BHARATI VIDYAPEETH
DEEMED TO BE UNIVERSITY, PUNE (INDIA)
(Established u/s 3 of the UGC Act, 1956 vide Notification No.F.9-15/95-U-3 of the Govt. of India)

'A+' Grade Accreditation by NAAC

"Social Transformation Through Dynamic Education"

SCHOOL OF DISTANCE EDUCATION

SYLLABUS

OF

BACHELOR OF COMPUTER APPLICATIONS
(BCA)

With effect from 2019-20

BHARATI VIDYAPEETH (DEEMED TO BE UNIVERSITY), PUNE
FACULTY OF MANAGEMENT STUDIES

Board of Studies in Computer Applications and Systems Studies
Structure of Bachelor of Computer applications Programme
(Under Choice Based Credit System)
To be effective from 2018-19 at Part I

1. INTRODUCTION:

The BCA Programme is a full time 100 Credits program offered by Bharati Vidyapeeth (Deemed to be University), Pune and conducted at its management institutes in Delhi, Karad, Kolhapur, Pune, Sangli, and Solapur. All the six institutes have excellent faculty, Laboratories, Library, and other facilities to provide proper learning environment. The University is reaccredited by NAAC with an 'A+' grade. The expectations and requirements of the Software Industry, immediately and in the near future, are visualized while designing the BCA programme. This effort is reflected in the Vision and Mission statements of the BCA programme. Of course, the statements also embody the spirit of the vision of Dr. Patangraoji Kadam, the Founder of Bharati Vidyapeeth and Chancellor, Bharati Vidyapeeth University which is to usher in "Social Transformation through Dynamic Education."

2. VISION STATEMENT OF BCA PROGRAMME:

To create high caliber solution architects and innovators for software development.

3. MISSION STATEMENT OF BCA PROGRAMME:

To teach 'things, not just words', 'how to think', and 'how to self-learn'.

4. OBJECTIVES OF BCA PROGRAMME:

The main objectives of BCA Programme are to prepare the youth to take up positions as system analysts, system engineers, software engineers and programmers. Accordingly the course curriculum aims at developing 'systems thinking' 'abstract thinking', 'skills to analyze and synthesize', and 'skills to apply knowledge', through 'extensive problem solving sessions', 'hands on practice under various hardware/software environments' and' three projects'. In addition, 'social interaction skills', 'communication skills', 'life skills', 'entrepreneurial skills', and 'research skills' which are necessary for career growth and for leading quality life are also imparted.

5. LEARNING OUTCOMES FROM THE BCA PROGRAMME:

At the end of the course the student should be able to:

(a) Analyze problems and design effective and efficient software solutions.

(b) Develop software under latest Application Development Environments.

(c) Learn new technologies with ease and be productive at all times.

(d) Read, write, and contribute to technical literature.

(e) Work in teams.

(f) Be a good citizen in all respects.

6. SCHEME OF EXAMINATION:

For some courses there is Internal Assessment (IA) conducted by the respective institutes as well as a University Examination (UE) at the End-of-the Term. UE will be conducted out of 70 marks and IA will be conducted for 30 marks then these are converted to grade points and grades as per the Table I. For courses having only Continuous Assessment (CA) the respective institutes will evaluate the students in varieties of ways, three or four times, during the term for a total of 100 marks. Then the marks will be converted to grade points and grades using the Table I.

7 STANDARDS OF PASSING & RULES OF ATKT:

For all courses, both UE and IA constitute separate heads of passing (HoP). In order to pass in such courses and to earn the assigned credits, the learner must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.
A student who fails at UE in a course has to reappear only at UE as backlog candidate and clear the Head of Passing. Similarly, a student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the Head of Passing to secure the GPA required for passing.

The 10 point Grades and Grade Points according to the following table:

Range of Marks (%)	Grade	Grade Point
80≤Marks≤100	O	10
70≤Marks<80	A+	9
60≤Marks<70	A	8
55≤Marks<60	B+	7
50≤Marks<55	B	6
40≤Marks<50	C	5
Marks < 40	D	0

The performance at UE and IA will be combined to obtain GPA (Grade Point Average) for the course. The weights for performance at UE and IA shall be 70% and 30%

respectively. GPA is calculated by adding the UE marks out of 70 and IA marks out of 30.The total marks out of 100 are converted to grade point, which will be the GPA.

8 Award of Honours:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honours are given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.5≤CGPA ≤10	O	Outstanding	80≤Marks≤100
9.0≤CGPA ≤9.49	A+	Excellent	70≤Marks<80
8.0≤CGPA ≤8.99	A	Very Good	60≤Marks<70
7.0≤CGPA ≤7.99	B+	Good	55≤Marks<60
6.0≤CGPA ≤6.99	B	Average	50≤Marks<55
5.0≤CGPA ≤5.99	C	Satisfactory	40≤Marks<50
CGPA below 5.0	F	Fail	Marks below 40

9 RULES OF ATKT:

1.A student is allowed to carry backlog of any number of subjects for Semester IV.

2.A student must pass Semester I and Semester II to appear for Semester V.

10. STRUCTURE:

SEMESTER-WISE COURSE STRUCTURE FOR BCA

SEMESTER I

Course Number	Course Title	Credits	IA Marks	EoTE Marks
101	Fundamentals of Information Technology	3	30	70
102	Algorithm and program Design	3	30	70
103	C Programming - I	3	30	70
104	Business organization system	2	30	70
105	Business Mathematics	3	30	70
106	Lab on MS-Office Suite	1	-	100
107	Lab on C Programming - I	1	-	100
108	**General course-I:** Community Work I / Career & Life Skills / Waste Management	1	50	-
Total		**17**	**200**	**550**

SEMESTER II

Course Number	Course Title	Credits	IA Marks	EoTE Marks
201	Computer Organization and Architecture	3	30	70
202	DBMS I	3	30	70
203	C Programming - II	3	30	70
204	Financial Accounting	2	30	70
205	Principles of Management	2	30	70
206	Lab on C Programming - II	1	-	100
207	Environmental Studies	1	30	70
208	**General Course II :** Community Work II (Swacchh Bharat Abhiyan) / Sectoral Analysis / Smart Cities	1	50	-
Total		**16**	**230**	**520**

SEMESTER III

Course Number	Course Title	Credits	IA Marks	EoTE Marks
301	Operating Systems	3	30	70
302	Software Engineering	3	30	70
303	DBMS II	3	30	70
304	Statistics	3	30	70
305	Multimedia Technology	2	30	70
306	Lab on Oracle and Multimedia	1	-	100
307	Lab on Linux Operating System	1	-	100
308	**General Course III :** Community Work III / Start up management / Agro Tourism	1	50	-
Total		**17**	**200**	**550**

SEMESTER IV

Course Number	Course Title	Credits	IA Marks	EoTE Marks
401	Computer Networks	3	30	70
402	Software Testing	3	30	70
403	Java Programming	3	30	70
404	Operations Research	2	30	70
405	Entrepreneurship Development	2	30	70
406	Lab on Java	1	-	100
407	Minor Project - I	1	-	50
408	**General Course IV:** Community work IV / Basics of Taxation / Meditation & Yoga	1	50	-
Total		**16**	**200**	**500**

SEMESTER V

Course Number	Course Title	Credits	IA Marks	EoTE Marks
501	Introduction to the Internet Technologies	3	30	70
502	Object Oriented Analysis and Design	3	30	70
503	C# Programming	3	30	70
504	Graph Theory	3	30	70
505	Elective I	2	30	70
506	Lab on Internet Technology and C# Programming	1	-	100
507	Minor Project II	1	-	50
508	**General Course V:** Social Media Management / Road Safety and Management / Event Management	1	50	-
Total		**17**	**200**	**500**

SEMESTER VI

Course Number	Course Title	Credits	IA Marks	EoTE Marks
601	Data warehousing and Data Mining	3	30	70
602	Web Programming	3	30	70
603	Software project Management	3	30	70
604	Business Analytics	3	30	70
605	Elective II	2	30	70
606	Lab on Web programming	1	-	100
607	Major Project	1		100
608	**General Course VI:** Business Ethics / Basics of Hospitality Management / Aptitude	1	50	-
Total		**17**	**200**	**550**

Electives:

Elective No.	Elective Group	Course No	Course Name
01	**Information Security**	505-1-A	Information Security Concepts
		605-1-B	Information Security Administration
02	**Big Data**	505-2-A	Introduction to Big Data
		605-2-B	HADOOP
03	**Information Systems**	505-3-A	E-Commerce
		605-3-B	Knowledge Management

Practical Examinations:

For courses Nos. 106,107, 206, 306, 307,406, 506 and 606 there will be practical examination.

SEMESTER I

Course Number	Course Name	Credits	
101	**Fundamentals of Information Technology**	**3**	

Course Objective:

The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics

Expected Outcome :

At the end of this course, student should be able to

(a) Understand basic concepts and terminology of information technology.

(b) Have a basic understanding of personal computers and their operations.

(c) Be able to identify issues related to information security.

References (Books, Websites etc) :

How to solve computer – Dromey

Computer Fundamentals by P. K. Sinha,

Suggested MOOC :

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Computers:** Definition, .Basics of Computer, Characteristics of computers, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.
2	**Computer Arithmetic:** Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , 1's Complements, 2's Complements, Computer Codes, Rules and laws of Boolean algebra, Basic Gates (NOT, AND & OR)
3	**Input Output Devices:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

4	**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Disks. Flash Drives, DVD, Blue-Ray disc.
5	**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w, Algorithms and Flow Charts.
6	**Data Communication:** Communication Process, Data Transmission speed, Communication Types (modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, LAN Topologies, Computer Protocols, Concepts relating to networking. Internet – Web Browsers, Web servers, Internet Protocol, Hyper text Transfer Protocol, Business Data Processing: Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization, File Utilities.

Course Number	Course Name	Credits	
102	**Algorithm and Program Design**	**3**	

Course Objective:

To understand good principles of algorithm design, elementary analysis of algorithms, and fundamental data structures. The emphasis is on choosing appropriate data structures and designing correct and efficient algorithms to operate on these data structures.

Expected Outcome:

This is a first course in data structures and algorithm design. Students will:

- learn good principles of algorithm design;
- learn how to analyze algorithms and estimate their worst-case and average-case behaviour (in easy cases);
- become familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles;

References (Books, Websites etc) :

1. Dromey R. G. : How to Solve it by a Computer.

2. Sartaj Sahni: Data Structure, Algorithms and Applications in C++ (Ch II).

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction**: Concept, of Problem, Procedure and Algorithm, Algorithm Representation through Pseudo - Code and Flow - Charts, Tracing of Algorithms Such as Swapping, Counting, Finding the Sum, Product, maximum, minimum, of a list of numbers.
2	**Concept of Structured Programming and Procedure Oriented Programming:** Introduction, Concept, Basic Control Structure, Benefits of Structured Programming and Procedure Oriented Programming
3	**Design of Algorithm:** Problem Analysis and Design of Algorithms for problems such as (1) Swapping (2) Counting (3) Finding the Sum, Product, maximum, minimum of a finite list of numbers, and (4) Simple variations of the above problem realization that, there may be alternative algorithm and that one algorithm may be better (in some sense) than the other.

4	**Problem Analysis and Design 1**: Design of algorithm for problem such as generating prime numbers, Evaluation of polynomial, Sum of first n factorials, Finding nth term of Fibonacci sequence.
5	**Problem Analysis and Design2**: Design of algorithm for problem such as Finding largest and second largest of list ,Determining nth root of a number, compute GCD and Base Conversion
6	**Concept of Array, Sort and Search Technique:** Introduction of Array, Array manipulation such as removing the duplicates, Partitioning of an array, listing of prime numbers, finding prime factor of a number, The problem of search and Merge, Linear, Binary search algorithms, The Problem of Sorting, Selection, Insertion and Bubble

Course Number	Course Name	Credits	
103	**C Programming - I**	**3**	

Course Objective:

This is a first course in programming. The objective of this paper is to teach the Programming Language C. However, the process of learning a computer language will also be emphasized. Emphasis is also on semantics and problem solving.

Expected Outcome:

At the end of the course a student should be able:

- To solve a given problem using programming/algorithm
- Understand and use C libraries,
- Trace the given C program manually
- Effectively use of Arrays and functions
- Write C program for simple applications of real life using structures and Unions.

References (Books, Websites etc) :

1. Let us C - Y.Kanetkar, BPB Publications 4. Yashawant Kanetkar, let Us C, BPB Publication
2. Programming in C - Gottfried B.S., TMH 2.
3. The 'C' programming language - B.W.Kernighan, D.M.Ritchie, PHI
4. Programming in ANSI C - Balaguruswami, TMH
5. C- The Complete Reference - H.Sohildt, TMH
6. A Structured Programming Approach using C – B.A. Forouzan & R.F. Gillberg, THOMSON Indian Edition
7. Computer fundamentals and programming in C – Pradip Dey & Manas Ghosh, OXFORD

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to C language** Origins of C, Character Set of C, C Tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Declaration of variables as constant, Operators, Types of operators, Precedence and associativity, Expression, Type conversions in expressions, Input and Output functions - printf(), scanf(), getchar(), putchar(), Formatted input and formatted output.
2	**Decision Control and looping** Introduction, Control Statements- Sequential, Selection, Iteration Statements, Branching structure- if statement, if-else statement, Nested if-else statement, else if Ladder,

	Conditional operator, switch statement, Loop control structures- while loop, do-while loop, for loop, Nested for loop, Jump statements-break, continue, goto
3	**Functions** Introduction, Purpose of function, Function declaration/ Function prototype, Function definition, Function call, return statement, Function parameters, Types of functions, Call by value , Storage classes, Recursion, Examples on recursive function
4	**Arrays and Strings** Introduction to one-dimensional Array, Definition, Declaration, Initialization, Accessing and displaying array elements, Arrays and functions, Introduction to two-dimensional Array, Definition, Declaration, Initialization, Accessing and displaying array elements, Introductions to Strings, Definition, Declaration, Initialization, Input, output statements for strings, Standard library functions, Implementations with standard library functions
5	**Structures and union** Introduction to structure, Defining a structure, Declaring structure variables, Accessing structure members, nested structure, Array of structure, Array within structure, Introduction to union, Definition, Declaration, Differentiate between structure and union
6	**Pointers** Introduction to pointer, Definition, Declaring and Initializing pointer variable, Indirection operator and address of operator, Accessing variable through its pointer, Pointer arithmetic, Dynamic memory allocation, Pointers & Functions, Pointers & Array, Pointers & Structures

Course Number	Course Name	Credits	
104	**Business Organization System**	**2**	

Course Objective:

To acquaint students with fundamentals of Business Organization and management systems as a body of knowledge.

