School of Engineering
Bachelor of Computer Application

SISTER NIVEDITA UNIVERSITY

SYLLABUS

FOR

THREE YEARS BACHELOR DEGREE COURSE

IN

COMPUTER APPLICATION (BCA)

UNDER

UGC-CBCS SYSTEM

2019

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Bachelor of Computer Application

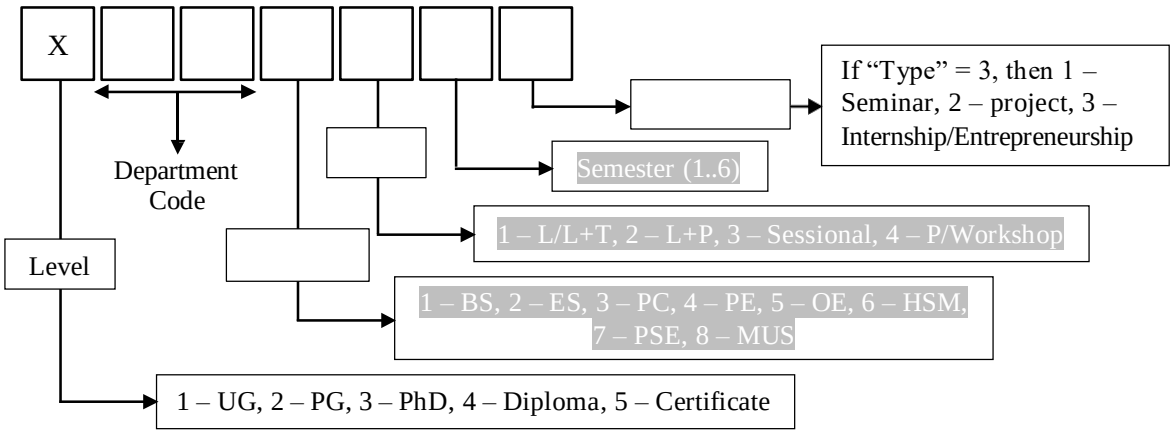
Credit Definition

Type	Duration (in Hour)	Credit
Lecture (L)	1	1
Tutorial (T)	1	1
Practical (P)	2	1

Category Codification with Credit Break up

Definition of Category	Code	No	Credit
Basic Science	BS	1	XX
Engineering Science	ES	2	XX
Professional Core	PC	3	XX
Professional Elective (Discipline Specific)	PE	4	XX
Open Elective (General Elective)	OE	5	XX
Humanities & Social Science including Management	HSM	6	XX
Project Work / Seminar / Internship / Entrepreneurship	PSE	7	XX
Mandatory / University Specified (Environmental Sc. / Induction Training / Indian Constitution / Foreign language)	MUS	8	XX
Total			**XXX**

Subject Codification Nomenclature



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SEMESTER: I

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Digital Electronics	1203211	6	3	1	4
2	Introduction to C-Programming	1203212	6	4	0	4
3	Mathematics- I	1191111	4	3	1	0
4	Generic Elective	*	4	3	1	0
5	Communicative English	1216115	2	2	0	0
6	Mentored Seminar – I	1207311	1	1	0	0
7	Foreign Language – I (German /Spanish /Japanese)	1278111/ 1278112/ 1278113	2	2	0	0
Total Credit			25			

SYLLABUS OUTLINE:

PAPER NAME: Digital Electronics

UNIT I: TOPICS	Number Systems & Codes (6L) Decimal Number, Binary Number, Octal Number, Hexadecimal Number, Conversion – Decimal to Binary, Binary to Decimal, Octal to Binary, Binary to Octal, Hexadecimal to Binary, Binary to Hexadecimal, Octal to Binary to Hexadecimal, Hexadecimal to Binary to Octal; Floating Point Number Representation, Conversion of Floating Point Numbers, Binary Arithmetic, 1's and 2's Complement, 9's and 10's Complement, Complement Arithmetic, BCD, BCD addition, BCD subtraction, Weighted Binary codes, Non-weighted codes, Parity checker and generator, Alphanumeric codes
UNIT II: TOPICS	Logic Gates (2L) OR, AND, NOT, NAND, NOR, Exclusive – OR, Exclusive – NOR, Mixed logic

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UNIT III: TOPICS	Boolean Algebra (4L) Boolean Logic Operations, Basic Law of Boolean Algebra, Demorgan's Theorem, Principle of Duality
UNIT IV: TOPICS	Minimization Techniques (5L) Sum of Products, Product of Sums, Karnaugh Map (up to 4 variables)
UNIT V: TOPICS	Multilevel Gate Network (3L) Implementation of Multilevel Gate Network, Conversion to NAND-NAND and NOR-NOR Gate Networks
UNITVI: TOPICS	Arithmetic Circuits (5L) Half Adder, Full Adder, Half Subtractor, Full Subtractor, Carry Look Ahead Adder, 4-Bit Parallel Adder
UNITVII: TOPICS	Combinational Circuits (5L) Basic 2-input and 4-input multiplexer, Demultiplexer, Basic binary decoder, BCD to binary converters, Binary to Gray code converters, Gray code to binary converters, Encoder
UNITVIII: TOPICS	Sequential Circuits (5L) Introduction to sequential circuit, Latch, SR Flip Flop, D Flip Flop, T Flip Flop, JK Flip Flop, Master Slave Flip Flop
UNITIX: TOPICS	Basics of Counters (2L) Asynchronous (Ripple or serial) counter, Synchronous (parallel) counter
UNIT X: TOPICS	Basics of Registers (3L) SISO, SIPO, PISO, PIPO, Universal Registers

Suggested Books:

1. Digital Circuit & Design, Salivahan,VIKAS
2. Digital Design, M. Morris. Mano & Michael D. Ciletti, PEARSON
3. Fundamentals of Digital Circuits; Anand Kumar; PHI
4. Digital Electronics; Tokheim; TMH
5. Digital Electronics; S. Rangnekar; ISTE/EXCEL

PAPER NAME: Introduction to C-Programming

UNITI: TOPICS	Overview of C: History of C, Importance of C, Structure of a C Program. Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant. Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(),putch(), putchar(), puts().
UNITII: TOPICS	Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity. Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto

	statement
UNITIII: TOPICS	Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement. Functions: Definition, prototype, passing parameters, recursion. The C Preprocessor.
UNITIV: TOPICS	Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime. Arrays: Definition, types, initialization, processing an array, passing arrays to functions, Strings & arrays. Pointers: Pointers and address, Pointers and function arguments, Pointers and arrays, Address arithmetic, Character pointer arrays, Pointers and functions, Pointer arrays, Pointers to pointers, Multidimensional arrays, initialization of pointer arrays, Pointer vs. Multi-dimensional arrays, Command-line arguments, Pointer to functions.
UNITV: TOPICS	Structures and I/O: Basic of structures, Structures and functions, Arrays of structures, Pointers to structures, Self- referential structures, Table lookup, Type of, unions and bit-fields. Input and Output: Standard input and output, formatted output-Print, Variable length argument lists, File access, File descriptor, Low level I/O- Read and Write, Open, Create, Close.

Suggested Books:

1. Programming with C, Gottfried, TMH
2. Practical C Programming, Oualline, SPD/O'REILLY
3. Let us C-YashwantKanetkar.
4. Programming in C- Ashok N Kamthane
5. The C Programming Lang., Pearson Ecl – Dennis Ritchie.

DSE – 1: Mathematics –I

UNIT I (10 lectures)

Matrix Algebra- Introduction & definition, properties of matrix, special type of matrices, arithmetic of matrices, symmetric & skew-symmetric matrices, orthogonal matrices, singular and non-singular matrices with their properties, Trace of a matrix, Eigen value and Eigen vector computation, Inverse of a matrix and related properties, numerical problems solving.

UNIT II (10 lectures)

Differential Calculus: Review of limit, continuity and differentiability, L-Hospital rule, Leibnitz rule, successive differentiation, Rolle's theorem, Mean value theorem, Taylor series expansion, Function of several variables, Euler's theorem on homogeneous function, Partial differentiation, Jacobian, Maxima and Minimum of functions of one and two variables.

UNIT III (10 lectures)

Integral Calculus: Review of integration and definite integral. Differentiation under integral sign, double integral, change of order of integration, transformation of variables. Beta and Gamma functions: properties and relationship between them.

UNIT IV (10 lectures)

Differential Equations: Exact differential equations, integrating factors, change of variables, Total differential equations, Differential equations of first order and first degree, Differential equations of first order but not of first degree, Equations solvable for x, y, q, Equations of the first degree in x and y, Clairaut's equations. Higher Order Differential Equations: Linear differential equations of order n, Homogeneous and non-homogeneous linear differential equations of order n with constant coefficients.

SUGGESTED READING:

- Lay David C: Linear Algebra and its Applications, Addison Wesley, 2000.
- Schaum's Outlines: Linear Algebra, Tata McGraw-Hill Edition, 3rdEdition, 2006.
- Searle S.R: Matrix Algebra Useful for Statistics. John Wiley &Sons., 1982.
- Gorakh Prasad: Differential Calculus, PothishalaPvt. Ltd., Allahabad (14th Edition - 1997).
- Gorakh Prasad: Integral Calculus, PothishalaPvt. Ltd., Allahabad (14th Edition - 2000).
- David C. Lay: Linear Algebra and Its Applications, 3rdEdn, Pearson Education, Asia.

SEMESTER: II

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Computer Architecture	1201221	6	3	1	4
2	Data Structures with Python	1201222	6	4	0	4
3	Mathematics II	1192121	4	3	1	0
4	Generic Elective	*	4	3	1	0
5	Environmental Science	1154121	2	2	0	0
6	Mentored Seminar – II	1205121	1	1	0	0
7	Foreign Language – II (German /Spanish /Japanese)	1276121/ 1276122/ 1276123	2	2	0	0
Total Credit		25				

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SYLLABUS OUTLINE:

PAPER NAME: Computer Architecture

UNITI: TOPICS:	1.Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2.Complements – 1's complement, 2' complement, 9's complement, 10' complement, (r-1)'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation
UNITII: TOPICS:	Computer arithmetic (5L) 1. Addition algorithm of sign magnitude numbers, 2. Subtraction algorithm of sign magnitude numbers, 3. Addition algorithms of signed 2's complement data, 4. Subtraction algorithms of signed 2's complement data, 5. Multiplication algorithm, Booth's algorithm, 6. Division algorithm
UNITIII: TOPICS	Register transfer and micro-operations (5L) 1. Register transfer language, 2. Register transfer, 3. Bus system for registers, 4. Memory transfers– memory read, memory write, 5. Micro operations – register transfer micro operations, arithmeticmicro operations, logic micro operations, shift micro operations, 6. Binary adder, binary adder, subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, 7. One stage logiccircuit, 8. Selective set, Selective complement, Selective clear, Mask, Insert, Clear
UNITIV: TOPICS	Basic Computer organization and design (4L) 1. Instruction codes, 2. Direct address, Indirect address & Effective address, 3. List of basiccomputer registers, 4. Computer instructions: memory reference, register reference & input – outputinstructions, 5. Block diagram & brief idea of control unit of basic computer, 6. Instruction cycle
UNITV: TOPICS	Micro programmed control (2L) 1. Control memory, 2. Address sequencing, 3. Micro program examples
UNITVI: TOPICS	Central processing unit (5L) 1. General register organization, 2. Stack organization, Register stack, Memory stack, Stackoperations – push & pop, 3. Evaluation of arithmetic expression using stack, 4. Instruction format, 5.Types of CPU organization (single accumulator, general register & stack organization) & example oftheir instructions, 6. Three, two, one & zero address instruction, 7. Definition and example of datatransfer, data manipulation & program control instructions, 8. Basic idea of different typesofinterrupts (external, internal & software interrupts), 9. Difference between RISC & CISC
UNITVII: TOPICS	Pipeline and vector processing (3L) 1. Parallel processing, 2. Flynn's classification, 3. Pipelining, Example of pipeline, space timediagram, speedup, 4. Basic idea of arithmetic pipeline, example of floating point addition/ subtractionusing pipeline
UNITVIII: TOPICS	Input – output organization (6L) 1. Peripheral devices, 2. Input – output interface, 3. Isolated I/O, Memory mapped I/O, 4.Asynchronous data transfer: strobe & handshaking, 5. Programmed I/O, 6. Interrupt initiated I/O, 7.Basic idea of DMA & DMAC 8. Input – output processor

