

Multidisciplinary Course from the department for pool of the Courses in the University

(These courses are to be offered to students of different discipline/Subject)

Semester 1

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-1	Digital Electronics	242/MCA/MD101	2	1	-	2	1	-	3	15	35	5	20	75

Semester 2

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-2	Mathematics	242/MCA/MD201	2	1	-	2	1	-	3	25	50	-	-	75

Semester 3

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
MDC-3	Probability and Statistics	242/MCA/MD301	3	-	-	3	-	-	3	25	50	-	-	75

Course code				
Category	Multidisciplinary Courses (MDC)			
Course title	Digital Electronics			
Scheme and Credits	L	T	P	Credits
	2	1	-	3
Theory Internal	15			
Theory External	35			
Practical Internal	5			
Practical External	20			
Total	75			
Duration of Exam	3 HRS			

Note: The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper . The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Outline the general concepts and terminology related to logic gates, logic families, combinational and sequential circuits.

CO2: Discuss the basic analog/digital components and their interconnections in logic families and circuits.

CO3: Apply different methods/techniques to design various digital circuits.

CO4: Analyse day to day problems and industrial problems for their solutions using digital circuits. CO5: Contrast different types of digital circuits and their designing methods.

CO6: Design digital circuit for various practical problems.

UNIT I FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems - binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

UNIT II COMBINATIONALDIGITAL CIRCUITS

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer, Decoders, Adders, Subtractors, BCD arithmetic, carry look-ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT III SEQUENTIAL CIRCUITS AND SYSTEMS

A 1-bit memory, the circuit properties of the Bistable latch, the clocked SR flip-flop, J-K flip-flop, T flip-flop and D flip-flop, applications of flip-flops, shift registers, applications of shift registers, serial-to-parallel converter, parallel-to-serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip-flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT IV A/D AND D/A CONVERTERS

Digital to Analog converters: weighted resistor/converter, R-2-R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter.

TEXT AND REFERENCE BOOKS:

R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

M. M. Mano, "Digital logic and Computer Design", Pearson Education India, 2016.

A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Nasib Singh Gill and J B Dixit, "Digital Design and Computer Organization", University Science Press, New Delhi

Course code	BCA -103			
Category	MDC			
Course title	Mathematics -1			
Scheme and Credits	L	T	P	Credits
	2	1		3
TI	25			
TE	50			
TOTAL	75			
Duration of Exam				

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UNIT I

SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications. DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, Solving a system of linear equations. MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, solving system of linear equation Cramer’s Rule.

UNIT II

RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions. LIMITS & CONTINUITY: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity of a function at a Point, Continuity Over an Interval, Sum, product and quotient of continuous functions, Intermediate Value Theorem, Type of Discontinuities.

UNIT III

DIFFERENTIATION: Derivative of a function, Derivatives of Sum, Differences, Product & Quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain Rule and differentiation by substitution.

UNIT IV

INTEGRATION: Indefinite Integrals, Methods of Integration by Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Reduction Formulae for simple and Trigonometric Functions, Definite Integral as Limit of Sum, Fundamental Theorem of Integral Calculus, Evaluation of definite integrals by substitution, using properties of definite integral

Course code				
Category	MDC			
Course title	Probability and Statistics			
Scheme and Credits	L	T	P	Credits
	2		1	3
TI	25			
TE	50			
PI				
PE				
Duration of Exam				

NOTE: “The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each unit and the marks of each question from Question no.2 to 9 will be of 20% of total marks of Question paper . The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.”

Unit 1 :

Probability: Sample space, events, and probability ,rules of Probability,Equally likely outcomes. Combinatorics, Conditional Probability. Independence

Unit 2:

Discrete Random Variables and their Distributions: Distribution of a random variable, Distribution of a random vector, Expectation and variance , Families of discrete distributions, Continuous Distributions: Probability density , Families of continuous distributions, Central Limit Theorem, *Midterm*

Unit 3:

Computer Simulations and Monte Carlo Methods: Simulation of random variables, Solving problems by Monte Carlo methods,

Unit 4:

Introduction to Statistics: Population and sample, parameters and statistics, Simple descriptive statistics, Graphical statistics, Statistical Inference , Parameter estimation ,Confidence intervals, Unknown standard deviation, Hypothesis testing Bayesian estimation and hypothesis testing