Expected Outcome :

1. Students shall know about business and structure
2. Students shall know about various forms of business
3. Students will have sound knowledge about overall business environment.

References (Books, Websites etc) :

Reference Books:

S.A. Sherlekar ,Modern Business Organization and Management – (Himalaya Publishing House)

Y.K. Bhushan ,Fundamental of Business Organization & Management – (S Chand Publishers)

Basu, C. R.; *Business Organization and Management*, Tata McGraw Hill, Publishing House, New Delhi, 1998

B S Moshal, J P Mahajan, J S Gujral, Business Organization and Management –. Galgotia Publishing Co, New Delhi

Redmond James, Robert Trager , Media Organization and Management –, Biztantra, New Delhi

Suggested MOOC :

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Laboratory Experiments:

1	**Nature of Business** Concept of Business – Meaning, Definition, Nature and Scope, Characteristics of Business. Business as an Economic Activity. Objectives of Business. Structure of Business (Classification of Business Activities. Requisites for Success in Modern Business.
2	**Evolution of Business** Beginning and development of Commerce, Evolution of Industry, Industrial Revolution, Beginning and growth of Indian Business, Industrialization in India.
3	**Forms of Business Ownership** Introduction to various forms – Factors affecting choices of an deal form of ownership, features Merits and Demerits of Sole Proprietorship – Joint Hindu Family Business – Partnership – Joint Stock Company – Co-operative Organisation, Public Enterprises.
4	**Formation of a Company** Stages in formation and incorporation of a company (e Promotion – incorporation and registration – Capital Subscription – Commencement of Business. - Documents

	of a Company i.e. Memorandum of Association – Articles of Association – Prospectus.
5	**Establishment of Business Enterprise** Various factors to be considered while starting a new Business enterprise i.e. identification of Business Opportunity – Market Assessment – Suppliers – Technology – Location – Human Resource – Finance etc. Small and Medium Enterprises – Meaning Characteristics and objectives. Role of Support Organisation such as Trade Associations and Chambers of Commerce.
6	**Organization of Trade** Channels of Distribution – Meaning, Functions and types. Internal Trade – Wholesale and Retail External Trade – Import and Export. Role and importance of support services to Business such as Transport Insurance etc. Business Combinations – Mergers and Acquisitions. Franchising. Business Process Outsourcing. Multinationals – Concept and role of MNCs

Course Number	Course Name	Credits	
105	**Business Mathematics**	**3**	

Course Objective:

To give general idea about mathematics and its application in Business

Expected Outcome:

The students will be able to solve small business problems by using the concepts of Business Mathematics

References (Books, Websites etc) :

Discrete Mathematics & its Applications by Kenneth Rosen

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Set Theory :** Definition of a set, Representation of elements of sets, Methods of representing sets , types of sets, operations on sets , cardinality of a set, Principle of Inclusion and Exclusion , Venn Diagram , Proof by using Venn diagram
2	**Functions and Relations** : Definition of Function, Types of Functions ,Composite Function, Relation definition, representation of relations
3	**Logic:** Propositions, Logic Operations-Negation, Disjunction, Conjunction, Conditional and Biconditional, Truth Tables of compound propositions, Translating English sentences in to logical statements and vice versa, Logic gates and circuits
4	**Matrices:** Matrix Definition, General Form, Representation of matrix in computers, Types of matrices, Operations on matrices: Addition, Subtraction and Multiplication, transpose , row / column transformations , Inverse of the matrix by Co-factor and Adjoint method, solutions to three variable problems by using matrices, application problems of matrices
5	**Permutations and Combinations:** Concept- Permutation, Combination, Sum and Product rules, problems on Permutation and combination (with wording atleast, atmost, neither nor, any one etc.)
6	**Probability:** Concept and problem solving, general probability, conditional probability, partitions, Bayes Theorm

Course Number	Course Name	Credits	
106	**Lab on MS-Office Suite**	**1**	

Course Objective:

The objective of this course is to help the student gain proficiency in text editing and formatting, spreadsheet and database management, and presentation preparation. An additional objective of the course is for the student to gain basic knowledge of modern-day computing technology.

Expected Outcome :

Upon completion of this course students will be able to:

- Demonstrate an advanced knowledge of the Word Processing package, MS Office and a knowledge of how to design & create effective and structured documents like technical reports, letters, brochures, etc.,
- Demonstrate the skills in the appropriate use of various features of the spread sheet package MS Excel and also to create useful spreadsheet applications like tabulated statements, balance sheets, statistical charts, business statements, etc.
- Demonstrate the skills in making an effective presentation with audio and video effects using the MS Excel package
- Draw graphical pictures, flow charts, block diagrams etc., using the drawing tools available in MS Word or MS Power Point and incorporate them into documents and presentations.

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	
1	**Information Technology Essentials, Windows and Internet Explorer**: Verify the components of a typical computer system, Explore, maintain files, and customize the Windows operating system, Review using the Internet Explorer.
2	**MS Word:** Introduction: Introduction to MS Word, Menus, Shortcuts, Document types Working with Documents: a) Opening Files – New & Existing, Saving Files b) Formatting page and Setting Margins c) Converting files to different formats : Importing, Exporting , Sending files to others d) Editing text documents : Inserting , Deleting ,Cut, Copy, paste , Undo, Redo , Find, Search, Replace e) Using Toolbars, Ruler, Icons and help Formatting Documents:

	a) Setting Font Styles: Font selection – style, size, color etc., Type face – Bold Italic, underline, Case settings, Highlighting, Special symbols b) Setting Paragraph style: Alignments, Indents, Line space, Margins and Bullets and Numbering c) Setting Page Style: Formatting, Border & Shading, Columns, Header & footer, Setting Footnotes, Inserting manual Page break, Column break and line break, Creating sections and frames, Inserting Clip arts, inserting pictures and other files, Anchoring & Wrapping d) Setting Document Styles: Table of Contents, Index, Page Numbering, data &Time, Author etc., Creating Master Documents Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, Formula Drawing: Inserting Pictures/Files etc., Drawing Pictures, Formatting &Editing pictures, Grouping and ordering, Rotating Tools: Word Completion, Spell Checks, Macros, Mail merge, Templates, Using Wizards, Tracking, Changes, Security
3	**MS Power Point:** Introduction: Opening new Presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts Creating a presentation: Setting presentation style, Adding Text to the presentation Formatting a presentation: Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide background, Slide layout Adding Graphics to the presentation: Inserting pictures, movies, tables, etc into the presentation, Drawing Pictures using Draw Adding effects to the presentation: Setting Animation & transition effect, Adding audio and video Printing Handouts and Generating standalone presentation viewer
4	**MS Excel:** Introduction: Spreadsheet & its Applications , Opening spreadsheet, Menus & Toolbars &

	icons, Shortcuts , Using help Working with Spreadsheets: Opening a File, Saving Files, Setting Margins, Converting files to different formats : Importing, Exporting and Sending files to others Spreadsheet addressing : Rows, Columns & Cells, Referring cells and Selecting cells Entering and Editing Data: Entering Data, Cut, Copy, paste, Undo, Redo, Find, Search & Replace, Filling continuous rows, columns, Inserting -Data, cells, column, rows & sheets, Manual breaks Computing data : Setting Formula, Finding total in a column or row, Mathematical Operations(Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formula Formatting Spreadsheets: Formatting – Cell, row, column & Sheet: Alignment, Font, Border & shading, highlighting values Hiding/Locking Cells Worksheet : Sheet Name , Row & Column Headers, Row Height, Column Width, Visibility – Row, Column, Sheet , worksheet Security Formatting – worksheet: Sheet Formatting & style - background, color, Borders & shading, Anchoring objects, Formatting layout for Graphics, Clipart etc., Working with sheets : Sorting, Filtering, Validation, Consolidation, Subtotal , Creating Charts, Selecting charts, Formatting charts, label, scaling etc., Using Tools: Error Checking, Spell Checks, Macros, Formula Auditing, Creating & using Templates, Tracking changes, customization, printing worksheet
5	**Working with Excel Functions:** Concept of Functions, Commonly used functions: Sum, Max,Min, Average, Count, Today, Now, Datedif, Countif, CountA, CountBlank, Round, RoundUp, RoundDown, ABS, Sign, Ceiling, Floor, Trim, Value, Clean, sqrt, if, sumif
6	**MS Access:** What is an Access Database, Opening a Database File, Create Table, Create and modify fields of tables, Construct simple queries, Saving and Running Queries

Course Number	Course Name	Credits	
107	**Lab on C Programming I**	**1**	

Course Objective :

This is companion course of C Programming I

Syllabus Broad Units:

This Companion course of C programming; Practical aspects of C programming towards problem solving is covered.

Expected Outcome :

The students will develop adequate programming skills with respect to following

1. Implement a real world problem using basic constructs of C language.
2. Develop an application using Decision making and looping
3. Make use of proper operators to solve problem.
4. Make use of Arrays and pointers efficiently and handling strings.
5. Comprehend the dynamic memory allocation and pointers in C.
6. Able to define new data types using enum, structures and typedef.

References (Books, Websites etc) :

1. Let us C - Y.Kanetkar, BPB Publications4. Yashawant Kanetkar, let Us C, BPB Publication
2. Programming in C - Gottfried B.S., TMH 2.
3. The 'C' programming language - B.W.Kernighan, D.M.Ritchie, PHI
4. Programming in ANSI C - Balaguruswami, TMH
5. C- The Complete Reference - H.Sohildt, TMH
6. A Structured Programming Approach using C – B.A. Forouzan & R.F. Gillberg, THOMSON Indian Edition
7. Computer fundamentals and programming in C – Pradip Dey & Manas Ghosh, OXFORD

Outline of Lab on C programming – I

Sr. No	Programming Exercises
1	Compilation and Executing programs Arithmetic operations Use of Symbolic constants Demonstrating the following gcc options -o, -c, -D, -l, -I, -g, -E Programs to demonstrate use of operators and Input/ output ***gcc or an equivalent compiler is assumed***.
2	Program to demonstrate the following

	– Branching – Nested Branching – Looping – Selection
3	Working with functions – Writing function prototype and definition – Using functions to solve problems (Calling a function) – Using recursion – Storage classes - Using register, extern and static
4	Arrays and Strings 1D - Linear Search, Sort 2D - Matrix operations Strings: program to do operations on string using library and user defined functions Finding length of string, String concatenation, removing extra spaces, get substring, check whether second string is part of another, converting string to lowercase, uppercase etc.
5	Structures Making use of structures to define new types(user defined types) Arrays of structure, display all elements of array and sorting of them.
6	Pointers, Programs to demonstrate working of pointer; need of pointer Pointer as parameter to function Comparison of pointer with arrays and using pointer to refer an array Creating pointer dynamically by using dynamic memory allocation Array of Pointers, Ragged Arrays, Function pointer

Course Number	Course Name	Credits	
108	**Community Work**	**1**	

Course Objective:

This course aims to expose the students to social issues and help them Participate in community service through trips/events organized at institute, state level etc and also to Volunteer at events like fundraising activities, fairs, festivals, slums, non profit organization etc

(I) To expose the students towards social reality and role of community development for social upliftment and well being

(II) To involve students in community work through active involvement and participation

Expected Outcome:

Students will be able to know the community needs and understand their role ito contribute meaningfully towards community development

Course Plan

Unit	**Contents**
1	History, meaning, Goals, values, functions, role and process of community work. Professional and voluntary community work. Attitudes, roles and skills of a community worker .
2	Social concerns in India: poverty, unemployment, population, problems faced by women – dowry, domestic violence, etc. Social problems - terrorism, corruption, caste conflict, drug abuse, AIDS, ETC.
3	Types of community work. Caring for needy, helping the poor, fundraising drives-organizing.
	COMMUNITY HOURS: Participate in community service trips/events organized at institute, state level etc , Volunteer at events like fundraising activities, fairs, festivals, slums, non profit organization etc , Submit a report on a particular type of community involvement undertaken.

Course Number	Course Name	Credits	
108	**Career & Life Skills**	**1**	

Course Objective:

a. To help students make well-informed, thoughtful decisions regarding your future as adults.
b. To develop behaviours and attitudes that help students contribute to the community in a positive manner.
c. Give you skills and knowledge to contribute to the well-being and respect of the self and others

Expected Outcome:

Students will be able to understand self potential and ways to enhance capabilities.

References (Books, Websites etc) :

LifeChoices Series: - LifeChoices: Careers, Healthy & Well, Relationships, Venturing Out

Online Resources:

1. the life-changing magic of tidying up: the japanese art of decluttering and organizing - marie kondo
2. how to organize (just about) everything: more than 500 step-by-step instructions for everything from organizing your closets to planning a wedding to creating a flawless filing system – peter walsh

Mindset: the new psychology of success -carol s. Dweck

Course Plan

Unit	Contents
1	**Unit 1: Introduction to Life Management** Life management-definition, scope and application, concept of emotions, self belief, setting realistic goals, understanding system
2	**Unit 2: Developing Emotional Potential and Physical Potential** Improving thinking skills, improving study skills, planning education Eating habits, healthy foods, staying healthy, changing habits-the self change model
3	**Developing Your Intellectual Potent** Effective communication, effective listening, effective speaking ,getting along with others, functioning in groups, how to delegate. Definition-stress, handling change and stress, managing time, managing money, formulation of career plan, bring it all together
4	**Career and Life Choices** Managing personal, lifelong career development. **Resource Choices…** Making responsible decisions in the use of finances and other resources that reflect personal values and goals as well as a commitment to self and others. **Personal Choices…** Understand the emotional/psychological, intellectual, social, spiritual, and physical dimensions of health and how these dimensions of health work together to contribute to personal well-being.