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UNITIX: TOPICS	Memory organization (6L) 1. Memory hierarchy, 2. Main memory definition, types of main memory, types of RAM, ROM,difference between SRAM & DRAM, 3. Cache memory, Cache memory mapping – Direct,Associative, Set Associative, 4. CAM, hardware organization of CAM, 5. Virtual memory, mappingusing pages, page fault, mapping using segments, TLB, 6. Auxiliary memory, diagrammaticrepresentation of magnetic disk & hard disk drive, 7. Definitions of seek time, rotational delay,access time, transfer time, latency

Suggested Books:

1. Computer System Architecture, M. Morris Mano, PEARSON
2. Computer Organization & Architecture –Designing For Performance, William Stallings, PEARSON
3. Computer Architecture & Organisation, J.P. Hayes, TATA MCGRAW HILL
4. Computer Organization and Architecture, T. K. Ghosh, TATA MCGRAW-HILL
5. Computer Architecture, BehroozParhami, OXFORD UNIVERSITY PRESS

PAPER NAME: Data Structure with Python

UNITI: TOPICS	Introduction to Python (12L) Introduction to Python Python variables, expressions, statements: Variables,Keywords,Operators&operands,Expressions ,Statements, Orderof operations, String operations, Comments, Keyboard input, Example programs Functions: Type conversion function, Math functions, Composition of functions, Defining own function, parameters, arguments, Importing functions, Example programs
UNITII: TOPICS	Conditions & Iterations (8L) Conditions: Modulus operator, Boolean expression, Logical operators, if, if-else, if-elif-else, Nested conditions, Example programs. Iteration: while, for, break, continue, Nested loop, Example programs
UNITIII: TOPICS	Recursion, Strings, List, Dictionaries, Tuples Recursion:Python recursion, Examples of recursive functions, Recursion error, Advantages & disadvantages of recursion Strings:Accessing values in string, Updating strings, Slicing strings, String methods – upper(), find(), lower(), capitalize(), count(), join(), len(), isalnum(), isalpha(), isdigit(), islower(),isnumeric(), isspace(), isupper() max(), min(), replace(), split(), 2.5 Example programs List:Introduction, Traversal, Operations,Slice, Methods, Delete element, Difference between lists and strings. Dictionaries: Introduction, Brief idea of dictionaries & lists Tuples: Introduction, Brief idea of lists & tuples, Brief idea of dictionaries & tuples.
UNIT IV: TOPICS	Data Structure using Array (4L) Stack, queue, circular queue, priority queue, dequeue and their operations and applications.

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UNITV: TOPICS	Searching and Sorting (6L) Searching: linear search, Binary search, their comparison, Sorting: insertion sort, Selection sort.Quick sort, Bubble sort Heap sort, Comparison of sorting methods , Analysis of algorithm,complexity using big 'O' notation
UNITVI: TOPICS	Linked List (4L) Linear link lists, doubly linked lists, stack using linked list, queue using linked list, circular linked listand their operations and applications.
UNITVII:	Trees (5L)
TOPICS	Binary trees, binary search trees, representations and operations, thread representations, sequentialrepresentations, B tree , B+ tree,
UNITVIII: TOPICS	Graphs (5L) Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal: Depth first search and Breadth first search. SpanningTrees, minimum spanning Tree, Shortest path algorithm
UNITIX: TOPICS	Hashing (4L) Definition, Hashing functions, Load factor and collision, open addressing (linear probing) andchaining method to avoid collision

Suggested Books:

1. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser
2. Data Structures and Algorithmic Thinking with Python, NarasimhaKarumanchi
3. Python Data Structures and Algorithms: Benjamin Baka

PAPER NAME: Mathematics-II

Unit 1

Theory of equations, statement of the fundamental theorem of algebra and its consequences. Relation between roots and coefficients or any polynomial equations. Solutions of cubic and biquadratic equations when some conditions on roots of equations are given. Evaluation of the symmetric polynomials and roots of cubic and biquadratic equations.

Unit 2

Determinant and its properties (up to third order), Minor and cofactors, Matrices, addition, multiplication and transpose of a matrix, Symmetric and skew-symmetric matrices and their properties, Adjoint, Inverse matrix, Rank of matrix, Solution of linear system by using Gaussian elimination, LU decomposition method.

Vector space, Dimension, orthogonality, projections, Gram-Schmidt orthogonalization. Eigenvalue and Eigen vectors; positive definite matrices. Linear transformations, Hermitian and unitary matrices.

Unit 3

Physical significances of grad, div, curl. Line integral, surface integral, volume integral-physical examples in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof]. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.

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Unit 4

Differentiation of complex functions, Cauchy Riemann equations, Analytic functions, Harmonic functions, determination of harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithmic) and their properties; Conformal mappings, Mobius transformations and their properties. Contour integrals, Cauchy Goursat theorem (without proof), Cauchy integral formula (without proof), Liouville's theorem and Maximum Modulus theorem (without proof); Taylor's series, Zeros of analytic functions, Singularities, Laurent's series; Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

References

1. Higher Algebra, S. K. Mapa, Levant Books.
2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd.ISBN 9789380673677
3. Integral Calculus including Differential Equations, Das and Mukherjee, U N Dhar Pvt. Ltd.ISBN: 978-9380673882
4. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd. ISBN:9789380673448,
5. Advanced Engineering Mathematics, E Kreyszig, Wiley

SEMESTER: III

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Object Oriented Programming with C++	1201231	6	4	0	4
2	Database Management System	1201232	6	4	0	4
3	Operating System & System Programming	1202233	6	3	1	4
4	Generic Elective	*	4	3	1	0
Total Credit		22				

SYLLABUS OUTLINE:

PAPER NAME: Object Oriented Programming with C++

UNITI: TOPICS	Concepts of OOP (3L) Introduction OOP, Procedural vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP
UNITII: TOPICS	C++ Basics (3L) Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures
UNITIII: TOPICS	C++ Functions (5L) Simple functions, Call and return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions

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UNITIV: TOPICS	Objects and Classes (8L) Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion
UNITV: TOPICS	Inheritance (8L) Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class
UNITVI: TOPICS	Polymorphism (6L) Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism
UNITVII: TOPICS	I/O and File Management (5L) Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O,manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files
UNITVIII: TOPICS	Templates, Exceptions and STL (2L) About template, Function templates and class templates, Introduction to exception, try-catch-throw, Overview and use of Standard Template Library

Suggested Books:

1. Object Oriented Programming With C++, E Balagurusamy, TMH
2. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia
3. The Compete Reference C++, Herbert Schlitz, TMH

PAPER NAME: Database management System

UNITI: TOPICS	Database System Concepts & Architecture: Data Independence, Schemas, Instances, Database Languages, Database System Environments Data Models, Basic Structure of Oracle System, Storage Organization in Oracle.
UNITII: TOPICS	Data Modelling: Use of High –level Conceptual Data Models, ER Diagrams, Subclasses, Superclasses and Inheritance, Specialization & Generalization, Conceptual Object Modeling using UML ClassDiagrams, Knowledge Representation Concepts, Exercises.
UNITIII: TOPICS	Relational Data Model: Relational constraints, domain constraints, key constraints referential integrity Constraints, relational algebra, fundamental operations of relational algebra & theirImplementation, interdependence of operations, example queries.
UNITIV: TOPICS	ER and EER to Relational Mapping: Mapping EER model concepts to relation, tuple relational calculus, domain relationalCalculus queries.
UNITV: TOPICS	Database Design: Functional dependencies, irreducible sets of dependencies, loss less decomposition, 1st, 2^{nd}& 3^{rd} NF, dependency preservation, Boyce Codd NF, Multivalued Dependency & 4th NF, join Dependency & 5 NF, domain key normal form, restriction –union normal form,Denormalization.
UNITVI: TOPICS	Query Processing And Optimization: SQLBasicQueries in SQL, Subqueries, Retrieving a Query Plan – Table Space

	Span & I/O, IndexScan, Equal Unique Index Lookup, Clustered vs. Non Clustered Indexing, Index Only Scan,Methods for Joining Tables –Nested Loop Join Merge Join, Hybrid Join, Multiple table Join,Transforming Nested Queries to Joins, Object Relational SQL, Procedural SQL, Introductionto Embedded SQL.
UNITVII: TOPICS	Transaction: Schedules,Serializability, Precedence Graph, Concurrency Control Techniques,Implementation of Transaction in Programs, Cursors and Transaction, Dynamic SQL,Locking Levels of Isolation, Recovery, Checkpoints.

Suggested Books:

1. Fundamental of Database Systems- ElmasriNavathe- Pearson Education Asia
2. Database- Principles, Programming and Performance- Parick O' Neil Elizabeth O'Niel, Harcort Asia PTE Limited
3. An Introduction to Database Systems- C.J.Date, Addison Wesley, Pearson EducationPress
4. Database System Concepts- Abraham Silberschat, Henry F. Korth, S.Sudarshan, Tata McGraw Hill.

