3	**Sessional: 50 marks**
	Practical: 50 marks
	Time: 3 hours

Conductors, Insulators and semiconductors

Effect of temperature on the conduction of electricity. Charge carriers in metals. The "bond" model of silicon charge carriers in semiconductors. Impurities and the effect of doping. n-type and p-type materials. Carrier generation, recombination and excess carriers. Transport of carriers by drift and diffusion. μ_P, D_P and diffusion length. Built-in electric field.

P-N Junction

Graded and Abrupt junction approximations. Forward and reversed biased diodes. Injection of carriers. Analysis of the passage of current through a p-n junction. Asymmetrically doped junction. Rectification of a.c. as an example of application.

The Bipolar Junction Transistor

Construction. The currents in a BJT and their relationship. Analysis of I_C - V_{CE} characteristics. The Ebers-Moll equations. The Early effect and a dc model for the BJT. Biasing and the analysis of a simple amplifier.

Small Signal Model

Small Signal Model of the BJT. The hybrid π model. Introduction to the Charge controlled model (Gummel-Poon). High frequency model.

The MOSFET

Construction. Analysis of I_D – V_{DS} characteristics. A dc model. Small Signal Model. High frequency model.

Text Books/references:

1. P.E. Gray and C.L. Searle-Electronic principles. John Wiley and Sons.
2. S.M. Sze- Physics of Semiconductor Devices. Willey Eastern.

L: 3	***CS 372 Advanced Computing***
T: 1	***Theory: 100 marks***
P: 3	**Sessional: 50 marks**
	Practical: 50 marks
	Time: 3 hours

Concepts of Pointers
Pointer types- their uses - dynamic memory allocation techniques - garbage collection - singly linked list - generic pointers.

Files
Files, opening- closing reading and writing- File attributes, File management

Basics of Object Oriented Programming(OOP)
Introduction to OOP- difference between OOP and procedure oriented programming – Classes, Objects and Methods – Overview of Inheritance and Polymorphism.

Object Oriented Design
Trends in software design- Notation of objects- Hybrid design method- Separation of responsibilities – Responsibility driven design- design phases and tools- step by step design – Grady Booch approach.

Data abstraction
Class definition – Control access to other functions – Different types of constructors – Destructors – Objects and classes – Dynamic creations and destructions of objects.

Inheritance
Derived classes – Syntax of derived classes – access to the base class - overloading inherited member functions – Multiple inheritance – Virtual base class virtual function and Polymorphism: Static and dynamic bindings – Virtual functions.

Polymorphism
Overloading functions and operators- Run time polymorphism – Overloading new and delete operators.

Generic classes in C++/JAVA
Necessities of templates – Generic class using Macros – Class templates – Function templates – Advance templates. Exception Handing in C++.
Benefits of exception handling – Troubles with standard C functions(setjmp amd long jmp) – Proposed Exception handling mechanism for C++.

Text Books and References:

1. Object Oriented Programming by Barkataki, PHI
2. Object Oriented Programming with C++ by E. Balaguruswamy, TMH.

3. Object Oriented Programming in Turbo C++ by R. Lafore, Galgotia, New Delhi
4. Object Oriented Analysis and Design with applications by Grady Booch, Benjamin/Cummings Publishing.
5. thinking in C- including Object Oriented Programming with C++ by P.B. Mahapatra, Wheeler Publishing

L: 3	EE 345 Electrical Engineering Material
T: 1	*Theory: 100 marks*
P: 0	Sessional: 50 marks
	Time: 3 hours

Structure of solids
Crystalline state of solids, systems and classes, Unit cell and space lattice, BCC, DC structure, Bragg's Law, Miller indices, Crystal imperfections, Grain boundaries

Dielectrics
(i)Properties of static field: Static dielectric constant , polarization , dielectric constant of monoatomic gases and polyatomic molecules, internal fields in solids and liquids, ferro electric materials, spontaneous polarization, piezo electricity.
(ii) Properties in alternating fields: Frequency dependence of electronic , ionic, polarizability, complex dielectric constant, dielectric loss, dipolar relaxation, break down in dielectrucs. General properties of common dieletrics(Electrical, Mechanical, Chemical and Thermal). Gaseous dielectrics, liquid insulating materials, solid insulating materials, films.

Magnetic properties of materials
Magnetization, Origin of permanent magnetic dipole movement, classification of magnetic materials, Dia, para, ferro, antiferro and ferri magnetism, magnetic anisotropy, magnetostriction soft and hard magnetic materials for electrical applications.

Conductors
Electron gas model of a metal , Relaxation time, collision time, mean free path, electron scattering and resistivity, heating effect of current, thermal conductivity, superconductivity, electrical conducting materials(Cu, Al) and their application. Mechanical properties like corrosion, solid crability, contact resistance.

Semiconductor
Density of carriers and intrinsic semiconductor and in N-type and P-type semiconductor, conductivity, Hall effect, drift and diffusion current, Einstein Relation.

Books:

1 Electrical engineering material by Dekker A. J(PHI)
2 A course in Electrical engineering material by Seth and Gupta

L: 3	**MA 376 Discrete Mathematics**
T: 1	***Theory: 100 marks***
P: 0	**Sessional: 50 marks**
	Time: 3 hours

Set theory
Sets, Functions, Relations, Partial Oroers, Lattices

Combinations
Permutations, Combinations, Partitions, Stirling numbers.

Recurrences
Surhmations, Generating Functions, Asymp[totic.

Graph Theory
Paths, Trees, Matchings, Colorability, Planarity.

A brief introduction to Algebra Structures
Homomorphism, Groups, Rings etc.

Proposition Logic
Well- formed formulas, Tautologies, Equivalence, Normal Forms.

A brief introduction to Predicate Logic
Predicate, puantifiers, predicate formula etc.

Textbooks & references:

1. Tremblay, J.P. and Mathur, R.P. , Discrete Mathematics with Applications to Computer Science. Mc Graw Hill International Edition, 1989.
2. Liu, C.L. Elements of Discrete Mathematics Mc Graw Hill International Edition, 1986.
3. Graham, R.L., Knuth, D.E. and Patashnik, O. Concrete Mathematics, 2/e Addison Wesley, 1994
4. Gersteing, J.L Mathematics Structures for Computer Science. 2/e Computer Science Press. 1983.
5. Grassman, W.K. and Tremblay, J.P. Logic and Discrete Mathematics: A Computer Science Perspective, Prentice Hall, 1996.

L: 0	***ET 367 Mini Project***
T: 0	**Total Marks: 50 marks**
P: 3	