Course Number	Course Name	Credits	
108	**Waste Management**	**1**	

Course Objective:

To expose students to the issue of waste and waste management tools and techniques applicable for waste disposal and management.

Expected Outcome:

After completion of the course students

- will be able to understand solid waste sources, health and environmental issues related to solid waste management.
- will get knowledge about Sources, handling and control of Biomedical, Chemical, Nuclear and e-wastes.

will be able to understand the issues regarding waste disposal and management and will become aware of Environment and health impacts due to solid waste mismanagement

References (Books, Websites etc) :

1. D. Bhide and B.B. Sundaresan, "Solid Waste Management – Collection, Processing and disposal" Mudrashilpa Offset Printers, Nagpur, 2001.
2. Biomedical waste (Management and Handling) Rules, 1998.
3. George Tchobanoglous, Hilary Theisen, Rolf Eliassen; Solid Wastes: Engineering Principles and Management Issues; McGraw-Hill.
4. Manual on Municipal Solid Waste Management, New Delhi, Controller of Publications.
5. Freeman H.M. (1988) Standard Handbook of Hazardous Waste Treatment and Disposal, New York, McGraw-Hill.
6. Constitutional Law of India – J.N. Pandey 1997 (31st Edn.) Central Law Agency Allahabad.
7. Diganta Bhusan Das , Diganta Bhusan Das; Solid Waste Management: Principles and Practice
8. George Techobanoglous et al,"Integrated Solid Waste Management" McGraw - Hill, 1993.
9. A Study of Waste Management Systems in Pune Municiple Corporation, Rajendra Jagtap, Ph.D Thesis, Bharati Vidyapeeth University, Pune

Online Resources:

1. http://www.moef.nic.in/legis/hsm/mswmhr.html
2. en.wikipedia.org/wiki/waste management
3. http://www.cyen.org/innovaeditor/assets/Solid%20waste%20management.pdf
4. http://www.ilo.org/oshenc/part-vii/environmental-pollution-control/item/514-solid-waste-management-and-recycling
5. www.houstontx.gov/solidwaste
6. www.epa.gov/tribalmsw/

7. www.unc.edu/courses/2009spring/.../SolidWasteIndiaReview2008.pdf 8. http://www.digitalbookindex.org/_search/search010environmenwasterefusea.asp (e-books)	
Course Plan	
Unit	Contents
1	**Solid Waste Management-** **Introduction to waste Management** Introduction, Meaning, Solid waste including municipal, hospital and industrial solid waste; health and environmental issues related to solid waste management. Provisions in Indian Penal Code for Environmental protection.
2	**Biomedical, Chemical, Nuclear and e-wastes** Biomedical wastes – Types – Management and handling – control of biomedical wastes, Chemical wastes – Sources –Environmental effects – Need for control – Health and environmental effects. Nuclear waste – Management of nuclear wastes, e-waste- sources and management.
3	**Waste reduction at source** Treatment and disposal techniques for solid wastes–composting, vermin-composting, autoclaving, microwaving, incineration, non- incineration, Thermal techniques, use of refuse derived fuels, land-filling. **Reduce Reuse and Recycling Techniques:** Need for the concept-Various Types - Handmade Paper production –Reuse of materials-Recycle of material

Semester II

Course Number	Course Name	Credits	
201	**Computer Organization and Architecture**	**3**	

Course Objective:

Main objective of this paper is to learn structure and functioning of various hardware components of digital computer. Also study the interactions and communication among these hardware components.

Expected Outcome :

At the end of this course, student should be able to understand

- Simple machine architecture and the reduced instruction set computers.
- Memory control, direct memory access, interrupts, and memory organization
- Basic data flow through the CPU (interfacing, bus control logic, and internal communications).
- Number systems, instruction sets, addressing modes, and data/instruction formats.

References (Books, Websites etc) :

M Morris Mano Computer systems Architecture third edition Prentice Hall of India Publication

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction To Digital Computer:** Data Representation – Data Types – Complements – Arithmetic Operations – Representations – Fixed –Point, Floating – Point , Decimal Fixed – Point – Binary Codes- Logic Gates, Boolean Algebra, Map Simplification – Combinational Circuits: Half-Adder, Full Adder- Flip Flops - Sequential Circuits
2	**Introduction To Digital Components And Micro Operations:** ICs – Decoders – Multiplexers – Registers – Shift Registers – Binary Counters – Memory Unit – Register Transfer Language – Register Transfer – Bus And Memory Transfers – Arithmetic, Logic And Shift Micro Operations , Arithmetic Logic Shift Unit.
3	**Computer organization:** Instruction Codes – Computer Registers – Computer Instructions – Timing And Control – Instruction Cycle – Memory Reference Instructions – I/O And Interrupt – Machine Language – Assembly Language – Assembler.
4	**Memory Organization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management.
5	**Central Processing Unit:** General Register Organization – Control Word – Stack Organization – Instruction Format – Addressing Modes – Data Transfer And Manipulation – Program Control, RISC
6	**Input – Output Organization:** Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes Of Transfer – Priority Interrupt – DMA – IOP – Serial Communication.

Course Number	Course Name	Credits	
202	**DBMS I**	**3**	

Course Objective:

This is a foundational course on Data Modeling. The course aims to impart knowledge of the concepts related to database and operations on databases. It also gives the idea how database is managed in various environments with emphasis on security measures as implemented in database management systems.

Expected Outcome :

At the end of the course, student should be able to

A) Understand the concepts of database and techniques for its management.

B) Different Data Models at Conceptual and Logical level.

C) Differentiate between the role of DBA and Data Architect

D) Understanding Data Security standards and Methods

References (Books, Websites etc) :

1) Database System Concepts By Henry korth and A. Silberschatz

2) Database Systems Concepts, Designs and Application by Shio Kumar Singh, Pearson

3) Database Management Systems by Debabrata Sahoo ,Tata Macgraw Hill

Suggested MOOC :

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Course Plan

Unit	Contents
1	**Introduction of Database Management System:** Difference between Data, Information, Data Processing & Data Management. File Oriented Approach, Database oriented approach to Data Management, Need for DBMS, Characteristic of Database, Database Architecture: Levels of Abstraction, Database schema and instances, 3 tier architecture of DBMS, Data Independence. Database users, Types of Database System. Database Languages, DBMS interfaces.
2	**Data Modeling:** Data Models, Logical Data Modeling: Hierarchical Data Model, Network Data Model, Relational Data Model, Advantages and Disadvantages of Logical Data Modeling. Conceptual Data Modeling: Entity Relationship Model, Entities, Attributes, Types of Attributes, Relationships, Degree of relationship Set, Mapping Cardinalities, Keys, ER Diagram Notations, Roles Participation: Total and Partial, Strong and Weak Entity Set. Case studies on ERD.
3	**Normalization:** Keys: Composite, Candidate, Primary, Secondary, Foreign, Super key,CODD's Rules, Mapping conceptual model into Relational Model. Functional Dependencies,

	Decomposition, Lossy and Lossless Decomposition, Dependency Preserving Decomposition Advantages and Disadvantages of Normalization, Normal Forms (1NF, 2NF, 3NF,) Case Studies on Normalization.
4	**File Structures and Data Administration:** File Organization, Overview of Physical Storage Media, Magnetic Disk, RAID, Tertiary Storage, Storage Access, Data Dictionary Storage, Organization of File (Sequential, Clustering), Indexing and Hashing, Basic Concepts, indices, B+ Tree index file, B- tree index file, Static hashing, Dynamic Hashing, Data administration, Role and Responsibility of DBA
5	**Transaction and Concurrency Control** Multiprogramming and Multiprocessing, Basic Database access operations, Concept of transaction, transaction state, ACID properties, Schedules, Serializability of schedules., Concurrency Control, lock based protocols, timestamp based protocols, Multiple granularity, Multiple Version Techniques, Deadlock and its handling, Wait-Die and Wound-Wait, Deadlock prevention without using timestamps, Deadlock detection and time outs
6	**Database Recovery and security Management:** Database Recovery, Types of Failures, and Data access. Recovery and atomicity, Recovery Techniques Algorithms: Log Based Recovery, Check points, Shadow Paging, Recovery with concurrent transactions

Course Number	Course Name	Credits	
203	**C Programming - II**	**3**	

Course Objective:

- To understand file handling in C.
- To develop skills to analyze the problem given and to design & develop an efficient solution to given problem
- To develop capability to choose appropriate data structures for given problems
- To imbibe programming skills & thereby making industry ready

Expected Outcome:

After undergoing this course, student will

1. Have thorough knowledge about data structures
2. Ability to design& develop program using linear data structures& non linear data structures for solving problems
3. Ability to choose appropriate data structures for problem solving
4. Ability to use combination of these data structures for problem solving.

References (Books, Websites etc) :

1. Behrouz A. Forouzan and Richard F. Gilberg , 2nd Edition, Thomson, 2003, Computer Science A Structured Programming Approach Using C
2. Basavraj S Anami, Shanmukhappa Angadi, Sunil Kumar S Manvi, PHI Publications, 2010. A Holistic approach to learning C.
3. Andrew Tenanbaum, Thomson, 2005, Data Structures with C.Robert Kruse & Bruce Leung, Data Structures & Program Design in C, Pearson Education,

Suggested MOOC :

Data structures and Algorithms, Prof. Sudarshan Iyengar, IITRopar, 8 weeks, Rerun Feb 05, 2018 https://onlinecourses.nptel.ac.in/noc16_cs06 at NEPTEL

Course Plan

Unit	Contents
1	**Elementary Data Structures**: Basic concepts such as data object, array, and record; Operations and relations on data objects; definition of data structure; Built-in data types as examples of data structures; concept of abstract data type; notation to specify an abstract data type; concepts of pre-conditions and post-conditions; Implementation of an ADT in a language; Specification and implementation of simple data structures such as Integer, Rational, Currency, Date, Temperature, distance, Pay, Marks, Grade_card etc.
2	**Linear Data Structures:** (Representation in Memory and operations like insertion, deletion and traversal) – one and multidimensional array, Pointer arrays, single link list, circular link list, double link list

3	**Particular Linear Data Structures:** Representation in Memory and operations like insertion, deletion and traversal) - Stacks: Applications: implementation of recursion, factorial calculation, queues, circular queue, deques;
4	**File Handling:** Creation, reading writing in a file. Pattern Matching and Extraction of data from a file. Reading and writing from files.
5	**Hierarchical data structures** : General trees and related concepts; depth first and breadth first traversal of trees; n-ary trees and important properties of n-ary trees; binary trees and their properties; binary tree traversal algorithms.
6	**The problem of search and Sorting** : Llinear and binary search and their efficiency; Hash tables, The standard sort algorithms (Bubble/insertion/selection) and their efficiencies; Merge sort and quick sort algorithms and their efficiencies.

Course Number	Course Name	Credits	
204	**Financial Accounting**	**2**	

Course Objective:

9. To impart basic accounting knowledge
10. To lay a foundation for further study of accounting at higher level
11. To enable the students to understand basic accounting principles, practice and its applications in modern business activities.

Expected Outcome :

- The knowledge of accounting and its principles at basic level.
- Practical's in Tally and Excel for Financial Accounting assignments

References (Books, Websites etc) :

1. Dr. S. N. Maheshwari , Financial Accounting For Management: (Vikas Publishing House)
2. Robert Anthony, David Hawkins, Business Accounting. (Tata McGraw –Hill)
3. M.G.Patkar, Book-Keeping & Accountancy. Std XI(FYJC) Commerce
4. Anil Chowdhry , Fundamentals of Accounting & Financial Analysis (PearsonEducation)
5. M.E.Thukaram Rao, Accounting for Managers.(New Age International Publishers)

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction:** Need for Accounting, Meaning and definition of book keeping, System of Book keeping. Financial Accounting-definition, Scope and objectives. Accounting v/s Book Keeping. Limitations of Financial Accounting, End users of financial statement.
2	**Accounting Principles, Concepts and Conventions:** Accounting Principles-definition and importance, Accounting Concepts and Conventions, Branches of accounting.
3	**Journal and ledger:** Journal-importance and utility, classification of accounts, journalizing of transactions. Ledger- meaning and utility, posting and balancing of account
4	**Subsidiary Books And Trial Balance:** Cash book, purchase book, sales book. Trial Balance- meaning and purpose, preparation of a trial balance.
5	**Preparation of final accounts:** Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietary business.
6	**Computerized Accounting:** Computers and Financial application, Accounting Software packages. (Orientation level)

Course Number	Course Name	Credits	
205	**Principles of Management**	**2**	

Course Objective:
To understand the concepts in Management and to develop the skills related to practice of management.

Expected Outcome:
To understand the functions and processes of business management.

References (Books, Websites etc) :

1. Heinz Weihrich & Harold Koontz , Principles and Practice of Management
2. Tripathi & Reddy , Principles of Management
3. Dr. L.M.Prasad, Principles of Management
4. Richard Daft., Management. Thomson South Western Publishers, Australia

Suggested MOOC :
Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Management:** Definitions and Meaning of Management, Characteristics of Management, Management Vs. Administration, Levels of Management, Functions of management, Scope and Importance of Management, Henry Fayol' s contribution to Management, Fredrick Taylor's contribution to Scientific Management, Social Responsibility of Management.
2	**Planning:** Meaning, Steps in planning process, Nature of planning , Types of plans, Mission and Objectives, Process of setting Objectives, Management by Objectives, Decision making - process.
3	**Organizing:** Meaning, Process of Organizing, Organization Structure, Forms of Organization
4	**Staffing:** Recruitment and its Sources, Selection process, Payment of Wages and Salaries, Incentives - Types, Motivation - Positive and Negative motivation.
5	**Directing:** Defining Leadership, Types of leadership. Authority & Responsibility, Delegation of Authority, Decentralization - Determinants of decentralization, Distinction between Delegation and Decentralization.
6	**Controlling:** Meaning, Characteristics of Control, Process of Controlling, Modern methods of controlling, Requirements for Effective Control, Relationship between Planning & Controlling. Use of IT in Controlling. Zero Based Budgeting and Management audit.