DSE – 3: Operating System & System Programming

UNITI: TOPICS	Introduction (3L) Importance of OS, Basic concepts and terminology, Types of OS, Different views, Journey of acommand execution, Design and implementation of OS
UNITII: TOPICS	Process (10L) Concept and views, OS view of processes, OS services for process management, Scheduling algorithms, Performance evaluation; Inter-process communication and synchronization, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks
UNITIII: TOPICS	Storage Management (8L) Memory Management- Backward, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging.
UNITIV: TOPICS	File-System Interface and Implementation (6L) File Concept, Access Methods, Directory Structure, Protection, File-System Structure, File-System Implementation, Directory Implementation; Allocation Methods, Free-Space Management.
UNITV: TOPICS	Mass-Storage Structure (4L) Disk Structure; Disk Scheduling; Disk Management; Swap-Space Management
UNITVI: TOPICS	Assemblers: Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86 , Algorithm of Single Pass Assembler, Multi-Pass Assemblers
UNITVII: TOPICS	Compilers: Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation,

	Compilation of Expression, Compilation of Control Structure, Code Optimization

Suggested Books:

1. Operating Systems, Galvin, John Wiley
2. Operating Systems ,Milankovic, TMH
3. An Introduction to Operating System, Bhatt,PHI
4. Modern Operating System, Tannenbaum,PHI
5. Guide to Operating Systems, Palmer, VIKAS
6. Operating Systems, Prasad, Scitech

SEMESTER: IV

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Computer Graphics & Multimedia	1201241	6	4	0	4
2	Software Engineering	1201141	6	3	1	4
3	Numerical Analysis	1192241	6	4	0	4
4	Natural language processing with Python	1201242	6	3	1	4
Total Credit		24				

SYLLABUS OUTLINE:

PAPER NAME: Computer Graphics & Multimedia

UNITI: TOPICS	Overview of Graphics Systems: Video Display Devices, Refresh Cathode Ray Tubes, Raster-Scan and Random-Scan Systems, Input Devices, Hard-Copy Devices and Graphics Software.
UNITII: TOPICS	Output Primitives: Points, Line Drawing Algorithms (DDA and Bresenham's Line Drawing Algorithm), Circle- Generating Algorithms (Bresenham's and Midpoint Circle Algorithms), Ellipse-Generating Algorithms(Midpoint Ellipse Algorithm only), Filled- Area Primitives: Scan –Line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm.
UNITIII: TOPICS	Two Dimensional Geometric Transformations: Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shear, Transformations between Coordinates Systems, Raster Methods for Transformations.
UNITIV: TOPICS	Two-Dimensional Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line(Cohan-0Sutherland Line Clipping and Liang –Barsky Line Clipping) and Polygon Clipping(Sutherland-Hodgeman Polygon Clipping).
UNITV:	Multimedia Systems Design:

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TOPICS	Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Data Interface Standards, the Need for Data Compressions, Multimedia Database.
UNIT VI: TOPICS	Data & File Format Standards: Rich –Text Format, TIFF File Format, RIFF, MIDI File Format, JPEG DIB File Format, MPEG Standards.

Suggested Books:

1. D.Hearn& M. P. Baker -Computer Graphics C Version, 2nd Edition Pearson Education, New Delhi, 2006
2. J. F. KoegelBuferd -Multimedia Systems, Pearson Education, New Delhi, 2006
3. R.A. Plastock et.al. - Computer Graphics (Schaums Outline Series), 2nd Edition, TMH, New Delhi, 2006.
1. J.D.Foley- Computer Graphics, 2nd Edition, Pearson Education, New Delhi, 2004

PAPER NAME: Software Engineering

UNITI: TOPICS	(12L) Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS Development Life Cycles- SDLC and its phases Models- Waterfall, Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS System analysis- DFD, Data Modeling with ERD
UNITII: TOPICS	(9L) Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree. Concept of User Interface, Essence of UML. CASE tool.
UNITIII: TOPICS	(9L) Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing, acceptance testing Design methodologies: top down and bottom up approach, stub, driver, black box and white box testing.
UNITIV: TOPICS	(10L) ERP, MRP, CRM, Software maintenance SCM, concept of standards (ISO and CMM)

Suggested Books:

1. System analysis and design, Igor Hawryszkiewycz, Pearson
2. Analysis and design of Information System, V Rajaraman, PHI
3. Software Engineering, Ian Sommerville, Addison-Wesley.

DSE4 – Numerical Analysis

Unit 1: Representation of numbers:

Round-off error, truncation error, significant error, error in numerical computation.

Unit 2: Solution of transcendental and algebraic equations:

Bisection, Regula-falsi, Fixed point, Newton Rephson.

Unit 3: Interpolation:

Newton's forward, backward, Lagrange's and divided differences.

Unit 4: Numerical differentiation:

Methods based on interpolations.

Unit 5: Numerical Integration:

Trapezoidal, Simpson's 1/3 rd. rule.

Unit 6: Solution of linear equations:

Direct methods – Gauss elimination, LU decomposition, Iteration methods- Jacobi, Gauss-Seidel.

Unit 7: Ordinary differential equations:

Single step method - Euler method, Runge-Kutta Method, multistep method.

Unit 8: Approximations:

Least square polynomial approximation.

Reference Books:

1. A. Gupta and S.C. Bose: Introduction to Numerical Analysis, Academic Publisher 3rded, 2013
2. M.K. Jain, S.R.K.Iyenger and R.K. Jain: Numerical methods for scientific and Engineering Computations, New Age Internationals (P) Ltd, 1999.

Component: Lab Numerical Analysis Credits: 2

List of practical (using C/ C++)

1. **Solution of transcendental and algebraic equations:**
   a) Bisection method
   b) Newton Raphson method
2. **Numerical Integration**:
   a) Trapezoidal Rule
   b) Simpson's one third rule
3. **Solution of ordinary differential equations:**
   a) Euler method
   b) RungeKutta method (order 4)

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SYLLABUS OUTLINE:

PAPER NAME: Natural Language Processing with Python

Module-I: Introduction to NLP **[15L]**
Introduction to NLP, Origins and challenges of NLP, Sentence Segmentation, Tokenization, Parts of Speech assessment, Stemming, Lemmatization, Stop Words.

Module-II: Semantics and Word Vectors [**6L**]
Overview of semantics, Word vectors, Word embeddings, Representation of words and phrases.

Module-III: N-Gram Language Model **[4L]**

Introduction to N-Gram, N-Gram probability estimation and perplexity, Smoothing technique.

Module-IV: Text Representation: [**5L**]
Bag-of-word: TF/IDF, Count vector, Vector space Model, Latent semantic Analysis, Word embedding, Word2Vec, Glove, fastText, Sentence embedding Technique: Doc2Vec.

Module-V: Parsing: [**6L**]
Syntax Parsing, Grammar formalisms and treebanks, Parsing with Context Free Grammars, Features and Unification, Statistical parsing and probabilistic CFGs.

Module-VI: Applications of NLP: **[12L]**
Information Extraction, Introduction to Named Entity Recognition and Relation Extraction, Question Answering, Text Summarization, Dialog System, Machine Translation.
Pedagogy for Course Delivery*: Hybrid Mode (Offline Class/Presentation/Video/MOODLE/NPTEL)*
List of Professional Skill Development Activities (PSDA)*:NA*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

Text & Reference books:

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
2. Anne Kao and Stephen R. Poteet (Eds), "Natural Language Processing and Text Mining", Springer-Verlag London Limited 2007.

Reference Books:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall, 2008.
2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin/Cummings publishing company, 1995.
3. Gerald J. Kowalski and Mark. T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.

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SEMESTER: V

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	GUI Programming with .NET	1201251	6	4	0	4
2	Computer Networks	1201252	6	3	1	4
3	Programming with JAVA	1201152	6	4	0	4
4	Project – I	1201451	6	0	0	12
Total Credit		24				

SYLLABUS OUTLINE:

PAPER NAME: GUI Programming with .NET

UNITI: TOPICS	Visual Basic .NET and the .NET Framework (8L) Introduction to .net framework -Features, Common Language Runtime (CLR), Framework Class Library (FCL), Visual Studio.Net – IDE, Languages Supported, Components, Visual Programming, VB.net- Features, IDE- Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window
UNITII: TOPICS	Elements of Visual Basic .net (8L) Properties, Events and Methods of Form, Label, Text Box, List Box, Combo Box, Radio Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, Scroll bar, Group Box, ToolTip Timer
UNITIII: TOPICS	Programming in Visual basic .net (8L) TOPICS: Data Types, Keywords, Declaring Variables and Constants, Operators, Understanding Scope and accessibility of variables, Conditional Statements- If-Then, If-Then-Else, Nested If, Select Case, Looping Statement- Do loop, For Loop, For Each-Next Loop, While Loop, Arrays- Static and Dynamic
UNITIV: TOPICS	Functions, Built-In Dialog Boxes, Menus and Toolbar (8L) Menus and toolbars- Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes – Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, Input Box, Message Box, Interfacing With End user- Creating MDI Parent and Child, Functions and Procedures- Built-In Functions- Mathematical and String Functions, User Defined Functions and Procedures
UNITV: TOPICS	Object Oriented Programming (8L) Object Oriented Programming- Creating Classes , Objects, Fields, Properties, Methods, Events , Constructors and destructors, Exception Handling- Models, Statements, File Handling- Using File Stream Class, File Mode, File Share, File Access Enumerations, Opening or Creating Files with File Stream Class, Reading and Writing Text using StreamReader and StreamWriter Classes, Data Access withADO.Net – What are Databases?, Data Access with Server Explorer, Data Adapter and Data Sets, ADO.NET Objects and Basic SQL. Connection with SQL Server

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Suggested Books:

1. Fred Barwell, " Professional VB.NET" ,2nd edition, WROX Publication
2. Jesse Liberty," Learning Visual Basic. NET",O'RELLY
3. Paul Vick," The Visual Basic .Net Programming Language"

PAPER NAME: Computer Networks

UNITI: TOPICS	Data Transmission Basic Concepts and Terminology: Data Communication Model,Communication Tasks, Parallel & Serial Transmission, Transmission Models, Transmission Channel, Data Rate, Bandwidth Signal Encoding Schemes, Data Compression, Transmission Impairments, Layering and Design Issues, OSI Model, Services and Standards.
UNITII: TOPICS	Computer Network: Network Topology, Performance of Network, Network Classification, Advantages & Disadvantages of Network, Transmission Media (guided and unguided), Network Architecture, OSI Reference Model, TCP/IP, SNA and DNA.
UNITIII: TOPICS	Data Line Devices: Modems, DSL, ADSL, Multiplexer and Different MultiplexingTechniques: (FDM, TDM).
UNITIV: TOPICS	Data Link Layer: Need for Data Link Control, Frame Design Consideration, Flow Control &Error Control (Flow control mechanism, Error Detection and Correction techniques) Data Link Layer Protocol, HDLC.
UNITV: TOPICS	Network Layer: Routing, Congestion control, Internetworking principles, InternetProtocols (IPv4 packet format, Hierarchal addressing sub netting, ARP, PPP), Bridges, Routers.
UNITVI: TOPICS	Physical Layer: Function and interface, physical layer standard, null modem.
UNITVII: TOPICS	Local Area Network: Definition of LAN, LAN topologies, Layered architecture of LAN, MAC, IEEE standard. Ethernet LAN, CSMA, CSMA/ CD, Token passing LAN.
UNITVIII: TOPICS	Network Security: Security Requirement, Data encryption strategies, authenticationprotocols, Firewalls.
UNITIX: TOPICS	Basic Applications: Telnet, FTP, NFS, SMTP, SNMP and HTTP.

Suggested Books:

1. B. Fourauzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill
2. William Stallings- Data & Communications, 6th Edition, Pearson Education
3. Tanenbaum- Computer Networks, 3rd Edition, PHI, New Delhi.

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PAPER NAME: Programming with JAVA

UNITI: TOPICS	Java Evolution and Overview of Java Language: How Java differs from C and C++,Java and Internet, Java and World Wide Web, Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.
UNITII: TOPICS	Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types,Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.
UNITIII: TOPICS	Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity, Mathematical Functions.
UNITIV: TOPICS	Decision Making and Branching: Introduction, Decision Making with if Statement, Simpleif Statement, The if... else Statement, Nesting of if ... else Statements, The else if Ladder, The switch Statement, The ?: Operator.
UNITV: TOPICS	Decision Making and Looping: Introduction, The while Statement, The do Statement,The for Statement, Jumps in Loops, Labelled Loops.
UNITVI: TOPICS	Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, AddingMethods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.
UNITVII: TOPICS	Arrays, String and Vectors: Arrays, One-Dimensional Arrays, Creating an Array, Two-Dimensional Arrays, Strings, Vectors, Wrapper Classes.
UNITVIII: TOPICS	Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces,implementing Interfaces, Accessing Interface Variables.
UNITIX: TOPICS	Packages: Putting Classes Together: Introduction, Java API Packages, Using systemPackages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes.
UNITX: TOPICS	Multithreaded Programming: Introduction, Creating Threads, Extending the ThreadClass, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization.
UNITXI:	Managing Errors and Exceptions:

TOPICS	Introduction, Types of Errors, Exceptions, Syntax ofException Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.
UNITXII: TOPICS	Applet Programming: Introduction, How Applets Differ from Application, Preparing toWrite Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More About Applet Tag, Passing Parameters to Applets.

Suggested Books:

1. Let Us JAVA 2 Edition, YashavantKanetkar, BPB Publications
2. Programming with JAVA 5th Edition, E Balagurusamy, TMH
3. Java - The Complete Reference, Herbert Schildt

PAPER NAME: Project – I

SEMESTER: VI

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Elective -I	1202261	4	3	1	0
2	Elective -II	1202262	4	3	1	0
2	Project Work II/ Dissertation	1201461	6	0	0	12
Total Credit		14				

Elective -I

- Big data
- Cyber security
- Cloud Computing

Elective -II

- Deep Learning
- Parallel Computing for AI & ML
- Machine Vision
- UNIX and Shell Programming

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SYLLABUS OUTLINE:

UNIX and Shell Programming

UNITI: TOPICS	Introduction to UNIX Operating System (8L) 1. Introduction to UNIX UNIX operating system, UNIX architecture: Kernel and Shell, Files and Processes, System calls, Features of UNIX, POSIX and single user specification, Internal and external commands 2. Utilities of UNIX Calendar (cal), Display system date (date), Message display (echo), Calculator (bc), Password changing (password), Knowing who are logged in (who), System information using uname, File name of terminal connected to the standard input (tty) 3. UNIX file system File system, Types of file, File naming convention, Parent – Child relationship, HOME variable, inode number, Absolute pathname, Relative pathname, Significance of dot (.) and dotdot (..), Displaying pathname of the current directory (pwd), Changing the current directory (cd), Make directory (mkdir), Remove directories (rmdir), Listing contents of directory (ls), Very brief idea aboutimportant file systems of UNIX: /bin, /usr/bin, /sbin, /usr/sbin, /etc, /dev, /lib, /usr/lib, /usr/include, /usr/share/man, /temp, /var, /home
UNITII: TOPICS	Files (8L) 1. Ordinary file handling Displaying and creating files (cat), Copying a file (cp), Deleting a file (rm), Renaming/ moving a file (mv), Paging output (more), Printing a file (lp), Knowing file type (file), Line, word and character counting (wc), Comparing files (cmp), Finding common between two files (comm), Displaying file differences (diff), Creating archive file (tar), Compress file (gzip), Uncompress file (gunzip), Archive file (zip), Extract compress file (unzip), Brief idea about effect of cp, rm and mv command on directory 2. File attributes File and directory attributes listing and very brief idea about the attributes, File ownership, File permissions, Changing file permissions – relative permission & absolute permission, Changing file ownership, Changing group ownership, File system and inodes, Hard link, Soft link, Significance of file attribute for directory, Default permissions of file and directory and using umask, Listing of modification and access time, Time stamp changing (touch), File locating (find)
UNIT III: TOPICS	Shell and Process (8L) 1. Shell Interpretive cycle of shell, Types of shell, Pattern matching, Escaping, Quoting, Redirection, Standard input, Standard output, Standard error, /dev/null and /dev/tty, Pipe, tee, Command substitution, Shell variables 2. Process Basic idea about UNIX process, Display process attributes (ps), Display System processes, Process creation cycle, Shell creation steps (init ->getty -> login -> shell), Process state, Zombie state, Background jobs (& operator, nohup command), Reduce priority (nice), Using signals to kill process,

	Sending job to background (bg) and foreground (fg), Listing jobs (jobs), Suspend job, Kill a job, Execute at specified time (at and batch)
UNITIV: TOPICS	Customization and Filters (8L) 1. Customization Use of environment variables, Some common environment variables (HOME, PATH, LOGNAME, USER, TERM, PWD, PS1, PS2), Aliases, Brief idea of command history 2. Filters Prepare file for printing (pr), Custom display of file using head and tail, Vertical division of file (cut), Paste files (paste), Sort file (sort), Finding repetition and non- repetition (uniq), Manipulating characters using tr, Searching pattern using grep, Brief idea of using Basic Regular Expression (BRE), Extended Regular Expression (ERE), and egrep, grep –E
UNITV: TOPICS	Shell script & System Administration (8L) 1. Introduction to shell script Simple shell scripts, Interactive shell script, Using command line arguments, Logical operator (&&, ||), Condition checking (if, case), Expression evaluation (test, []), Computation (expr), Using expr for strings, Loop (while, for), Use of positional parameters 2. System Administration Essential duties of UNIX system administrator, Starting and shutdown, Brief idea about user account management (username, password, home directory, group id, disk quota, terminal etc.)

Suggested Books:

1. UNIX-Concepts & Applications, Sumitava Das, TMH
2. Learning UNIX Operating System, Peek, SPD/O'REILLY
3. Understanding UNIX, Srirengan, PHI
4. Essentials Systems Administration, Frisch, SPD/O'REILLY

CLOUD COMPUTING

Course Code:

Credit Units: 04

Course Objective: This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:

Module-I: **INTRODUCTION**

Cloud Computing Overview Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

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Module-II: **CLOUD ENABLING TECHNOLOGIES**
Cloud Insights Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Basics of Virtualization – Types of Virtualization, Virtualization Structures – Tools and Mechanisms, Virtualization of CPU – Memory, Limitations – Sensitive information - Application development-security level of third party - security benefits, Virtualization Support and Disaster Recovery. Regularity issues: Government policies.
Module-III: **CLOUD ARCHITECTURE, SERVICES AND STORAGE**
Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.
Module-IV: **RESOURCE MANAGEMENT AND SECURITY IN CLOUD**
Inter Cloud Resource Management, Resource Provisioning and Resource Provisioning , Global Exchange of Cloud Resources , Security Overview – Cloud Security Challenges , Software-as-a-Service, Software-as-a-Service, Security Governance , Virtual Machine Security , IAM – Security Standards
Module-V: **CLOUD TECHNOLOGIES AND ADVANCEMENTS**
Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Examination Scheme:
Text & References:
Text: • Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
• Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
References: • Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
• Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Deep Learning

The main objective of this course is to make students comfortable with tools and techniques required in handling large amounts of datasets. They will also uncover various deep learning methods in NLP, Neural Networks etc. Several libraries and datasets publicly available will be used to illustrate the application of these algorithms. This will help students in developing skills required to gain experience of doing independent research and study.
Module 1 : Introduction
Introduction to Deep Learning (DL):Drawbacks of machine learning;From Spring to Winter of AI; Biological inspiration;McCulloch Pitts Neuron; The Perceptron;Power of

a network of Perceptrons; The Sigmoid Neuron; Power of a network of Sigmoid neurons
Module 2 : Neural Networks
Feedforward Neural Networks: Learning parameters; Backpropagation (BP); Gradient calculation: output units, hidden units, parameters

Module 3 : Deep Neural Network
Training deep neural networks: Optimizers: gradient descent and its variations; Train error v/s test error; Dataset augmentation; Early stopping; Dropout; Initialization strategies; Batch Normalization; More activation functions
Module 4 : Convolutional Neural Networks (CNN):

The convolution operation: kernel, padding,
stride; The pooling operation: max pooling, average pooling; BP in CNN; Success stories on the ImageNet dataset;Transfer learning
Module 5 : Sequence Modelling: Recurrent Neural Network (RNN); Types of RNN; Drawbacks
of RNN: vanishing gradient and exploding gradient; BP through time; Long Short Term Memory Network
Module 6: Applications:

Computer Vision, Natural Language Processing

Books
1. Goodfellow, I, Bengio, Y, and Courville, A (2016): Deep Learning. MIT Press
2. Josh Patterson, Adam Gibson "Deep Learning: A Practitioner's Approach", O'ReillyMedia, 2017
3. Francois Chollet "Deep Learning with Python", Manning Publications, 2017.
4. Nikhil Buduma and Nicholas Locascio. 2017. Fundamentals of Deep Learning:Designing Next-Generation Machine Intelligence Algorithms (1st. ed.). O'Reilly Media,Inc.

CYBER SECURITY

Course Objective: This course provides the foundation for understanding the key issues associated with protecting information assets. The purpose of the course is to provide the student with an overview of the field of information security and assurance.

UNIT I INTRODUCTION :Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security -Organizational Implications.

UNIT II HACKERS AND CYBER CRIMES Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats - Sniffing - Gaining Access - Escalating Privileges - Executing Applications - Hiding Files - Covering Tracks - Worms - Trojans - Viruses - Backdoors

UNIT III ETHICAL HACKINGAND SOCIAL ENGINEERING Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration 22 Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defence Strategies.

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UNIT IV CYBER FORENSICS AND AUDITING Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.

UNIT V CYBER ETHICS AND LAWS Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.

Books for References: 1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., "Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats", Apress, 1st Edition, 2015. 2. Nina Godbole, Sumit Belapure, "Cyber Security", Willey, 2011. 3. Roger Grimes, " Hacking the Hacker" , Wiley, ist Edition, 2017. 4. Cyber Law By Bare Act, Govt of India, It Act 2000

Big Data

Course Objective : To understand the need of Big Data, challenges and different analytical architectures 2.Installation and understanding of Hadoop Architecture and its ecosystems 3.Processing of Big Data with Advanced architectures like Spark. 4. Describe graphs and streaming data in Spark.

Module:1 Introduction To Big Data 3hours Data Storage and Analysis - Characteristics of Big Data – Big Data Analytics - Typical Analytical Architecture – Requirement for new analytical architecture – Challenges in Big Data Analytics – Need of big data frameworks

Module:2 Hadoop Framework 6 hours Hadoop – Requirement of Hadoop Framework - Design principle of Hadoop –Comparison with other system - Hadoop Components – Hadoop 1 vs Hadoop 2 – Hadoop Daemon's – HDFS Commands – Map Reduce Programming: I/O formats, Map side join, Reduce Side Join, Secondary sorting, Pipelining MapReduce jobs

Module:3 Hadoop Ecosystem 3 hours Introduction to Hadoop ecosystem technologies: Serialization: AVRO, Co-ordination: Zookeeper, Databases: HBase, Hive, Scripting language: Pig, Streaming: Flink, Storm

Module:4 Spark Framework 4 hours Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features.