Course Number	Course Name	Credits	
206	**Lab on C Programming -II**	**1**	

Course Objective :

This is companion course of C Programming II

Syllabus Broad Units:

This Companion course of C programming II; Practical aspects of C programming towards problem solving is covered.

Expected Outcome :

The students will develop adequate programming skills with respect to following

1. Define basic data structures such as Date, Currency and Rational; and using it.
2. Defining and using and updating Liner data structures : arrays and Linked List
3. Should define data types such as stack, queue and List
4. Able to read and write data into files.
5. Able to define hierarchical data types; manipulate and use it.
6. Able to understand searching and sorting mechanism and use various algorithms on it.

References (Books, Websites etc) :

1. Behrouz A. Forouzan and Richard F. Gilberg , 2nd Edition, Thomson, 2003, Computer Science A Structured Programming Approach Using C
2. Basavraj S Anami, Shanmukhappa Angadi, Sunil Kumar S Manvi, PHI Publications, 2010. A Holistic approach to learning C.
3. Andrew Tenanbaum, Thomson, 2005, Data Structures with C.Robert Kruse & Bruce Leung, Data Structures & Program Design in C, Pearson Education,

Lab on C programming -II

Sr. No	Programming Exercises
1	Elementary Data Structures - Write a program having functionality of one dimension and two dimensionarrays with use of simple data types such as Integer, Float, Date etc. - Write a program wherein mathematical calculations involves such as average, percentage calculation, Factorial calculation and Matrix multiplication - Write program for structure implementation for array and pointers. - Create a object of the class to achieve various functionalities of accounting such as Net Pay calculation, Tax dedication, Gross pay etc.
2	Linear Data Structures - Demonstrate various functionalities for Link list, Circular link list and double link list with the reference of array and pointer. - Write a C program to insert and delete string / integer data from specific place of

	linked list. - Search a specific string/ integer in a given data set also find how many time it occurs or repeats in a set given
3	Particular Linear Data Structures - Write program for implementation of recursion - Demonstrate Insertion, Deletion and Searching functionalities with their nomenclatural for – o Stack o Queues o Circular Queues - Do necessary assumption for implementation of it
4	File Handling – Program to create and write data into files – Program to read data from files. – Programs on pattern matching on data of files and using this pattern matching at the time of reading and writing data into file
5	Hierarchical data structures – Programs for defining data structure to represent a tree. Creating tree and adding data/nodes into it. – Programs to traverse tress: DFS, BFS and other – Deleting and nodes in tree
6	The problem of search and Sorting - Programs to use liners/sequential searching and binary searching - Programs to implement standard sorting algorithms with efficiency measurement - Reading data form and using it with various sorting algorithms

Course Number	Course Name	Credits	
207	**Environment Studies**	**1**	

Course Objective:
To Understand and the nature and function of the natural environment affecting society.

Expected Outcome :
Understand the importance of Environment in the life of living things.

References (Books, Websites etc) :

- Agrawal K.C.:Environmental Biology:Nidhi Publishers Ltd(2001)
- Bharucha Erach: The Biodiversity of India: Mapin Publishing Pvt. Ltd.
- Jadhav H and Bhosale V.M.: Environmental Protection and Laws: Himalaya Publishing House.
- Miller T.G. Jr.: Environmental Science: Wadsworth Publishing Co.

Suggested MOOC :

Course Plan

Unit	Contents
1	**The multidisciplinary nature of environment studies:** Definition, scope and importance-need of public awareness. **Natural Resources**: **Renewable and non-renewable resources:** **Forest resources:** Use and over- exploitation, deforestation. Case studies. Timber extraction, mining, dams and their effects on forest and tribal people. **Water resources:** Use and over-utilization of surface and groundwater, floods, droughts, conflicts over water, dams- benefit and Problems. **Mineral Resources:** Use and exploitation 'environmental effects of extracting and using mineral resources, case studies. **Food resources:** World food problems, changes caused by agriculture. Fertilizer-pesticide problems, water logging, salinity, case studies. **Energy resources:** Growing energy needs, renewable and non-renewable energy resources, use of alternative energy sources. **Land resources:** Land as resources, land degradation, man induced landslides, desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles
2	**Ecosystem:** Concept of ecosystem, structure and function of an ecosystem, producers, consumers and decomposers .Energy flow in the ecosystem, Ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristics features structure and function of the following ecosystem, forest ecosystem ,grassland ecosystem, Desert ecosystem, Aquatic ecosystems, ponds, stream, lakes, rivers, estuaries.

3	**Biodiversity and its conservations:** Introduction, Definition: genetic, species and ecosystem diversity, Biogeographically classification of India, value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option vales, India as a mega diversity nation, Hot-Spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, Man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.
4	**Environmental Pollution:** Definition- Causes, effects and control measures of:-Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear hazards .Soil waste management: cause, effects and control measures of urban and industrial waste. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquakes, cyclone and landslide.
5	**Social issues and Environment:** From unsustainable to sustainable development, urban/problems related to energy, water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns Case Studies, Environment ethics: Issues and possible solutions ,wasteland reclamation, Consumerism and waste products, Environment protection Act, Air(presentation and Control of Pollution)Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.
6	**Human Population and the Environment:** Population growth, variation among nations, population explosion-Family Welfare Programme. Environment and Human health. Human Rights Value Education. HIV/AIDS Women and Child Welfare. Role of Information Technology in Environment and human health.

Course Number	Course Name	Credits	
208	**Community Work – Swacch Bharat Abhiyan**	**1**	

Course Objective:
This course aims to expose the students to Swach Bharat Abhiyan initiative of the government.

Expected Outcome :
Students will be able to understand the details about the Swach Bharat Abhiyan and its impact on society.

References (Books, Websites etc) :
www.swachhbharaturban.in/
swachhbharatmission.gov.in

Course Plan

Unit	Contents
1	History, meaning, Goals of Cleanliness initiatives
2	Initiators of cleanliness drive in India. Sant Ghadage Baba, Mahatam Gandhi, Efforts taken towards the Swach Bharat Abhiyan, Swach Bharat Mission
3	Impact of Cleanliness initiatives. Social Awareness, Case Studies.
	COMMUNITY HOURS: Internship of 15 days (100 hours) to be undertaken Submit a report on a particular type of community involvement undertaken

Course Number	Course Name	Credits	
208	**Sectoral Analysis**	**1**	

Course Objective:

- To expose the students to the different sectors of the economy
- To enable the students to understand the importance and contribution of the sectors to business, economy and global environment
- To expose the students towards rural problems To awaken sense of responsibility amongst students towards senior citizens

Expected Outcome :

Students will get exposure to the different sectors of the economy and their contribution to the national development.

References (Books, Websites etc) :

1. S.A. Sherlekar ,Modern Business Organization And Management – (Himalaya Publishing House)
2. Y.K. Bhushan ,Fundamental Of Business Organization & Management – (S Chand Publishers)
3. Basu, C. R.; *Business Organization And Management*, Tata Mcgraw Hill, Publishing House, New Delhi, 1998
4. Business World

Course Plan

Unit	Contents
1	Introduction to the sectors of the economy
2	Detailed view of the IT, Manufacturing, Agriculture, Banking Insurance, Service Sector, Retail
3	Project work on detailed analysis of any one sector – national and global scenario

Course Number	Course Name	Credits	
208	**Smart Cities**	**1**	

Course Objective:

To give exposure to tools and techniques applicable for planning, controlling & monitoring of Smart Infrastructure and Cities. This subject would also enable to develop insight for managing project risks, uncertainties and complexities of smart cities
project.

Expected Outcome :

Students will get an understanding of road map for Planning Smart Cities and benchmarking their performance for Indian context.

References (Books, Websites etc) :

Suggested MOOC :

Course Plan

Unit	Contents
1	Introduction to Smart Cities, •Introduction to '"City Planning", Understanding Smart Cities
2	Dimensions of Smart Cities, Global Experience of Smart Cities, Smart Cities –Global Standards and Performance, Benchmarks, Practice Codes, India "100 Smart Cities" Policy and Mission
3	•Smart City Planning and Development •Financing Smart Cities Development •Governance of Smart Cities, Case Studies on Smart Cities

SEMESTER III

Course Number	Course Name	Credits	
301	Operating Systems	3 Credits	

Course Objective:

- To provide an understanding of the major operating system components
- To provide coverage of basic computer system organization
- The overall aim of this course is to provide a general understanding of how a computer works. This includes aspects of the underlying hardware as well as structure and key functions of the operating system.

Expected Outcome :

At the end of this course, student should be able to

- Explain the concepts of process, address space and file
- Compare and contrast various CPU scheduling algorithms
- Understand functioning and working of Windows as well as Unix Operating System

Prerequisite:

Students should have basic knowledge of working on an operating system

References (Books, Websites etc) :

- Operating systems design and implementation by Andrew Tanenbaum and Albert Woodhull
- Operating systems concept and design by Milan Milenkovic
- Operating system Concepts by Silberschulz, Abraham and Galvin, peter raer

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Operating System:** Definition and concept of OS, History of OS, Importance and function of Operating system. Types of OS-Batch System, timesharing, Multitasking, multiprogramming, multiprocessing, online operating system, real time, distributed operating system. Views-command language users view, system call users view, structure of OS- simple, monolithic system and layered system, client server model. User operating-system interface: command line interface, GUI, system calls. **Case Study:** Unix History, General Structure of Unix, The shell of Unix operating system, The shell of Unix operating system
2	**Process Management:** Process concept, Process Control Block, process states and its transitions, context switch, OS services for Process management, scheduling and types of schedulers, scheduling algorithm- First come first served, shortest job first, shortest remaining time next, time slice scheduling, priority based scheduling, multilevel queue, multilevel queue with feedback **Case Study:** Process management in Unix

3	**Storage Management:** Basic concept of storage management, logical and physical address space, swapping, contiguous allocation, non-contiguous allocation, fragmentation, segmentation, paging, demand paging, virtual memory, page replacement algorithms- FIFO, Optimal page replacement algorithm, least recently page replacement algorithm, clock page replacement algorithm, design issue of paging, thrashing,
4	**Inter-process communication and synchronization:** Need, Mutual Exclusion, Semaphore, Busy-wait Implementation, characteristics of semaphore, queuing implementation of semaphore, producer consumer problem, critical region and conditional critical area. What is deadlock? Conditions to occur the deadlock, deadlock prevention, deadlock avoidance- banker's algorithm. resource request, resource release.
5	**File Systems:** Files-basic concept, file attributes, operations, file types, file structure, access methods, Directory- structure-single level directory system, two level directory system, hierarchical directory system, directory operations, protection, security, allocation method. **Case Study:** Unix File Management and Security
6	**Input/output System:** Principles of I/O hardware, I/O devices, device controller, DMA, Principles of I/O software-goals, interrupt handler, device driver. Mass storage structure-disk structure, disk scheduling (FCFS, SSTF, SCAN, LOOK, C-SCAN, C-LOOK) **Case Study:** Input output management in Unix

Course Number	Course Name	Credits	
302	Software Engineering	3 Credits	

Course Objective:

To introduce the current methodologies involved in the development and maintenance of Software over its entire life cycle.

Learning Outcome : At the end of this course, student should be able to

- Understand life cycle models**,** Requirement elicitation techniques, understand the concept of Analysis and Design of software.
- Develop SRS as per any of the existing standards.
- Implement software engineering concepts in software development to develop quality software.

Pre-requisites:

Preliminary knowledge of computer, their operations and applications.

References (Books, Websites etc):

- SOFTWARE ENGINEERING A PRACTITIONERS APPROACH seventh edition BY Roger S. Pressman McGraw Hill International Edition.
- Software Engineering by Sommerville, Pearson Education, 7th edition
- Software Engineering by K.K. Aggarwal & Yogesh Singh, New Age International Publishers.

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Software Engineering:** Software, Program vs Software, software characteristics, Definition of Software Engineering, importance, principles of software engineering, Difference between software engineering and software programming, Members involved in software development.
2	**Software process and Feasibility study:** Need of Feasibility study, types of Feasibility study, Cost Benefit Analysis. General software development life cycle with all phases. Overview of software models (Waterfall, Prototyping, and Spiral and Rapid Application Development model).
3	**Requirement Engineering Concepts and Methods:** What is Requirement Engineering, Types of requirements, Requirement elicitation techniques- Traditional methods and Modern methods, Verification and validation process. Principles of Requirement Specification, Software Requirement Specification document Outline Characteristics of good SRS: - correct, complete, unambiguous, consistent, modifiable, traceable, Understandable

4	**Analysis and Structured System Design tools:** **Analysis and Design Tools** : Entity-Relationship Diagrams, Decision Tree and Decision Table , Data Flow Diagrams (DFD) , Data Dictionary , Elements of DD Advantage of DD , Pseudo code , Input And Output Design **Structured System Design:** Modules Concepts and Types of Modules Structured Chart , Qualities of Good Design , Coupling, Types of Coupling , Cohesion, Types of Cohesion, CASE STUDIES (Based on Above Topic)
5	**Software Testing and Software Quality Assurance** **Software Testing:** Definition, Test characteristics, Types of testing: Black-Box Testing , White-Box Testing ,Unit testing , Integration testing, Validation, Verification. **Quality concept:** (Quality, quality control, quality assurance, cost of quality), SQA activities, SQA plan. Formal Technical review: Review meeting, review reporting and review guidelines Software Configuration Management: - What is configuration management, Baseline, Software Configuration items, SCM process- Identification of objects, Version control and Change control.
6	**Software Maintenance:** What is software maintenance? Problems during software maintenance. **Categories of Software Maintenance**: Corrective maintenance, Adaptive maintenance, Perfective maintenance, and preventive maintenance. Cost of Maintenance, Maintenance Activities. **Maintenance Process and Models:** Maintenance processes, Fix Model, Iterative Enhancement Model, Reuse Oriented Model, Boehm Model, and Taute's Models.