Module:5 Data Analysis with Spark Shell 4 hours Writing Spark Application - Spark Programming in Scala, Python, R, Java - Application Execution.

Module:6 Spark SQL and GraphX 5hours SQL Context – Importing and Saving data – Data frames – using SQL – GraphX overview – Creating Graph – Graph Algorithms. Module:7 Spark Streaming 3 hours Overview – Errors and Recovery – Streaming Source – Streaming live data with spark Module:8 Recent Trends in Big Data Analytics

Reference Books

1. Mike Frampton, “Mastering Apache Spark”, Packt Publishing, 2015.
2. TomWhite,“Hadoop:TheDefinitiveGuide”,O’Reilly,4thEdition,2015.
3. Nick Pentreath, Machine LearningwithSpark,PacktPublishing,2015.
4. Mohammed Guller, Big Data Analytics with Spark, Apress,2015
5. Donald Miner, Adam Shook, “Map Reduce Design Pattern”, O’Reilly, 2012

Machine Vision

Prerequisite: Robotic Sensor, Vision System, Automated Scanning/Tracking system Rationale: Machine vision system is the best part automation field. The concepts of vision system are vitally important to the robotics and automation engineer.

Module 1 Vision System: Basic Components – Elements of visual perception, Lenses: Pinhole cameras, Gaussian Optics- cameras-computer interfaces.

Module 2 Vision Algorithms: Fundamental Data Structures: Images, Regions, Sub-pixel Precise Contours – Image Enhancement : Gray value transformations, image smoothing, Fourier Transform – Geometric Transformation - Image segmentation – Segmentation of contours, lines, circles and ellipses – Camera calibration – Stereo Reconstruction.

Module 3 Object Recognition: Object recognition, Approaches to Object Recognition, Recognition by combination of views – objects with sharp edges, using two views only, using a single view, use of dept values.

Module 4 Applications: Transforming sensor reading, Mapping Sonar Data, Aligning laser scan measurements - Vision and Tracking: Following the road, Iconic image processing, Multiscale image processing, Video Tracking - Learning landmarks: Landmark spatiograms, K-means Clustering, EM Clustering.

Module 5 Robot Vision: Basic introduction to Robotic operating System (ROS) - Real and Simulated Robots - Introduction to OpenCV, Open NI and PCL, installing and testing ROS camera Drivers, ROS to OpenCV - The cv_bridge Package.

Reference Books: 1. Rafael C. Gonzalez and Richard E.woods, “Digital Image Processing”, Addition - WesleyPublishing Company, New Delhi, 2007. 2. Shimon Ullman, “High-Level Vision: Object recognition and Visual Cognition”, A Bradford Book,USA, 2000. 3. R.Patrick Goebel, “ ROS by Example: A Do-It-Yourself Guide to Robot Operating System – Volume I”, A Pi Robot Production, 2012. 4. Carsten Steger, Markus Ulrich, Christian Wiedemann, “Machine Vision Algorithms and Applications”, WILEY-VCH, Weinheim,2008. 5. Damian m Lyons,“Cluster Computing for Robotics and Computer Vision”, World Scientific, Singapore, 2011.

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Parallel Computing

Course Objective:

Parallel programming is ubiquitous in today's multi-core era and solves many real-world scientific problems. Massive parallelism entails significant hardware and software challenges. The course is structured so that the participants understand challenges in efficient execution of large-scale parallel applications. The assignments will be designed to strengthen understanding of parallel programming. The course will also involve a research-based project component.

Course Contents:

S. No.	Broad Title	Topics
1.	Introduction	Why parallel computing? Shared memory and distributed memory parallelism, Amdahl's law, speedup and efficiency, supercomputers.
2.	Message passing	MPI basics, point-to-point communication, collective communication, synchronous/asynchronous send/recv, algorithms for gather, scatter, broadcast, reduce.
3.	Parallel communication	Network topologies, network evaluation metrics, communication cost, routing ininterconnection networks, static and adaptive routing, process-to-processor mapping.
4.	Performance	Scalability, benchmarking, performance modeling, impact of network topologies, parallel code analysis and profiling.
5.	Designing parallel codes	Domain decomposition, communication-to-computation ratio, load balancing, adaptivity, case studies: weather and material simulation codes.
6.	Parallel I/O	MPI I/O algorithms, contemporary large-scale I/O architecture, I/O bottlenecks.
7.	Additional topics	Job scheduling, RDMA, one-sided communication, NVM, extreme scale computing: issues and trends.

Books

1. Peter S Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.
2. DE Culler, A Gupta and JP Singh, Parallel Computer Architecture: A Hardware/Software Approach Morgan-Kaufmann, 1998.
3. Marc Snir, Steve W. Otto, Steven Huss-Lederman, David W. Walker and Jack Dongarra, MPI - The Complete Reference, Second Edition, Volume 1, The MPI Core.
4. William Gropp, Ewing Lusk, Anthony Skjellum, Using MPI : portable parallel programming with the message-passing interface, 3rd Ed., Cambridge MIT Press, 2014.
5. A Grama, A Gupta, G Karypis, and V Kumar, Introduction to Parallel Computing. 2nd Ed., Addison-Wesley, 2003.

Reference Books:

1. JL Hennessy and DA Patterson, Computer Architecture: A Quantitative Approach, 4th Ed., Morgan Kaufmann/Els India, 2006.
2. MJ Quinn, Parallel Computing: Theory and Practice, Tata McGraw Hill, 2002.

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GENERIC ELECTIVES (GE)

COURSES OFFERED BY DIFFERENT DEPARTMENTS AS GENERAL ELECTIVE SUBJECT FOR UNDER GRADUATE STUDENTS

DEPARTMENT	COURSE
ENGLISH	THE STUDY OF SCRIPTS (FOR ODD SEMSTER) TRANSLATION STUDIES (FOR EVEN SEMESTER)
COMPUTER SCIENCE	BASICS OF COMPUTER SCIENCE (FOR FIRST SEMESTER) DATA STRUCTURE (FOR 4TH SEMESTER) OBJECT ORIENTED PROGRAMMING (FOR 5TH SEMESTER) DATABASE MANAGEMENT SYSTEMS (DBMS) (FOR 6TH SEMESTER)
BIOTECHNOLOGY	BIOTECHNOLOGY IN HUMAN WELFARE (FOR ODD SEMESTER) FUNDAMENTALS OF DEVELOPMENTAL BIOLOGY (FOR EVEN SEMESTER)
MASS COMUNICATION AND JOURNALISM	BASICS OF JOURNALISM(FOR ODD SEMESTER) SCIENTIFIC REPORT WRITING AND EDITING (FOR EVEN SEMESTER)
HOSPITALITY AND TOURISM ADMINISTRATION	HOSPITALITY & TOURISM ENTREPRENEURSHIP (FOR ODD SEMESTER) PERSONALITY DEVELOPMENT (FOR EVEN SEMESTER)
MICROBIOLOGY	MOLECULAR SECRETS OF LIFE (FOR ODD SEMESTER) INTRODUCTION TO FORENSIC SCIENCE (FOR EVEN SEMESTER)
ECONOMICS	ECONOMIC HISTORY OF INDIA (FOR ODD SEMESTER) ECONOMIC DEVELOPMENT (FOR EVEN SEMESTER)
CHEMISTRY	FUNDAMENTALS OF CHEMISTRY(FOR ODD SEMESTER) STEREOCHEMISTRY AND CONFORMATION (FOR EVEN SEMESTER)
PHYSICS	WHERE DO YOU LIVE? A JOURNEY THOUGH OUR GORGEOUS UNIVERSE (FOR ODD SEMESTER) HISTORY AND PHILOSOPHY OF SCIENCE
MANAGEMENT	ORGANIZATIONAL BEHAVIOR (FOR ODD SEMESTER) BUSINESS STRATEGY (FOR EVEN SEMESTER)

DEPARTMENT: ENGLISH

COURSE: GE – THE STUDY OF SCRIPTS (FOR ODD SEMSTER)

1. Course Objectives:

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This course intends to acquaint the students with the ancient scripts of the bronze as well as the iron age civilizations that are awaiting decipherment, especially the Linear A and B scripts, the enigmatic Indus Valley Civilization Script (IVCS), the Rongorongo script and the Egyptian script that however, has been deciphered. It will trace the history of the study of these scripts and shall look into the modern computational methods and the latest discoveries in the field of computational and cognitive linguistics that have been used to study them.

2. Course Outcomes:

After taking this course, students are expected to gain an understanding of the basic orthography as well as the real problems that lie in the path of decipherment of the same and also understand the various research methods employed to study them.

Unit I: The History of Language Decipherment:

Decipherment and the underlying theory, first and second order language, the concept of underlying language, famous linguists, structuralism and structural linguistics, Chomsky and the cognitive revolution, ethnography, archaeology and the study of scripts.

Unit II: Scripts: An Introduction

Linear A and B, Rongorongo, IVC, Egyptian.

Unit III: The Indus Valley Script—Detailed Study

Problems posed by short inscriptions and orthography, the proto-Dravidian Hypothesis, IravathanMahadevan's concordance of the IVC signs, AskoParpola and his hypothesis, Nisha Yadav's and Rajesh Rao's observations, the study of select seals from Dholavira and Harappa, the Dholavira sign board, the possible reasons for the decline of the script, IVC painted pottery, the 'Pashupatinath' seal, the dancing girl and female iconography, trade practices and the IVC script, the anti-literate hypothesis: S. Farmer *et al.* , animal figurines in the seals, seals found in Mesopotamia: issues.

Unit IV: Modern techniques to study the IVC script:

The idea of conditional entropy, recent advances in computational linguistics, the use of sound silencing, AI and decipherment, the Chennai team and deep neural networks, efforts in IIT Kharagpur to understand the disappearance of the civilization and the script through climate modelling simulation, other relevant techniques.

Select Readings:

1) Robinson, Andrew, *Lost Languages: The Enigma of World's Undeciphered Scripts.* New York: Mac-Graw-Hill, 2005.
2) Shendge, Malati J, *Unsealing the Indus Script: Anatomy of its Decipherment.* New Delhi: Atlantic, 2010.
3) Yule, George, *The Study of Language.* New Delhi: CUP, [2007?].

COURSE: GE – TRANSLATION STUDIES (FOR EVEN SEMESTER)

1. Course Objectives:

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After taking this course, the students are expected to understand the nuances of translation and the act of transcreation itself that often takes into account the fact that the translator has to possess a sound understanding of both the language and the general vocabulary of the target text and the source text.

2. **Course Outcomes**:

After going through the course, the students are expected to understand the theory and the praxis of the very enterprise of transcreation.

Unit I: Transcreation: Theory and History

The history of translation and the emergence of translation studies, translation as a discipline in ancient Greece and Rome, translation in India, the theory of translation, translation or transcreation?

Unit II: Translation: Issues at Work

Translation and the issue of vocabulary, the 'loss' of meaning during the act of translation, 'good' and 'bad' translation, the issue of copyright © in translation, translation as a profession.

Unit III: Transcreation : Practice 1

Translating from select texts into English (from Bengali to English and Hindi to English and vice versa).