Course Number	Course Name	Credits	
303	**DBMS – II**	**3 Credits**	

Course Objectives:

The main objective is to teach the concepts related to database its techniques and operations. SQL (Structured Query Language) is introduced in this subject. This helps creates strong foundation for application of data design.

Expected Outcome:

At the end of this course, the student should be able to:

- Creating tables, and queries using SQL
- Applying SQL Operators and SQL Functions in the created tables in SQL;
- Writing and solving complex queries based on joins, sub queries
- Writing PL/SQL blocks, objects

Text Books:

Ivan Bayross. SQL, PL/SQL The Programming Language of Oracle 3rd Revised Edition BPB Publications

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Syllabus

1.	**Introduction to Oracle and SQL:** Introduction to Oracle: History, Features, Versions of Oracle, Oracle File Management, Spool command **SQL:** Defining a database in SQL, Components of SQL: DDL, DML, DCL, DQL, SQL query Rules, Data types, Keywords, Delimiters, Literals. DDL Commands – Defining a database in SQL, Creating table, changing table definition, removing table. DML Commands- Inserting, updating, deleting data. DQL Commands: Select Statement with all options. Renaming table, Describe Command, Distinct Clause, Sorting Data in a Table. Data Constraints: Primary key, Foreign Key, NOT NULL, UNIQUE, CHECK constraint.
2.	**Operators:** Arithmetic, Logical, Relational, Range Searching, Pattern Matching, IN & NOT IN Predicate, all, % any, exists, not exists clauses, Set Operations: Union, Union All, Minus, Intersect.
3.	**Joins and Oracle Functions:** Join Concept. Simple join, equi join, non equi join, Self join, Outer join, Sub queries, Aggregate Functions, Numeric Functions, String Functions, Conversion functions, Date conversion functions, and Date functions.

4.	**Database Objects:** **Index**: Creating index, simple index, composite index, unique index, dropping indexes, multiple indexes on table **Sequence**: Creating sequence, altering sequence, dropping sequence. **Views**: Concept, creation, usage **Objects**: declaring and initializing objects in SQL, Manipulating object in PL/SQL
5.	**Introduction to PL/SQL programming:** Introduction, Advantages, PL/SQL Block, PL/SQL Execution Environment, PL/SQL Character set, Literals, Data types, Variables, Constants, Displaying User Message on screen, Conditional Control in PL/SQL, Iterative Control Structure: While Loop, For Loop, Goto Statement
6.	**Advanced Programming Techniques of PL/SQL:** **Cursors**: Introduction, Types of Cursors: Implicit Cursor, Explicit Cursors, Parameterized cursors, Programs on cursors **Triggers**: Introduction, Use of triggers, Types of Triggers, Creating triggers, Examples on Triggers **Stored Procedures / Functions:** Introduction, How oracle executes procedures/ functions, Advantages, How to create Procedures & Functions, Examples

Course Number	Course Name	Credits	
304	Statistics	3 Credits	

Course Objective:

The main objective is to introduce basic concepts of statistics to the students and make them competent in collecting and analyzing the data by using statistical techniques

Expected Outcome : At the end of this course, student is expected to

- Tabulate the raw data by using frequency distribution and represent the data graphically.
- Analyse the data by using measures of central tendancy and dispersion
- Estimate the value of dependent variable
- Generate the relationship between two variables in the form of degree or equation

Prerequisite:

Students should have basic knowledge of use of calculator and research attitude

References:

1) Fundamentals of Statistics , S.C. Gupta , Himalaya Publishing House (5th Edition)

2) Business Statistics , S.P. Gupta, M.P. Gupta –Sultan Chand & Sons, New Delhi (16th Edition)

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Statistics:** Definition of Statistics, Importance of Statistics, Scope of statistics : Economics, Computer Science, Business and Management, limitations of Statistics .
2	**Data Collection and representation:** Primary and Secondary data, Sources of Data collection, Tabular Representation of data: Ungrouped and grouped frequency distribution, Graphical representation of data: Simple bar, subdivided bar, percentage bar diagram, pie diagram, histogram, frequency polygon, ogive curves.
3	**Measures of central tendency:** a)**Mean**: Definition, problems on mean for listed data items, discrete distribution and continuous distribution, merits and demerits b)**Median**: Definition, problems on median for listed data items, discrete distribution and continuous distribution, merits and demerits c) **Mode**: Definition, problems on mode for listed data items, discrete distribution and continuous distribution, merits and demerits.
4	**Measures of Dispersion:** **a)Range:** Definition, problems on range for listed data items, discrete distribution and continuous distribution, merits and demerits of range **b)Mean Deviation:** Definition, problems on mean deviation about mean for listed data items, discrete distribution and continuous distribution, merits and demerits

	c) Standard Deviation: Definition, problems on standard deviation for listed data items, discrete distribution and continuous distribution, merits and demerits. **d)Deciles, percentiles, quartiles**
5	**Regression and Correlation:** a) **Regression**: Definition, regression equations, regression coefficients, problems on finding regression equations and estimations b) **Correlation**: Definition, Karl Pearson's correlation coefficient, Spearman's Rank correlation with correction factor
6	**Time series analysis:** Components of Time series Analysis , Fitting a straight line $y=ax+b$, fitting a curve $y=ax^2+bx+c$,3 yearly and 5 yearly moving averages

Course Number	Course Name	Credits	
305	Multimedia Technology	2 Credits	

Course Objective:

The main objective of this course is to know the concept of multimedia by students. To know different software tools used in multimedia technology. To know multimedia computing.

Expected Outcome: After learning this course, student will be able

- To understand about various interactive multimedia devices, the basic concept about images and image formats.
- To understand different software tools used in multimedia.

Reference Books:

- Principles of Multimedia – Ranjan Parekh, Publisher: Tata McGraw Hills
- Multimedia: Making It Work (8th Edition) – by Tay Vaughan, Publisher: Tata McGraw Hills.
- Multimedia Communications: Applications, Networks, Protocols and Standards - Fred Halsall, Publisher: Pearson Education.

Suggested MOOC:

1) www.openlearning.com
2) www.mooc-list.com
3) www.coursera.org

Course Plan

Unit	Contents
1	What is multimedia? History of Multimedia, Steps for Creating multimedia presentation, Delivering multimedia, Where to Use multimedia? (Business, Schools, Home, and Public Places), Multimedia authoring tools, types of multimedia authoring tools, features of multimedia authoring tools.
2	Storage technology, Magnetic media (Hard disk, RAID), Optical Media (CD Storage, CD standards), DVD (Size and capacity of DVD, DVD video, DVD audio).
3	Using text in multimedia, text types, designing with text, Hypertext and Hypermedia, Characteristics of Hypertext and Hypermedia. Using image in multimedia, image color models, Dithering, Image file formats, Macintosh formats, Windows formats, Cross-platform formats.
4	What is sound? Characteristics of Sound, Digital Audio, MIDI audio, MIDI Vs Digital audio, Audio file formats, Copyright issues. Principles of animation, Animation techniques, Animation file formats, Making animation (A Rolling Ball, A Bouncing Ball), Creating animated scene.
5	Working of video, Video signal formats (Component Video, Composite Video and S-Video), Digital Video, Digital Video Standards (EDTV, CCIR Recommendations), HD Video and HDTV.
6	Multimedia communications, Multimedia information representation, Multimedia networks, Multimedia applications, Media types, Communication modes, network types, Multipoint conferencing, Network QOS.

Course Number	Course Name	Credits	
306	Lab on Oracle and Multimedia	1 Credit	

Course Objectives:

The main objective is to teach the concepts related to SQL (Structured Query Language) and multimedia. The different SQL commands to be introduced. It helps to the students in writing SQL queries and its implementations. It basically helps to design and develop database structure. This is foundational course for building up database and processing through different queries.

Expected Outcome:

At the end of this course, the student should be able to:

- Creating tables, and queries using SQL
- Applying SQL Operators and SQL Functions in the created tables in SQL;
- Writing and solving complex queries based on joins, sub queries
- Writing PL/SQL blocks, objects
- Creating multimedia file
- Understanding the use of multimedia in web sites

Text Books:

Ivan Bayross. SQL, PL/SQL The Programming Language of Oracle 3rd Revised Edition BPB Publications

Suggested MOOC:

In house on www.bharatividyapeeth.edu

Part A: Lab on Oracle

Q. No.	Question
1	Create following tables in your user with specified constraints.

Client_Master

Column Name	DataType	Size	Constraints
ClientNo	VARCHAR2	6	PRIMARY KEY, First Letter must start with 'C'
Name	VARCHAR2	20	NOT NULL
Address	VARCHAR2	30	
City	VARCHAR2	15	
State	VARCHAR2	15	
PinCode	NUMBER	6	
Bal_Due	NUMBER	10,2	

Product_Master

Column Name	DataType	Size	Constraints
ProductNo	VARCHAR2	6	PRIMARY KEY, First Letter must start with 'P'
Description	VARCHAR2	20	NOT NULL
ProfitPercent	NUMBER	2,2	NOT NULL

UnitMeasure	VARCHAR2	10	NOT NULL
QtyOnHand	NUMBER	8	NOT NULL
ReOrderLevel	NUMBER	8	NOT NULL
SellPrice	NUMBER	8,2	NOT NULL, Cannot be 0
CostPrice	NUMBER	8,2	NOT NULL, Cannot be 0

SalesMan_Master

Column Name	DataType	Size	Constraints
SalesManNo	VARCHAR2	6	PRIMARY KEY, First Letter must start with 'S'
Name	VARCHAR2	20	NOT NULL
Addresss	VARCHAR2	30	
City	VARCHAR2	20	
State	VARCHAR2	20	
SalsAmt	NUMBER	8,2	NOT NULL Cannot be 0
Target	NUMBER	6,2	NOT NULL, Cannot be 0
YtdSales	NUMBER	6,2	NOT NULL, Cannot be 0

2 **Insert following records into a related table.**

Data for Client_Master

ClientNo	Name	City	PinCode	State	Bal_Due
C00001	Ivan Bayross	Bombay	400054	Maharashtra	15000
C00002	Vandan Saitwal	Madras	780001	Tamil Nadu	0
C00003	Pramada Jaguste	Bombay	400057	Maharashtra	5000
C00004	Basu Navindagi	Bombay	400056	Maharashtra	0
C00005	Ravi Sreedharan	Delhi	100001	Delhi	2000
C00006	Rukmini	Bombay	400050	Maharashtra	0

Data for Product_Master

ProductNo	Description	ProfitPercent	UOM	QtyOnHand	ReOrderLevel	SellPrice	CostPrice
P00001	1.44 Floppies	5	Piece	100	20	525	500
P03453	Monitors	6	Piece	10	3	12000	11280
P06734	Mouse	5	Piece	20	5	1050	1000
P07865	1.22 Floppies	5	Piece	100	20	525	500
P07868	Keyboards	2	Piece	10	3	3150	3050
P07885	CD Drive	2.5	Piece	10	3	5250	5100
P07965	540 HDD	4	Piece	10	3	8400	8000
P07975	1.44 Drive	5	Piece	10	3	1050	1000
P08865	1.22 Drive	5	Piece	2	3	1050	1000

Data for Salesman_Master

SalesMan No	Name	Address	City	PinCode	SalAmt	Target	YtdSales	Remarks
S00001	Kiran	A/14, Warli	Bombay	400002	3000	100	50	Good
S00002	Manish	65, Nariman	Bombay	400001	3000	200	100	Good
S00003	Ravi	P-7, Bandra	Bombay	400032	3000	200	100	Good
S00004	Ashish	A/5, Juhu	Bombay	400044	3500	200	150	Good

3 Describe all tables.

Retrieve all records.

4 **Create following tables in your table with specified constraints.**

Sales_Order

Column Name	DataType	Size	Constraints
SalesOrderNo	VARCHAR2	6	PRIMARY KEY, First Letter must start with 'O'
SalesOrderDate	DATE		
ClientNo	VARCHAR2	6	FOREIGN KEY referencing Client_Master
DelyAddress	VARCHAR2	25	
SalesManNo	VARCHAR2	6	FOREIGN KEY referencing Salesman_Master
DelyType	CHAR	1	Delivery: Part(P)/Full(F), Default 'F'
BilledYN	CHAR	1	
DelyDate	DATE		Cannot be less than SalesOrderDate
OrderStatus	VARCHAR2	10	Values IN('In Process', 'Fulfilled', 'BackOrder','Canceled')

Sales_Order_Details

Column Name	DataType	Size	Constraints
SalesOrderNo	VARCHAR2	6	PRIMARY KEY, FOREIGN KEY referencing Sales_Order
ProductNo	VARCHAR2	6	PRIMARY KEY, FOREIGN KEY referencing Product_Master
QtyOrdered	NUMBER	8	
QtyDispatched	NUMBER	8	
ProductRate	NUMBER	10,2	

Challan_Header

Column Name	DataType	Size	Constraints
ChallanNo	VARCHAR2	6	PRIMARY KEY, First Letter two letter must start with 'CH'
SalesOrderNo	VARCHAR2	6	FOREIGN KEY referencing SalesOrderNo
ChallanDate	DATE		
BilledYN	CAHR	1	Values IN('Y','N'), Default 'N'

Challan_Details

Column Name	DataType	Size	Constraints
ChallanNo	VARCHAR2	6	PRIMARY KEY, FOREIGN KEY referencing Challan_Header
ProductNo	VARCHAR2	6	FOREIGN KEY referencing Product_Master
QtyDispatched	NUMBER	4,2	NOT NULL

5 **Insert following records into a related table.**

Data for Sales_Order

SalesOrderNo	SalesOrderDate	ClientNo	DelyType	BilledYN	SalesManNo	DelyDate	OrderStatus
O19001	12-Jan-96	C00001	F	N	S00001	20-Jan-96	IP
O19002	25-Jan	C00002	P	N	S00002	27-Jan-96	C
O46865	18-Feb-96	C00003	F	Y	S00003	20-Feb-96	F
O19003	3-Apr-96	C00001	F	Y	S00001	7-Apr-96	F
O46866	20-May-96	C00004	P	N	S00002	22-May-96	C
O10008	24-May-96	C00005	F	N	S00004	26-May-96	IP

Data for Sales_Order_Details

SalesOrderNo	ProductNo	QtyOrdered	QtyDispatched	ProductRate
O19001	P00001	4	4	525
O19001	P07965	2	1	8400
O19001	P07885	2	1	5250
O19002	P00001	10	0	525
O46865	P07868	3	3	3150
O46865	P07885	3	1	5250
O46865	P00001	10	10	525
O46865	P03453	4	4	1050
O19003	P03453	2	2	1050
O19003	P06734	1	1	12000
O46866	P07965	1	0	8400
O46866	P07975	1	0	1050
O10008	P00001	10	5	525
O10008	P07975	5	3	1050

Data for Challan_Header

ChallanNo	SalesOrderNo	ChallanDate	BilledYN
CH9001	O19001	12-Dec-95	Y
CH6865	O46865	12-Nov-95	Y
CH3965	O10008	12-Oct-95	Y

Data for Challan_Details

ChallanNo	ProductNo	QtyDispatched
CH9001	P00001	4
CH9001	P07965	1
CH9001	P07885	1
CH6865	P07868	3
CH6865	P03453	4
CH6865	P00001	10
CH3965	P00001	5
CH3965	P07975	2

6 **Describe all tables.**

Retrieve all records.

7 Based on above created tables Write down following queries.

Selection, Renaming, Logical Operators and Pattern Matching

a) Select ProductNo, Description and compute Sell_Price*0.05 and Sell_Price*1.05 for each row retrieved. Rename the columns Increase and New Price respectively.
b) Select client information like client no, name, address, city for all clients in 'BOMBAY' or 'DELHI'.
c) Select ProductNo, Description, and Profit Percent where Profit Percent is between 10 and 30 both inclusive.
d) Select supplier name where the second letter of name is 'r' or 'h'.
e) Select supplier name, city where name is 3-character long and the first two characters are 'ja'.

8 Based on above created tables Write down following queries.

Grouping

a) Select Product No with description and total qty_ordered for each product.
b) Select Product No and description for which total qty_ordered of the products 'P00001', 'P03453'.

9 Based on above created tables Write down following queries.

Manipulating Date

Display the information like SalesOrderNo, ClientNo, SalesOrderDate for all the orders placed by the client in the ascending order of date. The SalesOrdereDate should be displayed in 'DD/MM/YY' format.

10 Based on above created tables Write down following queries.

Joins

a) Display the information like SalesOrderNo, ClientName, SalesOrderDate for all the orders placed by the client in the ascending order of date. The SalesOrdereDate should be displayed in 'DD/MM/YY' format.
b) Select ProductNo, Description and total qty_ordered for each product.

11.	Based on above created tables Write down following queries. Print the information of the client_Master, product_master, sales_order table in the following format fro all records: {Description} worth Rs. {total sales for the product} was ordered in the month of {s_order_date}
12.	Based on above created tables Write down following queries. Find the list of clients who stay in city 'Bombay' or city 'Madras' or city 'Delhi'.
13.	Based on above created tables Write down following queries. <u>Using UNION, INTERSECT and MINUS Clause</u> a) Select all clients and the salesman in the city of 'Bombay'. b) Select salesman name in 'Bombay' who has at least one client located at 'Bombay'. c) Select all the productno of non-moving items in the product_master table. d) Select the productno, description, qty_on_hand, cost_price of non-moving items in the product_master table.
14.	Based on above created tables Write down following queries. a) Retrieve the list of names and the cities of all the clients. b) List the various products available from the product_master table. c) Find the names of the clients having 'a' as the second letter in their names. d) Find the list of clients who stay in city 'Bombay' or city 'Madras' or city 'Delhi'. e) Print the list of clients whose bal_due greater than values 10000. f) Display the Order Information for Clients 'C00002' and 'C00001'. g) Find the products whose selling price is more than 1500 and also find the new selling price as original selling price * 15. h) List the products in sorted order of their description. i) Calculate the average price of all the products. j) Determine the maximum and minimum products prices. Rename the titles as 'Max-Price' and 'Min-Price' respectively. k) Count the number of products having price greater than or equal to 1500. l) Find all the products whose Qty_On_Hand is less than Re_Order_Level. m) Change the Sales_Order_Date of Client_No 'C00001' to 24/07/96. n) Change the cost price of '1.22 Floppy Drive' to Rs. 950.00. o) Delete all records having delivery date before 10th July' 96
15.	**Exercise following functions using DUAL Table.** • <u>Number Functions</u> 1. ABS () 2. MOD (m, n) 3. POWER (m, n) 4. ROUND (n, m) 5. SIGN (n) 6. SQRT (n) 7. TRUNC (n, m) 8. GREATEST () 9. LEAST () • <u>Aggregate Functions</u> 1. AVG () 2. MIN () 3. COUNT (*) 4. COUNT (expr) 5. MAX () 6. SUM ()

	• Character Functions 1. ASCII () 2. CHR () 3. INITCAP () 4. INSTR () 5. LENGTH () 6. LOSER () 7. UPPER () 8.LTRIM () 9. RTRIM () 10. LPAD () 11. RPAD () 12. SOUNDEX () • Date Functions 1. ADD_MONTHS () 4. LAST_DATE () 2. MONTHS_BETWEEN () 5. NEXT_DATE () 3. TRUNC () 6. SYSDATE ()
16.	**Granting and Revoking Privileges to/from user** a) Grant all privileges on the table product_master to the user Pradeep. b) Grant SELECT and UPDATE privilege on table client_master to Neeta. c) Grant all privileges on the table client_master to the user Ivan with grant option. d) Select all records from product_master table belonging to Sunita. e) Revoke DELETE privilege on supplier_master from Florian. f) Revoke the remaining privileges on supplier_master that were granted to Florian.
17.	**Writing PL/SQL Block** a) Write a PL/SQL Block to generate any n odd and even numbers. b) List the contents of product_master. c) Write a PL/SQL Block that inverse the string or number. [if given number is 8973 then its inverse is 3798]. If the price of the product 'P00001' is < 4000 then change the price to 4000. The price change is recorded in the old_price table along with product_no and the date on which price was changed last. d) Write a PL/SQL block that processes an order for "540 HDD". [Check the availability of the product, if yes update its value.]
18.	**Writing CURSORS** 1. Write a PL/SQL block that updates the acctmast table and sets the balance depending upon the account is debited or credited. The updation should be done only for those values that are not processed i.e. the processed flag is 'N' in the accttrans table. acctmast (acctno*, name, balance) accttrans (acctno, trndate, debt_crdt, amount, processed) 2. The HRD manager has decided to raise the salary of employees by 0.15. Write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in the employee table. 3. The HRD manager has decided to raise the salary of employees working as "Programmers" by 0.25. Write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in the employee table. 4. Create following 2 tables item-mast (item-id*, description, bal-stock) item-trans (item-id, description, operation, qty, status)

	-> the operations are for UPDATE – U, for INSERT –I, for DELETE –D Based on the value in the operation column of table item-trans the records for table item-mast is inserted, updated or deleted. On the basis of success/failure of insert, update and delete operation the status column in the table item-trans is updated with appropriate text indicating success or reason for failure. Following are the 3-cases which are to be taken care of: • if operation = 'I' then the item-id against along with description and qty is inserted into the required columns of the table item-mast. If the insert is successful then the status field of item-trans table is updated to 'SUCCESSFUL' else 'ITEM ALREADY EXIST'. • if operation = 'D' then row from item-mast is deleted whose item-id is equal to the item-id in the table item-trans with the operation column having the value 'D'. If delete is successful then the status column of item-trans table is updated to 'SUCCESSFUL' else 'ITEM DOES NOT EXIST'. • if operation = 'U' then the qty against this operation column is added to bal-stock column of the table item-mast where item-id of table item-mast is same as that of item-trans. if update is successful then the status of item-trans table is updated to 'SUCCESSFUL' else 'ITEM DOES NOT EXIST'. Write a parameterized CURSOR that defines all the above cases.
19.	**Writing TRIGGERS** 1. Create a transparent audit system for a table client-master. The system must keep track of the records that are being deleted or modified and when they have been deleted or modified. client-master (client-no, name, city, state, pin, bal-due) audit-client (client-no, name, bal, operation, o-date) • operation: the operation performed on the client-master table • o-date: the date when the operation was performed. 2. Write a database triggers that checks that the qty-on-hand does not become negative.
20	**Writing PROCEDURES** Create following 2 tables item-mast (item-id*, description, bal-stock) item-trans (item-id, description, operation, qty, status) -> the operations are for UPDATE – U, for INSERT –I, for DELETE –D Base on the value in the operation column of table item-trans the records for table item-mast is inserted, updated or deleted. On the basis of success/failure of insert, update and delete operation the status column in the table item-trans is updated with appropriate text indicating success or reason for failure. Following are the 3-cases which are to be taken care of: i. if operation = 'I' then the item-id against along with description and qty is inserted into the required columns of the table item-mast. If the insert is successful then the status field of item-trans table is updated to 'SUCCESSFUL' else 'ITEM ALREADY EXIST'.

	ii. if operation = 'D' then row from item-mast is deleted whose item-id is equal to the item-id in the table item-trans with the operation column having the value 'D'. If delete is successful then the status column of item-trans table is updated to 'SUCCESSFUL' else 'ITEM DOES NOT EXIST'. iii. if operation = 'U' then the qty against this operation column is added to bal-stock column of the table item-mast where item-id of table item-mast is same as that of item-trans. if update is successful then the status of item-trans table is updated to 'SUCCESSFUL' else 'ITEM DOES NOT EXIST'. Write a database procedure which will check for the existence of item-id in the table item-mast. The procedure must have one argument which receives a value for which a matching pattern for item-id in the table item-mast and another which will return value indicating whether a match has been found or not. The value returned by the procedure can be used to make a decision to perform further processing or not.

Part B: Lab on Multimedia

Q.No.	Question
1	Create a new document in a word processing application. Next, type in a line of text and copy the line five times. Now change each line into a different font. Recopy the entire set of lines three times. Finally, change the size of the first set to 10-point text, the second set to 18-point text, and the third set to 36-point text. a) Which of the smallest lines of text is most readable? b) Which line of text stands out the most?
2	Download three different images from a web site. One should be photographic, one should be a graphic (solid colors or gradients), and one should be a mix. Convert the images to 256 colors. Use the tools available to use different dithering patterns and palettes. Print out the files before and after reducing to 256 colors. Write the file sizes on each one.
3	Visit different web sites. Describe the use of colors for each in subjective terms. Is each site vibrant? childish? muted? subtle? Why? What cultural or other factors determined the color selection? Print out a page from each site, and write a paragraph describing the colors and images used in each one.
4	Open an image in an image-editing program capable of identifying colors. Select three different pixels in the image. Sample the color and write down its value in RGB, HSB, CMYK, and web (hexadecimal) color.
5	Visit three web sites that use sound (you may need to find Flash-based web sites). Where, when, and how is sound used? Does the sound fit the mood of the site? Is there background sound? Can the sounds be turned on and off? Document your findings.
6	Locate three web sites that offer "royalty-free" or "buyout" music. Such sites almost always allow visitors to listen to low-quality samples. What formats are the samples

	provided in? Listen to some of the samples. Try to identify which are synthesized and which are actual instruments playing the music. What are the license arrangements for using the music? Document your findings, noting the various lengths and formats the music is provided in.
7	Use a search engine to search on the words "animation" and "definition." Create a document that provides many different definitions of the term animation. Describe the differences among definitions. Which elements make the most difference among them—type of motion, process used for creation, method of playback, or something else? What do all (or, at least, most) of the definitions have in common?
8	Conceptualize a brief animated sequence. Include a number of moving elements that move into and out of the frame. Consider where the key frames should be. How do the elements move? Do they get bigger or smaller? Do they rotate? Do they "deform" (change shape)? Create a storyboard with sketches showing at least ten of the key frames.
9	Locate three web sites that include video clips. What format are they served in? Examine the HTML source code to discover what method of video delivery is used. Make a note of your findings.
10	Prepare five graphic images using paint or drawing program. Be sure to include a variety of colors and contrasts. Add text to the images. Use small text, large text, text with serifs, bold text, and text in contrasting and similar colors. Add drop shadows. Add boxes and other shapes to the images, in various weights.

Course Number	Course Name	Credits	
307	Lab on Linux Operating System	1 Credit	

Course Objective:

The student would be able

- To obtain knowledge of how to manage files in Linux system.
- To understand Linux commands and write shell programming.
- To grasp the concepts of User Management in Linux.
- To control the system running Ubuntu operating system.

Expected Outcome :

The course is to provide the knowledge of the Linux Operating System. This course intends to teach various features that will help the students to use and learn the working of Ubuntu /Red Hat operating system

Prerequisite:

Students should have basic knowledge of working on an operating system.