Unit IV: Transcreation: Practice 2

The concept of computer/ machine translation and the use of software and translation blogs and services.

Select Readings:

Munday, Jeremy. *Introducing Translation Studies: Theories and Applications.* New York; London: Routledge, 2012.

DEPARTMENT: COMPUTER SCIENCE

COURSE: GE – BASICS OF COMPUTER SCIENCE (FOR FIRST SEMESTER)

Unit 1: Data representation (4 Lectures):

Data vs Information: Bit, byte number system: binary, octal, hexadecimal, 1's, 2's complement arithmetic, digital logic: AND, OR etc.

Unit 2: General problem Solving concepts (6 Lectures):

Algorithm and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops, time & space complexity; Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C*).*

Unit 3: Human Computer Interface: (7 Lectures):

Types of software, operating system as user interface, utility programs; Computing systems: hardware & software, Architecture & organization history: von Neumann Architecture:

memory, processor, I/O; BIOS, Booting, Application software, system software, introduction of programming languages: brief overview of Pascal, FORTRAN, and BASIC.

Unit 4: Devices:(6 Lectures):
Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Unit 5: Computer Organisation and Architecture: **(5 Lectures):**
C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.

Unit 6: Overview of Emerging Technologies: (4 Lectures)
Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

Unit 7: Use of Computers in Education and Research: **(4 Lectures)**
Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, Mathematica etc.

Reference Books:
1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007.

COURSE: GE – DATA STRUCTURE (FOR 4TH SEMESTER)

(36 LECTURES); L-T-P: 3-0-2

Module 1: (8 Lectures)
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Module2: (10 Lectures)
StacksandQueues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues

Module3: **(10 Lectures)**
LinkedLists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees

Module4: (10 Lectures)

SortingandHashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort;

Suggested books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni, Computer Science Press.

Suggested reference books:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

COURSE: GE – OBJECT ORIENTED PROGRAMMING (FOR 5TH SEMESTER)

(30 Lectures); L-T-P: 3-0-2

Module 1: Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction function. Implementing operations, illustrated by the Text example. Features of object-oriented programming. Encapsulation, object identity, polymorphism – but not inheritance. 1 Inheritance in OO design. [10L]
Module 2: Design patterns. Introduction and classification. The iterator pattern. Model-view-controller pattern. Commands as methods and as objects. Implementing OO language features. Memory management. Generic types and collections [12L]
Module 3: The software development process. The concepts should be practised using Java. [8L]
Suggested books
1. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001
Suggested reference books
1. Any book on Core Java 2. Any book on C++

COURSE: GE – DATABASE MANAGEMENT SYSTEMS (DBMS) (FOR 6TH SEMESTER)
(36 Lectures); L-T-P: 3-0-2
Module 1: (10L)
Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship

model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Module 2:(10L)

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Module 3:(6L)

Storage strategies: Indices, hashing.

Module 4:(10L) Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Suggested books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Suggested reference books:

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education 3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

DEPARTMENT: BIOTECHNOLOGY

COURSE: GE – BIOTECHNOLOGY IN HUMAN WELFARE (FOR ODD SEMESTER)

PURPOSE

The course will provide a basic knowledge of applications of Biotechnology in industrial and medical fields

Unit 1*:* Environmental Biotechnology

Water and waste water treatment process: Current community drinking water treatment process disinfection of water (chlorination and ozonation), primary, secondary and advanced treatment of sewage (domestic waste water), Definition and concept of: biodegradation, bio deterioration and biotransformation.Biodegradation of plastic, pesticides and hydrocarbons Bioremediation, Bioleaching, Biosorption, Biopesticides, Biofertilizers, Biofuels, Biosensors, Bioindicators, Biodegradable plastics

Unit II: Xenobiotic and recalcitrant compounds

Bioaccumulation and biomagnification. Assessment of water and wastewater quality: Concept of COD, DO and BOD. Indicators of faecal pollution and MPN and MFtechnique for coliforms. Significance and principal of IMViC.

UNIT III: Industrial Biotechnology
Basic Principles of Industrial Biotechnology: Important commercial products produced by microorganisms and GMOs and their applications. Microbes in industry – foods from microorganism (vinegar and cheese). production of citric acid, amylases, proteases, vitamin B12, beer, wine, biogas, methane, hydrogen.

Unit IV: Food Biotechnology
Production and types of cheese, microorganisms as food –production of mushroom and spirulina, assessment of microbiological quality of various foods. Industrial awareness: Quality control and quality assurance in food and pharamaceutical industry, concept of current good manufacturing practices in pharmaceutical industry

Unit V: Agricultural Biotechnology
crop improvement, herbicide resistance, insect resistance, virus resistance, plants as bioreactors. Genetic modification in Agriculture –transgenic plants, genetically modified foods, application, future applications, ecological impact of transgenic plants

COURSE: GE – FUNDAMENTALS OF DEVELOPMENTAL BIOLOGY (FOR EVEN SEMESTER)

PURPOSE-
This *course* presents the genetic, cellular and molecular mechanisms involved in the development of animal *embryology*

Unit I: Gametogenesis and Fertilization

Definition, scope & historical perspective of development Biology, Gametogenesis – Spermatogenesis, Oogenesis Fertilization - Definition, mechanism, types of fertilization. Different types of eggs on the basis ofyolk.

Unit II: Early embryonic development

Cleavage: Definition, types, patterns & mechanism Blastulation: Process, types & mechanism Gastrulation: Morphogenetic movements– epiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers, Fate Maps in early embryos.

Unit III: Embryonic Differentiation

Differentiation: Cell commitment and determination- the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome,

transcription and post-translation level Concept of embryonic induction: Primary, secondary & tertiary
embryonic induction, Neural induction and induction of vertebrate lens.

Unit IV: Organogenesis
Neurulation, notogenesis, development of vertebrate eye. Fate of different primary germlayers Development of behaviour: constancy & plasticity, Extra embryonic membranes, placenta in Mammals
.

DEPARTMENT: MASS COMUNICATION AND JOURNALISM

COURSE: GE – BASICS OF JOURNALISM(FOR ODD SEMESTER)

Pre requisites: Basic Knowledge of 12th grade communicative English.

Course Objective:

1. Gain an overview of news journalism's public service role in a democratic society
2. Become familiar with fundamental principles of journalism, such as truth-telling, watchdog reporting,
accuracy, courage, tolerance, justice, minimizing harm
3. Learn basics of journalism law, history and ethics

Course Outcome:

Demonstrate critical thinking skills necessary to collect, evaluate, organize and disseminate news
1. Analyze relative newsworthiness of various fact sets, using elements of newsworthiness (proximity, interest, importance, impact, timeliness)
2. Write a simple news using set of facts
3. Distinguish news from infotainment, public relations, advertising and non-journalistic blogging, as well as the difference between news and opinion

Unit 1: Understanding News Ingredients of news meaning, definition, nature The news process: from the event to the reader (how news is carried from event to reader) Hard news vs. Soft news, basic components of a news story Attribution, embargo, verification, balance and fairness, brevity, dateline, credit line, byline.

Unit 2: Tabloid press Language of news- Robert Gunning: Principles of clear writing, Rudolf Flesch formula- skills to write news.

Unit 3: Understanding the structure and construction of news Organizing a news story, 5W's and 1H, Inverted pyramid Criteria for news worthiness, principles of news selection, importance of research in news, sources of news, use of internet

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Unit 4: Different mediums-a comparison Language and principles of writing: Basic differences between the print, electronic and online journalism Citizen journalism

Unit 5: Role of Media in a Democracy Responsibility to Society press and Democracy Contemporary debates and issues relating to media Ethics in journalism, debates discussion and practical writing /Viva.

Books/References

1. Bruce D. Itule and Douglas A. Anderson. *News writing and reporting for today's media;* McGraw Hill Publication, 2000. –
2. M.L. Stein, Susan Paterno& R. Christopher Burnett. *News writer's Handbook: An Introduction to Journalism;* Blackwell Publishing,2006.
3. George Rodmann. *Mass Media in a Changing World*; Mcgraw Hill Publication,2007.
4. Carole Flemming and Emma Hemmingway. *An Introduction to Journalism*; Vistaar Publications,2006. Richard Keeble. *The Newspaper's Handbook*; Routledge Publication,2006.
5. JohnHohenberg: Professional Journalists; Thomson Learning.
6. M.V. Kamath: Professional Journalism; Vikas Publishing, New Delhi.

COURSE: GE – SCIENTIFIC REPORT WRITING AND EDITING (FOR EVEN SEMESTER)

Course Overview

Science and technology profoundly shape our lives, changing the way we communicate with others, the kinds of careers we will have, and the quality of our natural environment. When science and technology move from laboratory to corporate boardroom to Media houses writing is involved in every step in this process. This course will focus on the writing that constitute science and technology. We will explore the writing done by scientists, technologists, will examine how writing circulates through society journalism, press releases, policy makers, citizens.

Course Outcome

• Use writing for the purposes of reflection, action, and participation in academic inquiry
• Work within a repertoire of genres and modes—including digital media—to meet appropriate rhetorical purposes
• Exercise a flexible repertoire of invention, arrangement, and revision strategies
• Engage in reading for the purposes of reflection, critical analysis, decision-making, and inquiry
• Demonstrate the ability to locate, critically evaluate, and employ a variety of sources for a range of purposes
• Synthesize external data and documentary sources into your own writing with greater awareness of proper citation

Unit 1: (4 Lectures)

Introduction to Science Writer Profile; Stories about Scientists;Introduction to New Discovery Story; Science communication models - problems, its solutions; writing science as news; engaging writing style; Article analysis – structure, style, voice, narrative.

Unit 2: (8 Lectures)

Writing from science journals; Language goals in scientific writing; reporting on new research; explanatory writing; Avoiding jargon; New discovery story analysis, Introduction to Feature Article, Explanatory features; Ethics in writing.

Unit 3: (6 Lectures)
Select a recent healthcare research study and find both the original study published in a biomedical journal and another (non-academic) article written about the study findings; Target Audience-Who is the audience? Purpose of the article; Bibliographic Database Searching and Citation Management Software; Fact-checking
Unit 4: (8 Lectures)

Interviewing a scientist; Questionnaire Design; Prepare Press releases; Workshopping ideas; Presentations and Posters; Presentation Slides; Presenting Research; Grant Proposals; Writing Abstracts; Writing Thesis and Capstone Documents; Survey: Schedule, Sample; Tools of Data Collection

Unit 5: (6 Lectures)
Planning for print-size, anatomy, grid, design; Format, typography, copy, pictures, advertisements; Plotting text: headlines, editing pictures, captions; Page-making; Technology and Print; layout, use of graphics and photographs; Printing Processes: Traditional vs modern; Desk Top Publishing: Quark Express, Coral Draw, Photoshop
Unit 6: (6 Lectures)
Online Story Package – Use of text, photos, video, audio, graphics; working together to tell a story; Types of Multimedia Content; Supporting Text; Story Pitch; Search Operators; Database; Hyperlink; Rule of Thirds; Rendering; Authenticity; In-Depth Story

REQUIRED TEXTBOOK(S):

1. Alley, Michael. The Craft of Scientific Writing, third edition. New York: Springer, 2009. ISBN: 0387947663 ISBN-13: 9780387947662
2. Alley, Michael. The Craft of Scientific Presentations, second edition. New York: Springer, 2013. ISBN: 1441982787 ISBN-13: 9781441982780

DEPARTMENT: HOSPITALITY AND TOURISM ADMINISTRATION

COURSE: GE – HOSPITALITY & TOURISM ENTREPRENEURSHIP (FOR ODD SEMESTER)

UNIT 1: 08 LECTURES

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Introduction to Entrepreneurship Development: Definition of entrepreneurship-emergence of entrepreneurial classes-theories of entrepreneurship-role of socio-economic environment-characteristics of entrepreneur-leadership, risk taking, decision-making & business planning.
Scope in tourism. Introduction to entrepreneur and entrepreneurship.

UNIT 2: 08 LECTURES

Opportunity analysis: External environmental analysis (economic, social & technological)-competitive factors-legal requirements for establishment of a new unit related to tourism & raising of funds-venture capital sources & documentation required.

UNIT 3: 08 LECTURES

Entrepreneurial Behaviour: Innovation and entrepreneur, entrepreneurial behaviour & psychological theories.

UNIT 4: 08 LECTURES

Entrepreneurial Development Program (EDP): EDPs & their role, relevance and achievements-role of Government in organizing EDPs-evolution of EDPs. Social responsibility in business.

UNIT 5: 10 LECTURES

Role of Entrepreneur: Role of an entrepreneur in economic growth as an innovator, generation of employment opportunities, complementing economic growth, bringing about social stability & balanced regional development of industries with emphasis on tourism, foreign earnings etc.

COURSE: GE – PERSONALITY DEVELOPMENT(FOR EVEN SEMESTER)

Unit I- 4 lectures
Introduction to bio data, features of a bio data, types of bio data, importance of bio data, specifications, preparation of bio data.

Unit II- 4 lectures
Group discussion: importance, participation, rules to be followed, listening skills, do's and don'ts Personal interview: Self introduction, expressing yourself, understanding the interviewers' need, do's and don'ts

Unit III- 4 lectures
Grooming and hygiene: basic grooming ideas, self-check of grooming, healthy practices.

Unit IV- 6 lectures
Speech on a given topic (extempore speech); presentation Skills; public speaking.
Time Management; Organizational Skills; Stress management; Team Building Skills; Change management.

Unit V- 4 lectures
Table manners, telephone etiquettes, body language

DEPARTMENT: MICROBIOLOGY

COURSE: GE – MOLECULAR SECRETS OF LIFE (FOR ODD SEMESTER)

Unit 1: Origin of Life:
Formation of life, Concept of Biogenesis and abiogenesis, Miller-Urey experiment, properties of water, contribution of scientists to the journey of biology,Discovery of microscope and its types. Theories of evolution, Contribution of Lamarck and Darwin.

Unit 2: Cell structure and function:
Prokaryotic and eukaryotic cell structure. Difference between prokaryotic and eukaryotic cell, Plant and animal cell, Cell envelop, Cell organelles and their functions. Eukaryotic cycle definition and its regulation, phases of cell cycle, Cell division and its significance, types of cell division, Mitosis and meiosis, different stages of cell division.

Unit 3: Biodiversity and classification:
Classification living organisms, nomenclature system, Characteristics of different classes of organisms, Three domains of life,

Unit 4: Macromolecules of life:
Carbohydrates and sugars, amino acids and proteins, enzymes, Lipids, Nucleic acid (both DNA and RNA)

Unit 5: Information flow in life:
Concept of gene and chromosome, Replication, Transcription, Translation, Methods of gene transfer in prokaryotes like Transformation, Transduction and Conjugation, Operon concept, Mutation.

Unit 6: Metabolic pathways in life:
Carbohydrate metabolism – glycolysis, TCA cycle, oxidative phosphorylation. Amino acid metabolism and urea cycle, Fatty acid metabolism – β oxidation of saturated and unsaturated fatty acids, photosynthesis.

COURSE: GE – INTRODUCTION TO FORENSIC SCIENCE (FOR EVEN SEMESTER)

Unit 1: History of Development of Forensic Science in India:
Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Frye case and Daubert standard.

Unit 2: Tools and Techniques in Forensic Science:
Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Duties of forensic scientists. Data depiction. Report writing.

Unit 3: Organizational set up of Forensic Science Laboratories in India
Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories.

Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.

Unit 4: Instrumentation:

Sample preparation for chromatographic and spectroscopic evidence. Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography. Spectroscopic methods. Fundamental principles and forensic applications of Ultravioletvisible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X-ray spectrometry. Colorimetric analysis and Lambert-Beer law. Electrophoresis – fundamental principles and forensic applications. Neutron activation analysis – fundamental principles and forensic applications.

Unit 5: Basics of Criminology:

Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology. Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.

Unit 6: Basics of Fingerprinting:

Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.

Unit 7: Biological Evidence:

Nature and importance of biological evidence. Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair. Types and identification of microbial organisms of forensic significance. Identification of wood, leaves, pollens and juices as botanical evidence. Diatoms and their forensic significance.

DEPARTMENT: ECONOMICS

COURSE: GE – ECONOMIC HISTORY OF INDIA (FOR ODD SEMESTER)

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

Course Outline

Unit 1: Economic Development since Independence

Major features of the economy at independence; growth and development under different policy regimes-goals, constraints, institutions and policy framework; an assessment of performance-sustainability and regional contrasts; structural change, savings and investment.

Unit 2: Population and Human Development

Demographic trends and issues; education; health and malnutrition.

Unit 3; Growth and Distribution

Trends and policies in poverty; inequality and unemployment

Unit 4: Policies and Performance in Agriculture
Growth; productivity; agrarian structure and technology; capital formation; trade; pricing and procurement.
Unit 4: Policies and Performance in Industry
Growth; productivity; diversification; small scale industries; public sector; competition policy; foreign investment.
Unit 6: Trends and Performance in Services

Readings:

1. Kaushik Basu, 2009, ―China and India: Idiosyncratic Paths to High Growth, Economic and Political Weekly, September.
2. Himanshu. 2011, ―Employment Trends in India: A Re-examination, Economic and Political Weekly, September.
3. Rama Baru et al, 2010, ―Inequities in Access to Health Services in India: Caste, Class and Region, Economic and Political Weekly, September.
4. Geeta G. Kingdon, 2007, ―The Progress of School Education in India, Oxford Review of Economic Policy

COURSE: GE – ECONOMIC DEVELOPMENT (FOR EVEN SEMESTER)

Unit 1: Meanings and nature of development – economic growth, redistribution from growth and capabilities approach to development, Objectives of development, Measures of development – Purchasing power parity and Per capita income as an index of development, difference between growth and development, human development index, developing economy – features, Introduction to concept of sustainable development,

Unit 2: Factors in economic development - Land: Ownership and tenancy system – fixed rent contract and share cropping, role of agriculture in development, barriers to agricultural development and land reforms, Labour – Population and Labor force growth, casual and long term labor, permanent labor market, Capital: Role of capital accumulation in economic development. Significance of capital-output ratio, role of technology and technological progress, learning, human capital, Natural Capital & concept of investment.

Unit 3: Population and Development - Concepts of Population: definitions of fertility, mortality, birthrates, death rates, fertility rate, life expectancy, infant mortality rate, youth dependency ratio. Theory of demographic transition

Unit 4: Development strategies - Complementarity and Coordination, Poverty Trap of Nurkse and Big Push theory of Rosenstein-Rodan , Linkages – backward and forward; linkages, policy and big push,,
Choice of technology and choice of scale (large vs small) and criteria for investment, Gains from trade, sustainable development strategies.

Unit 5: Development in a Labour surplus economy - The concept of economic dualism, Disguised Unemployment, The Informal Sector, Rural-urban migration of labour – Harris-Todaro model, development in natural resource rich contest

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Unit 6: Development, Inequality and poverty - Meaning of inequality, inequality measures, Lorenz Curve, Range, Coefficient of variation, Gini-coefficient, Kuznet's Inverted U hypothesis. Poverty, relative and absolute deprivation with respect to income, Poverty line, Poverty measures – Head count ratio, Poverty gap ratio, Income gap ratio, Human Poverty Index. Social dimensions of poverty – rural poverty, women and ethnic minorities and indigenous populations

References:

Development Economics Debraj Ray

Development Economics Hayami

DEPARTMENT: CHEMISTRY

COURSE: GE – FUNDAMENTALS OF CHEMISTRY (FOR ODD SEMESTER)

Unit 1: Basic concepts of Organic Chemistry

Fundamentals and Applications:

Basic Organic Chemistry Concepts: introduction to organic molecules and functional groups understanding organic reactions, atomic orbitals, hybridization, orbital representation of methane, ethane, ethyne and benzene.

Polarity of bonds: Inductive, resonance and steric effects hyper conjugation, and their influence on acidity and basicity of organic compounds.

Green Chemistry introduction and principles.

Unit 2: Basic concepts of Physical Chemistry

Zeroth Law of Thermodynamics: Equilibrium, State Functions, Temperature, Equations of State.

First Law of Thermodynamics: Work, Heat, Internal Energy, Heat Capacity, Concept of Enthalpy.

Open thermodynamics.

Solutions: Molarity, Normality, Partial Molar Quantities, Ideal Solutions, Non Ideal Solutions, Electrolytes, Ionic activity and the Debye Huckel Theory, Colligative properties.

Reaction Kinetics: Reaction Rates, Rate Laws, Application.

Unit 3: Basic concepts of Inorganic Chemistry

Atomic Structure &Study of matter:

Study of matter – its properties and behavior; Atomic Structure: Discovery of Electron by J J Thomson, Bohr's Theory, De Broglie Hypothesis, Heisenberg's Uncertainty Principle.

COURSE: GE – STEREOCHEMISTRY AND CONFORMATION(FOR EVEN SEMESTER)

Unit 1: Stereochemistry

Introduction, Chirality,Concepts of Isomerism, Types of Isomerism: Structural and Stereoisomerism.

(R) and (S) Nomenclature of asymmetric carbon atoms.

Optical Isomerism or Enantiomerism, Optical Activity.

Biological discrimination of enantiomers.

Racemic mixtures, Enantiomeric excess, Optical purity.

Fischer Projections and their use.

Diastereomers, stereochemistry of molecules with two or more asymmetric carbons.

Geometrical isomerism: cis–trans and, syn-anti isomerism and E/Z notations.

Unit 2 - Conformation

Cycloalkanes and Conformational Isomerism,

Conformational analysis of ethane and n-butane,

Conformation analysis of alkanes: Relative stability, Axial and Equatorial bonds.

Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

DEPARTMENT: PHYSICS

COURSE: GE – WHERE DO YOU LIVE? A JOURNEY THOUGH OUR GORGEOUS UNIVERSE (FOR ODD SEMESTER)

Unit 1: Radiation from stars: spectral lines and their formation; stellar atmosphere.
Unit 2: Telescopes and other detectors.
Unit 3: Special relativity - Basic ideas.
Unit 4: Stellar parameters; Binary stars.
Unit 5: Main sequence stars and their structure; Nuclear processes in stars; End points of stellar evolution; White dwarfs, Neutron stars and Black holes.