- Linux for beginners : An introduction to the linux operating system and command line
- Linux: the complete reference, sixth edition paperback by Richard Petersen, McGraw Hill education
- Unix shell Programming: by yashwant Kanitkar
- UNIX Concepts and Applications - by Sumitabha Das

Course Plan

Unit	Contents
1	Introduction to Linux Operating system, various flavors of Linux O.S., Learning to use and Install Linux, Booting Any one flavor of Linux like ubuntu, red hat etc, Starting up ,Logging in, Exploring the desktop ,Working with virtual desktops, Getting Everything up and running ,Viewing your hardware , Getting online Using an Ethernet Card ,Joining wireless network ,Configuring Email and instant messaging, Adding a Printer , Configuring a local printer, Configuring a network printer, Setting up digital imaging devices, Transferring photos from digital camera, Configuring scanner, Configuring Bluetooth.
2	**General Purpose Utilities:** banner (display a blown-up message), cal (The calendar), date-display the system date, who-Login detail tty-knowing your terminal uname-know your machine name passwd-change your password lock-lock your terminal echo-display message bc-the calculator. who am i,- display login name

3	**Navigating the file system:-** pwd-checking your current directory, cd-changing directories, mkdir-Making directories rmdir-moving directories ls-listing files **Handling Ordinary files:** cat-displaying and creating files, touch-creating empty file cp-copying a file rm-deleting files mv-renaming files more-paging output lp-printing a fiile file-know the file type wc-line, word and character counting split-splitting file in to multiple files cmp-comparing two files comm.-finding common chmod-changing file permission files searches using find command, locate command, mount and unmount command. Understanding vi modes, Using vi to edit the file, Creating a new text file using vi, Searching through files.
4	**Filters:** pr- paginating files head-displaying the beginning of a file, tail- displaying the end of file cut- slitting a file vertically paste- pasting file sort- ordering file uniq- locating repeated line nl- line numbering tr-translating characters. regular expressions and grep to find text ps-process status kill-terminate process Other process related commands
5	sh command, pattern matching- the wild cards, escaping-the backslash(\), quoting, redirection, pipes, tees
6	What is Shell, Different types of shells, Shell as command processor, shell variables, creating command substitution, various shell scripts using functions, conditionals, loops, customizing environment

Course Number	Course Name	Credits	
308	Community Work III	1 Credit	

Course Objective:

This course aims to expose the students to the societal issues and help them participate in the community service through trips/events organized at institute, state level etc and also to Volunteer at events like fundraising activities, fairs, festivals, slums, nonprofit organization etc.

- To expose the students towards social reality and role of community development for social upliftment and well being
- To involve students in community work through active involvement and participation

Expected Outcome :

Students will be able to know the community needs and understand their role towards community development.

Reference Books :

- An Introduction to Community Development, Rhonda Phillips, Robert Pittman – 2014
- Community Development in Asia and The Pacific, Manohar S. Pawar, 2009

Online Resources:

https://community-wealth.org/sites/clone.community-wealth.org/files/downloads/tool-enterprise-directory.pdf

https://www.ahaprocess.com/solutions/community/events-resources/free-resources/

Community Hours:

Participate in community service trips/events organized at institute, state level etc , Volunteer at events like fundraising activities, fairs, festivals, slums, non profit organization etc , Submit a report on a particular type of community involvement undertaken.

MOOCs:

https://alison.com/course/diploma-in-community-development

Course Plan

Unit	Contents
1	**Community work through Education:** Teaching at Schools, Teaching at Orphanages, Teaching to poor children ,study the role of government in the education sector ,study the NGOs particularly working in education sector.
2	**Community Work for Slums:** Learn the government facilities, NGOs which are working for the slums and try to connect any NGO.
3	**Community Work for Environment:** Role of Govt. and NGOs which are working to save the environment, Initiatives like Clean your city drive, Cycle day, Awareness of Dry and wet waste classification, Tree Plantation Drive, Environment awareness activities etc.

Course Number	Course Name	Credits	
308	**Start-Up Management**	1 Credit	

Course Objective:

The objectives of the course is

- To Introduce to the students the idea of start ups and their role in the society and nation
- To impart knowledge about the organization and management of start ups

Expected Outcome :

Students will be able to understand the role of start ups and case studies of well known start ups in India.

Reference Books :

- Khanka S. S. – Entrepreneurship Development, S. Chand.
- Burns, P. (2001). Entrepreneurship and small business. New Jersey:Palgrave.
- Mullins, J. (2004). New business road test. New Delhi: Prentice Hall.

Online Resources:

https://www.entrepreneur.com/

https://www.shopkeep.com/blog/the-7-best-free-resources-for-planning-your-new-business

MOOCs:

https://startupindia.upgrad.com/ - Startup India Learning Programme Swayam

Course Plan

Unit	Contents
1	Meaning of Start ups, Formation of a start up, idea generation for start ups, scaling up process.
2	Managing a startup, Customer Development, Market Sizing, Lean Startups, Support by government for startups,
3	Case Studies on well known startups.

Course Number	Course Name	Credits	
308	Agro Tourism	1 Credit	

Course Objective:

The objectives of the course are to familiarize students with principles and relationship between tourism and agricultural activities.

Expected Outcome :

Students will be able to obtain and diversify knowledge from tourism, rural tourism and their specific form agri-tourism.

Reference Books :

- Talwar, Prakash. Travel and Tourism Management. Gyan Books Pvt., Ltd.,Main Ansari Road, Darya Ganj, New Delhi- 110 002.
- Bagri, S. C. Trends in Tourism Promotion 2003.International Books Distributors, 9/3, Rajpur Road, Dehradun-248 001 Uttarakhand (India).

Online Resources:

http://www.agritourism.in
http://www.ecoindia.com

MOOCs:

https://www.mooc-list.com/tags/tourism
https://www.coursera.org/
https://swayam.gov.in/
https://alison.com/courses?query=agriculture+tourism

Course Plan

Unit	Contents
1	Introduction, importance, scope, forms of agro-tourism, advantages and implementations, sustainability component, difficulties involved.
2	Govt. policies and legislations in respect of tourism and agro-tourism and environment protection laws. Requirements for Agro-tourism Farm, forest, garden, fish tank/ponds, residential huts, etc. Introduction to Indian culture through agro tourism.
3	Profiling the tourist for: age, sex, life cycle, education, employment, income, satisfaction and expectations, values, purpose of visit, accommodation, duration of stay, preferences and perceptions regarding area management, environmental concerns, involvement and responsibility, motivations, etc.

SEMESTER IV

Course Number	Course Name	Credits	
401	Computer Networks	3 Credits	

Course Objectives:

The key objective is to acquire a foundational understanding of computer network and communication technologies. Networking concepts will be illustrated using TCP/IP networks. To enable the learner with Network Technologies and applications of Network.

Learning Outcomes:

At the end of this course, student should be able to

- Students will acquire a good knowledge of the computer network, its architecture and operation.
- Student will be able to pursue his study in advanced networking courses (This knowledge will help them to create base for the Network Electives to be studied in the next semesters).
- Students will be able to follow trends of computer networks. So, students will get exposer to advanced network technologies like MANET, WSN, and 4G.

References (Books, Websites etc) :

- 1.A.S. Tanenbaum, **Computer Networks** (4^{th} ed.), Prentice-Hall of India, Latest Edition
- 2.W.Behrouz Forouzan and S.C. Fegan, **Data Communication and Networking,** McGraw Hill, Latest Edition

Other Books:

- Network Essential Notes GSW MCSE Study Notes
- Internetworking Technology Handbook CISCO System
- Introduction to Networking and Data Communications Eugene Blanchard
- Computer Networks and Internets with Internet Applications Douglas E. Comer

Suggested MOOC :

Course Plan

Unit	Contents
1	**Introduction to Computer Networks:** What is Computer Network? Network Goals and Motivations, Application of Networks, Network Topologies, Classification of Networks, **Network software:** Network Protocols, Protocol Hierarchies, Design issues for the Layers, Connection Oriented and Connectionless Services, Service Primitives, Relation of services to Protocols, **Network Models:** The OSI Reference Model, The TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Model, A critique of OSI Model, A critique of TCP/IP Model, **Examples of some networks:** Internet, X.25, ISDN, Frame relay, ATM, Ethernet, Wireless Lans- (wi-fi)
2	**Data Transmission and Physical Layer:** **Signals:** Analog and Digital Signals, Data Rate, Transmission Impairment, Signal

	Measurement: Throughput, Propagation Speed and Time, Wavelength, Frequency, Bandwidth, Spectrum **Transmission Media& its Characteristics:** Guided and Unguided Media, Synchronous and Asynchronous Transmission, Multiplexing**:** FDM, WDM, TDM, Switching**:** Circuit, Message and Packet Switching, **Mobile Telephone Systems**: 1G, 2G, And 3G
3	**Network Layer: Network Layer Design Issues; Routing Algorithms:** Static/ Dynamic , Direct/ Indirect, Shortest Path Routing, Flooding, Distance Vector Routing , Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, **Congestion Control Algorithms:** General Principal of Congestion Control, congestion prevention polices, Load shedding, Jitter Control, **IP Addressing:** IP-Protocol, IP-Address Classes (A, B, C, D, E), Broadcast address, Multicast address, Network Mask, Subnetting, Internet control Protocol-ICMP, IGMP, Mobile-IP, IPv6
4	**Transport and Application Support Protocols,:** Transport service, Service Primitives, Internet, and Transport Protocols: TCP/UDP, Remote Procedure Calls, RTP, **Session Layer:** Token Concept **Presentation Layer:** Data Encryption and Data Security, Message Authentication, **Application Layer:** Domain Name Service, Telnet, FTP, SMTP, SNMP, MIME, POP, IMAP, WWW,HTTP
5	**Advance Networks:** Concept of 4G Networks, Introduction of 802.16, 802.20, Bluetooth, Infrared, MANET, Sensor Networks. Technical Issues of Advanced Networks, **Mobile Ad-hoc Networks:** Introductory concepts, Destination-Sequenced Distance Vector protocol, Ad Hoc On-Demand Distance Vector protocol, **Wireless Sensor Networks:** Sensor networks overview: Introduction, applications, design issues, requirements.
6	**Internet Basics:** Concept and Characteristics of Internet , Intranet, Extranet . Structure of Internet through Client Sever . Domain name , Website Development formats for Business Applications.

Course Number	Course Name	Credits	
402	Software Testing	3 Credits	

Course Objective :

The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics.

Expected Outcome :

At the end of this course, student should be able to:

- Understand basic concepts and terminology of information technology.
- Have a basic understanding of personal computers and their operations.
- Be able to identify issues related to information security.

References (Books, Websites etc) :

- Software Testing by Renu Rajani and Pradeep Oak
- Software Engineering by Roger S. Pressman
- Software Testing Principles And Practices by Srinivasan Desikan and Gopalaswamy
- Ramesh

Suggested MOOC :

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Software Concepts:** Introduction, Definition and Characteristics of oftware, Importance of Software, Software types, Software components, Members involved in software development, Overview of SDLC.
2	**Introduction to Testing:** What is testing, Why, When and How Testing, Importance of Testing. Testing goals and characteristics, Testing during planning stage, Testing during design stage, Testing during coding stage.

3	**Software Testing Lifecycle & Software Testing Process:** Overview of STLC, Principles of Verification and Validation, Techniques of verification (review, inspections, walkthroughs), V testing model Software development V & V Software acquisition V & V Software supply V & V **Software Testing Process:** Testing process: a) Plan b) Develop c) Execute d) Manage Conventional Software Architectures.
4	**Software Testing Strategies:** Test strategies for conventional software a) Unit Testing b) Integration Testing i) Top-Down Integration ii) Bottom-Up Integration iii) Regression Testing iv) Smoke Testing v) Integration test documents c) Validation Testing a. Test Criteria b. Configuration Review c. Alpha and Beta Testing a) System Testing i) Recovery Testing ii) Security Testing iii) Stress Testing iv) Performance Testing Difference between Testing and Debugging, The Art of Debugging a) Debugging Process b) Debugging strategies c) Correcting the Error.

5	**Software Testing Techniques:** Overview of Black-Box and White-Box Testing, Methods of White-box Testing: a) Basis Path Testing i) Flow Graph Notation ii) Independent Program Paths iii) Deriving Test Cases iv) Graph Matrices b) Control Structure Testing i) Conditional Testing ii) Data Flow Testing iii) Loop Testing • Simple Loops • Nested Loops • Concatenated Loop Methods of Black-Box Testing: a) Graph Based Testing b) Equivalence Partitioning c) Boundary Value Analysis d) Orthogonal Array Testing Testing of client/server Architectures, Testing Documentation and Help Facilities, Testing for Real-Time Systems: a) Task Testing b) Behavioral Testing c) Intertask Testing d) System Testing Testing Patterns: a) Pair Testing b) Separate Test Interface c) Scenario Testing
6	**Risk Management:** Introduction and Characteristics of Risks, Role of Testing in Risk Management, Types of Risks: a) Project Risks b) Technical Risks c) Business Risks d) Predictable Risks e) Unpredictable Risks

Course Number	Course Name	Credits	
403	Java Programming	3 Credits	

Course Objective :

The Objectives of the course is to introduce Object Oriented Programming using Java, Make student to use Java for implementing OO Concepts and also make them familiarize to use JDK and Java API for concurrent programming, input/output, Java data structures and GUI (AWT) programming using java.

Expected Outcome :

At the end of this course, student should be able to understand

- Design interfaces, abstract and concrete classes
- Use concurrent programming, java Collections and utility classes
- Able to achieve object persistence using object serialization.
- Design applications using event driven programming.
- Get the main features of Java Programming for Business Applications

References (Books, Websites etc) :

- Herbert Schildt, Java: The Complete Reference, McGraw-Hill Osborne Media; Seventh Edition, 2007
- Cay S. Horstmann and Gary Cornell ,Core Java-Volume-I, Sun Core Series, Eighth Edition, 2008
- Bruce Eckel , Thinking In Java – Printice Hall, Fourth Edition

Suggested MOOC:

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Java:** Features of Java, Java compiler, JVM, Garbage collection, Data types, concept of class and object, java naming conventions wrapper classes, control structures in java, arrays in java, array of objects.
2	**Class and Object Concepts:** Concepts of OOP, Defining a class, creating objects from class, adding attributes and methods to the class, using constructors, Passing values to the functions – pass by value, pass by reference, Function overloading. Modifiers – public, private, protected, default, static, final, Concept of package, Introduction to Exception Handling.
3	**Inheritance and Polymorphism:** Concept and importance of inheritance, is-a relationship, types of inheritance,

	Polymorphism – function overriding, dynamic method dispatch. Using abstract and final keywords with class declaration, Concept of interface and class.
4	**Concurrent Programming :** Concept of threads, lifecycle of threads, creating threads, Thread class, Runnable interface, Introduction to Tread Synchronization .
5	**Java Input/Output:** Concept of streams, types of streams – byte streams, character streams. The Console: System.out, System.in, and System.err, InputStream class, OutputStream class, File class, FileInputStreams, File OutputStream, Reader class, Writer class, FileReader, FileWriter. Buffered streams – BufferedInputStream, BufferedOutputStream, BufferedReader, BufferedWriter. Object Streams
6	**Java Applets and GUI:** Applet concept, creating basic applet, applet lifecycle, controlling applet content, introduction to AWT controls – Button, Lable, TextField, TextArea, List, Checkbox and RadioButtons, Scrollbar, Menu etc. (Only AWT Component)

Course Number	Course Name	Credits	
404	Operations Research	2 Credits	

Course Objective :

Main objective of this paper is to learn historical development of O.R., need and characteristics of OR in business and management. Formulate a real-world problem as a mathematical programming model. To aware the students about the basic terms in operations research. Students will be able to formulate and solve optimization problems related to job/ work assignments.