Unit 6: Interstellar medium and star formation.
Unit 7: Cluster of stars.
Unit 8: Galaxies.
Unit 9: Universe on large scale: an overview.
Unit 10: Cosmological moles for a homogeneous and isotropic universe.
Unit 11: Early Universe.

References:
1. The Physical Universe: an introduction to Astronomy - Frank H. Shu

2. Cosmos - Carl Sagan

3. Fundamental Astronomy - H. Karttunen et. al

COURSE: GE – HISTORY AND PHILOSOPHY OF SCIENCE (FOR EVEN SEMESTER)

Unit 1: What is Science?
Unit 2: Scientific Reasoning.
Unit 3: Explanation in Science.
Unit 4: Realism and Anti-realism.
Unit 5: Scientific change and Scientific evolution.
Unit 6: Philosophical problems in physics, biology and psychology.
Unit 7: Science and its critics.
Unit 8: Conclusions.

References:
1. Science order and creativity -D. Bohm and D. Peat

2. Understanding Philosophy of Science - J. Ladyman

3. Philosophy of Science: A Contemporary introduction - A. Rosenberg

DEPPARTMENT: MANAGEMENT
COURSE: GE - ORGANIZATIONAL BEHAVIOR (FOR ODD SEMESTER)

1) Organization- the concept.
2) Human behavior- concepts and practice.
3) Leadership and leadership styles.
4) Motivation- theory and practice.
5) Communication.
6) Individual and Group dynamics.
7) OB and decision making.
8) Presentation and case studies.

COURSE: GE - BUSINESS STRATEGY (FOR EVEN SEMESTER)

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1) Concept of business strategy- reactive, preactive and proactive strategies.
2) McKinsey 7S framework.
3) Impact of environment in strategy formulation.
4) Mega, Micro and relevant environment.
5) The strategic management pyramid.
6) Swot analysis.
7) BCG growth share matrix.

SKILL ENHANCEMENT COURSE (SEC)

Course: SEC1 – Mentored Seminar I
Credit: 1 (1L-0T-0P)

In this course, every student has to prepare presentations during the first semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic.

Course: SEC2 – Mentored Seminar II
Credit: 1 (1L-0T-0P)

In this course, every student has to prepare presentations during the second semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

Course: SEC3 – Mentored Seminar III
Credit: 1 (1L-0T-0P)

In this course, every student has to prepare presentations during the third semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

Course: SEC4 – Mentored Seminar IV
Credit: 1 (1L-0T-0P)

In this course, every student has to prepare presentations during the fourth semester under the guidance of any faculty of the department who will mentor the student's work. The students are taught how to prepare a presentation, how to deliver seminar and to make them

comfortable in answering the questions asked to them during the interactive session. At the end of the semester, the student has to deliver a lecture on a specific topic

ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)

Course: AECC1 – Communicative English
Credit: 2 (2L-0T-0P)

Component: Theory

Unit 1 - Functional grammar
Tenses: basic forms and use; sentence formation; common errors; parts of speech, direct and reported speech structures and voices

Unit 2 - Letter Writing
Job application; business letter; editorial letter; email

Unit 3 - Essay Writing
Overall argument; consistent logic; main points; paragraphs; introduction & conclusion

Unit 4 - Report Writing
Manuscript; memo

Unit 5 - Precis Writing
Understanding main points; inculcating precision; reducing to basics

Unit 6 - Note Making

Unit 7 - Other Kinds of Texts
Notice; Circular; Agenda; Minutes

Unit 8 - Presentation Skills
Soft skills; relevance of content; knowledge and confidence

Unit 9 - Group Discussion

The basic structure of GD's; workshops to develop participation and team-work skills

Unit 10 - Role play
What is 'role play'? identifying and understanding one's role; workshops

Unit 11 - Developing Interview Skills
The "Do's & Don'ts" of Interviews; verbal proficiency; personality development; mock-interviews

References:

Nilanjana Gupta - *Communicate with Confidence* (Anthem Press, 2011)

BarunMitra - *Effective Technical Communication: Guide for Scientists and Engineers* (OUP, 2006)

Course: AECC1 – Environmental Science
Credit: 2 (2L-0T-0P)

Component: Theory

Unit 1: Environment and its components:
Definition, Geographical distribution of environment, Environmental chemistry, Atmosphere and its composition.

Unit 2: Forest resources:
Use and over exploitation, deforestation, timber extraction, mining, dams and their effects on forests, tribal people.

Unit 3: Water resources:
Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

Unit 4: Food resources:
World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer and pesticides, water logging, salinity.

Unit 5: Energy resources:
Growing energy needs, renewable and non-renewable energy resources, use of alternative energy sources.

Unit 6: Land resources:
Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit 7: Ecosystem, Biodiversity and its Conservation:
Concept of ecosystem, structure and function of ecosystem, Energy flow, Bio-geological cycles, Introduction to biodiversity, genetic diversity, species diversity, ecological diversity, Biogeographical classification of India, Biodiversity Hot-spots, conservation of biodiversity.
Unit 8: Environmental Pollution:
Definition, cause and effect of pollution, Control measures of pollution, Air pollution, Water

pollution, Soil pollution, Noise pollution, Solid waste management, Disaster management, role of the society to control pollution.

Unit 9: Environmental issues, Laws and ethics:
Water conservation, climate change: cause and effect, global warming, acid rain, ozone layer depletion, hazardous material industries, Wasteland reclamation, Environment protection act, Air (prevention and control of pollution) act, Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act, issues involved in enforcement of environment legislation, Public awareness.

UNIVERSITY SPECIFIED COURSE (USC)

Course: USC1 – Foreign Language –I (German)
Credit: 2 (2L-0T-0P)

Component: Theory

Lesson 1
Speech acts:
Greetings and farewells
1st, 2nd and 3rd person introduction.
Speaking about other persons
Numbers till 20
Exchanging telephone numbers and E-mail addresses.
How to spell a word?
Speaking about countries and languages.
Grammar: W-Questions and declarative sentences, personal pronouns- I.
Vocabulary: Numbers, countries and languages.

Lesson 2:
Speech acts:
Speaking about hobbies.
Weekdays and weekends.
Speaking about work, profession and working hours.
Numbers above 20
Seasons
Making profiles on the internet
Grammar: Definitive articles, verbs and personal pronouns-II, yes/no questions, plurals, verbs 'haben' and 'sein'.
Vocabulary: Hobbies, Days of the week, numbers from 20, months of the year, seasons

Lesson 3
Speech acts:

To name places and buildings
To ask questions about places
Picture stories
To enquire about things
Transportation
Concept of international words
Grammar: Articles for nouns, definite articles, indefinite articles, negative articles, imperative sentences.
Vocabulary: Places and buildings, transportation, directions.

Course: USC1 – Foreign Language –I (Spanish)
Credit: 2 (2L-0T-0P)

Component: Theory

1. Introduction, Alphabets

2. Vocabulary (Relatives, Fruits, Flowers, Colours, Food, Dress, Days of Week, Month, year etc.)
3. Numbers
4. Noun
5. Subject Pronoun
6. Indicative Mood
7. Verbs: - Regular
8. Verbs Irregular: - Ser, Estar, Tener, Haber, poder, poner etc.
9. Verbs Irregular: - Stem Changing (e to ie), (e to i), (o to ue)
10. Adjective: -Regular Comparative and Superlative
11. Reflexive Verb
12. Object Pronoun
13. Preposition
14. Demonstrative Adjective
15. Possesive Adjective
16. Possesive Pronoun
17. Por and Para
18. Past Tense: - Preterite
19. Audio
20. Conversation

School of Engineering
Bachelor of Computer Application

Course: USC1 – Foreign Language I (Japanese)
Credit: 2 (2L-0T-0P)

Component: Theory:

a. Course Title: Japanese Language Course

b. Learning Objectives:

1 Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.

1 Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.

1 Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Text Books:

①Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language competences (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

②Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language activities (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

1. Japanese Script & Greetings
1 Hiragana (Japanese Native Script)
1 Katakana (Foreign Script)
1 Kanji
1 Exchange greetings in Japanese

2. Japanese Vocabulary
1 Country Names, Languages, Occupations, Family, People, Numbers
1 Food, Drinks, Food for Lunch, Easting Places
1 Home, Furniture, Places to visit Near buy, Rooms, Things in the room
1 Daily routines, Time, Free-time activities, Places, Calendar

3. Basic Conversation & Grammar
4. Listening, Reading and Writing activities in Japanese
1 Self-introduction
1 My Family
1 Favorite Food
1 My family's breakfast
1 My breakfast, My lunch
1 My home, My room
1 My daily life
1 My week's schedule

School of Engineering
Bachelor of Computer Application

Course: USC2 – Foreign Language II (German)
Credit: 2 (2L-0T-0P)

Component: Theory

Lesson 4:

Speech acts: Talk about food, planning a shopping, conversations during shipping, conversations in a Restaurant, understanding texts with W-Questions.

Grammar: Positions in a sentence, sentence structure, 'Akkusativ' and 'Akkusativ'-verbs.

Vocabulary: meals, groceries, beverages, shops and businesses.

Lesson 5:

Speech acts: Understanding of time and to call, informations with date and time, talking about family, planning an appointment, to apologise for delay, cancellation of an appointment over the telephone.

Grammar: Informations with date and time with prepositions 'um', 'am', 'von'……. 'bis', possessive articles, Modal verbs,

Vocabulary: Daily routine, time, family.

Lesson 6:

Speech acts: Planning something together, to speak about birthdays, to receive and send invitations, talk about events, finding of particular informations in a text.

Grammar: separable verbs, preposition 'für' for 'Akkusativ', personal pronouns, past tense of 'haben' and 'sein'.

Vocabularies: Hobbies, food, beverages, passion and events

Course: USC2 – Foreign Language II (Spanish)
Credit: 2 (2L-0T-0P)

Component: Theory

1. Gustar ,Encantar, Doler Verb
2. Some More irregular Verbs-Saber ,Conocer , querer, haceretc
3. Past Tense:-Preteriteindefinido
4. Audio
5. Conversation
6. Comprehension
7. Picture description
8. Letter Writing
9. Paragraph Writing
10. Form Filling

School of Engineering
Bachelor of Computer Application

Course: USC2 – Foreign Language II (Japanese)
Credit: 2 (2L-0T-0P)

Component: Theory

a. Course Title: Japanese Language Course

b. Learning Objectives:

1 Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.

1 Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.

1 Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

d. Text Books:

①Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language competences (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

②Marugoto: Japanese language and culture Starter A1 Coursebook for communicative language activities (Goyal Publisher & Distributer Pvt Ltd. New Delhi)

1. Japanese Script
1 Kanji
2. Japanese Vocabulary
1 Hobbies (sports, films, music, etc.), Places, Events, Calendar

1 Transport, Places in Town, Locations

1 Souvenirs, Counting Numbers, Clothes, Prices

1 Holiday activities
3. Conversation & Grammar

4. Listening, Reading and Writing activities in Japanese
1 My hobby

1 My town

1 My shopping last week

1 Clothes that I like

1 My Holiday trip

1 Experiences in Japan