Expected Outcome :

At the end of this course, student should be able to understand:

- Students will be able to describe characteristics and scope of OR.
- Students will be able to define and formulate mathematical problems.
- Students will be able to select optimal problems solving techniques for a given problem using LP.
- Students will be able to formulate and solve transportation, travelling sales problems.
- Students will be able to demonstrate and solve simple models of Game theory.
- Students will be able to solve different problems related to Network.

References (Books, Websites etc) :

- Operations Research: An Introduction by Hamdy Taha, Pearson
- Operations Research by A M Natarajan, P Balasubramani, A Tamilarasi, Pearson Education Inc
- Operations Research by P Mariappan, Pearson
- Operations Research by H N wagner, Prentice hall.
- Optimization in Operations Research by Ronald Rardin, Pearson Education Inc.
- Operations Research by R. Paneerselvam, Prentice Hall of India Pvt. Ltd.
- Quantitative Techniques in Management by N D Vohra, Tata McGraw-Hill

Suggested MOOC : List of Open Source Software/learning website: www.nptel.ac.in/

Course Plan

Unit	Contents
1	**Basics of Operation Research :** Origin of Operation Research, Historical Standpoint, Methodology, Different Phases, Characteristics, Scope and Application of Operations Research, limitations of OR.
2	**Linear Programming :** Introduction, Requirement of LP, Basic Assumptions, Formulation of LP, General Statement of LP, Solution techniques of LP: Graphical Methods, Analytical Methods: Simplex Method , Concept of slack, surplus & artificial variables. Manual solutions of L.P.P. upto 3 iterations. Minimization & Maximization Problems.

	Special Cases – i)Alternative solution (ii) Unbounded solutions (iii) Infeasible solutions to be shown graphically & also by simplex method.
3	**Transportation Model :** North-West Corner rule, Least-cost method, Vogel's approximation method, Final Transportation cost using MODI method, **Special cases** : i)Degeneracy in transportation problem, ii)unbalanced supply and demand, iii)profit maximization problem iv) prohibited transportation routes
4	**Assignment Model:** Hungarian method for solution, non square matrix, **Special Cases** :i) unbalanced problem ii)restriction on assignments iii)Maximization problem iv)alternate solution
5	**Network Analysis :** Terms used in network analysis, Network or arrow diagram, Fulkerson's rule, Programme Evaluation and Review Technique (PERT), Critical path method (CPM), Time estimates for activities. Probability of completion of project. Determination of floats (total, free, independent & interfering) , Crashing of Simple Networks.
6	**Decision Theory And Decision Tree**: Introduction, Decision under certainty, Decision under risk, Payoff table, Regret table, Decision making under uncertainty, Maximin & Maximax criteria,Minimax Regret criterion, Laplace criterion, Hurwicz criterion, Expected Monetary Value criterion, Expected Value of Perfect Information (E.V.P. I.), Expected Opportunity Loss (E.O.L.), Decision Tree, Simple examples

Course Number	Course Name	Credits	
405	Entrepreneurship Development	2 Credits	

Course Objectives :

- To develop an understanding of entrepreneurship concepts
- To provide sufficient knowledge to students aspiring to be entrepreneurs
- To provide ways and means to start an enterprise

Expected Outcome :

At the end of this course, student should be able to understand

- Evolution, definition, characteristics, function and types of entrepreneurs.
- Role of Entrepreneurship in Economic Development.
- Business Opportunity Identification
- Importance of Business plan
- Support Agencies
- Concept of Intellectual property rights

Reference Books :

- Dr. Dilip Sarwate, Entrepreneurship Development and Project Management, Everest Publishing house
- Vasant Desai, Dynamics of Entrepreneurship development and Management, Himalaya Publishing House
- David H Holt, Entrepreneurship and New Venture Creation, Prentice Hall
- Paul Ajit Kumar, Paul, Entrepreneurship Development, Himalaya Publishing House Mumbai
- Raj Shankar – "Entrepreneurship: Theory and Practice" – Vijay Nicole Imprints Pvt. Ltd.
- S.S. Khanka – Entrepreneurial Development – S. Chand And Company Ltd., New Delhi – 1999

Websites

- www.startupindia.gov.in
- www.india.gov.in
- http://www.makeinindia.com/home

Suggested MOOC :

Note:

1. **Case studies to be discussed on various aspects mentioned in the syllabus.**
2. **Visiting/Interaction with successful local entrepreneurs should be done.**

Course Plan

Unit	Contents
1	**Introduction to Entrepreneurship :** Evolution, Concept and definition of an entrepreneur, Characteristics, function and types of entrepreneurs, Qualities of an Entrepreneur, Growth of Entrepreneurship in India, role of Entrepreneurship in Economic Development, Women Entrepreneurship in India

2	**Business Opportunity Identification :** Search for Business Ideas, Market Assessment, Sources of Information, Environmental Analysis, Entrepreneurial opportunities in India, Business Opportunity identification and selection
3	**Business Plan Preparation :** Meaning of Business plan, Significance and Contents of a Business Plan, developing Business Plan, Presenting Business Plan, Elevator Pitch
4	**Project Finance :** Types of Finance, Sources of Finance, Venture Capital, Start-up and Make-in-India program, MUDRA
5	**Support Agencies :** Support to Entrepreneurs by DIC, SIDBI, SIDCO, SSIB, NSIC, SISI, Other Institutions etc. Entrepreneurship promotion by Government through various schemes.
6	**Entrepreneurial Motivation and Development :** Factors motivating entrepreneurs, Basic course contents of EDP‟s Evaluation of EDP‟s, Organizations involved in EDP‟s. Basics of Intellectual property rights

Course Number	Course Name	L-T-P- Credits	
406	Lab on Java	1	

Course Objective : To develop logical abilities of students using Java Programming language

Expected Outcome:
Provide foundation for programming and Enable the students to analyze and efficiently solve the problems using Java Programming.

References (Books, Websites etc) :

- Herbert Schildt, Java: The Complete Reference, McGraw-Hill Osborne Media; Seventh Edition, 2007
- Cay S. Horstmann and Gary Cornell ,Core Java-Volume-I, Sun Core Series, Eighth Edition, 2008
- Bruce Eckel , Thinking In Java – Printice Hall, Fourth Edition

Sr. No.	Contents
1	Program to demonstrate the following: 1. Branching Statements 2. Looping Statements 3. Classes and objects 4. Wrapper classes 5. Arrays 6. Array of objects.
2	Design Programs on following concepts: 1. Constructor 2. Constructor Overloading 3. Pass by value 4. Method Overloading 5. Package 6. Exception Handling
3	Working with Inheritance and Interface: 1. Programs to demonstrate working of Inheritance, types of inheritance and Polymorphism – function overriding. 2. Making use of abstract and final keywords with class declaration. 3. Programs to demonstrate working of interface.
4	Design Programs on following concepts: 1. Thread class, Runnable interface and Tread Synchronization.
5	Program to demonstrate Java Input/Output : 1. Concept of streams, byte streams, character streams. 2. The Console: System.out, System.in, and System.err 3. Making use of InputStream class, OutputStream class, File class, FileInputStreams, File OutputStream, Reader class, Writer class, FileReader, FileWriter. Buffered streams – BufferedInputStream, BufferedOutputStream, BufferedReader, BufferedWriter. Object Streams
6	Working with Java Applets and GUI: 1. Design program to demonstrate Applet concept. 2. Making use of AWT controls through programs– Button, Lable, TextField, TextArea, List, Checkbox and RadioButtons, Scrollbar, Menu etc.

Course Number	Course Name	Credits	
407	Minor Project I	1Credit	

Course Objective :

Student has to complete a Minor project work under the guidance of the faculty member in the institute. Students has to develop any software using C in a group of 2 to 3. Each team has to give 4 minimum PPT presentation to the Project Guide during the semester. Final project viva will be conducted as per University Time Table.

Course Number	Course Name	Credits	
408	Community Work-IV	1 Credit	

Course Objective:

This course aims to expose the students to social issues and help them Participate in community service through trips/events organized at institute, state level etc and also to Volunteer at events like fundraising activities, fairs, festivals, slums, nonprofit organization etc.

- To expose the students towards social reality and role of community development for social upliftment and well being
- To involve students in community work through active involvement and participation

Expected Outcome :

Students will be able to know the community needs and understand their role to contribute meaningfully towards community development.

Reference Books :

a. An Introduction to Community Development, Rhonda Phillips, Robert Pittman – 2014
b. Community Development in Asia and The Pacific, Manohar S. Pawar, 2009,

Online Resources:

https://community-wealth.org/sites/clone.community-wealth.org/files/downloads/tool-enterprise-directory.pdf

https://www.ahaprocess.com/solutions/community/events-resources/free-resources/

MOOCs:

https://alison.com/course/diploma-in-community-development

COMMUNITY HOURS:

Participate in community service trips/events organized at institute, state level etc , Volunteer at events like fundraising activities, fairs, festivals, slums, non profit organization etc , Submit a report on a particular type of community involvement undertaken

Course Plan

Unit	Contents
1	Community work in Food and Nutrition related social concerns ,role of government and NGOs in India
2	Community work for old age people and its related social concerns, role of government and NGOs in India
3	Community work for woman empowerment ,its related social concerns ,role of Govt. and NGOs in in India

Course Number	Course Name	Credits	
408	Basics of Taxation	1 Credit	

Course Objective:

- To provide a basic knowledge about direct tax system in India
- To provide a basic knowledge about indirect tax system in India.
- To upgrade with the latest amendments in taxation policy of India.

Expected Outcome :

- Students will be able to have a basic knowledge about direct tax system in India
- Students will be able to have a basic knowledge about indirect tax system in India.
- Students will be upgraded and upskilled with the latest amendments in taxation policy of India.

Reference Books :

1. Shukla and Grewal: Advanced Accounts. (S. Chand & Co. Ltd. New Delhi)
2. Jain and Narang: Advanced Accounts.(Kalyani Publishers, Ludhiana)
3. Sr. K. Paul: Accountancy, Volume-I and II.(New Central Book Agency, Kolkata)
4. R. K. Lele and Jawaharlal: Accounting Theory (Himalaya Publishers)
5. Dr. L. S. Porwal: Accounting Theory (Tata McGraw Hill).
6. Robert Anthony, D.F.Hawkins& K.A. Merchant: Accounting Text & Cases (Tata McGrawHill

Online Resources:

1. https://incometaxindiaefiling.gov.in/

2. https://www.taxmann.com/#

3. http://www.gstcouncil.gov.in/

MOOCs:
Alison
Swayam

Course Plan

Unit	Contents
1	**Introduction :** Basic concepts: Income, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, maximum marginal rate of tax; Permanent Account Number (PAN) Residential status; Scope of total income on the basis of residential status Exempted income under section 10
2	**Direct and Indirect Tax:** Income from Salaries; Income from house property, Profits and gains of business or profession; Capital gains; Income from other sources, Deductions from gross total income; Rebates and reliefs Computation of total income of individuals and firms; Tax liability of an individual Indirect taxes.
3	**Overview of GST:** Overview Of GST: Introduction to GST-Key Concepts – Taxes under GST – Central GST – State GST – Union Territory GST – Integrated GST - Cess

Course Number	Course Name	Credits	
408	Meditation & Yoga	1 Credit	

Course Objective:

- To introduce the practice of yoga and its benefits to students
- To impart practices of basic yogic kriyas

Expected Outcome :

Students will be able to understand the advantages of Yoga and practice basic yog kriyas

Reference Books :

- Yoga – Asanas, Pranayam, Mudras, Kriya, Vivekananda Ashram
- Yoga – Sivanand Yog Vedanta Center

Online Resources:

https://www.yogatoday.com/

https://www.youtube.com/user/yogatoday

https://m.youtube.com/user/yogawithadriene/playlists

MOOCs:

Swayam

Course Plan

Unit	Contents
1	i) Origin of Yoga & its brief development. ii) Meaning of Yoga & its importance iii) Yoga as a Science of Art (Yoga Philosophy). iv) Meaning of meditation and its types and principles.
2	i) Classification of Yoga/Types of Yoga ii) Hatha Yoga , Raja Yoga, Laya Yoga, Bhakti Yoga, Gyan Yoga, Karma Yoga. iii) Asthang Yoga.
3	i) Principles of Yogic Practices. ii) Meaning of Asana, its types and principles. iii) Meaning of Pranayama, its types and principles. iv) Meaning of Kriya its types and principles. v) Yogic therapies and modern concept of Yoga vi) Naturopathy, Hydrotherapy, Electrotherapy, Messotherapy, Acupressure, acupuncture.

SEMESTER V

Course Number	Course Name	Credits	
501	Introduction to the Internet Technologies	3 Credits	

Course Objective :

- To teach the basic internet concepts and train them to develop internet applications.
- An overview of the HTML5 specification
- Practical knowledge to implement new HTML5 elements and attributes.
- Overview of Javascript

Pre-requisites:

Preliminary knowledge of computer, their operations and applications.

Expected Outcome :

- Describe and use client-side technologies of the World Wide Web: HTML5, CSS3, Javascript.
- To implement different constructs and programming techniques provided by Java Script.

References (Books, Websites etc) :

Text Books:

1. The Complete Reference HTML -Thomas A.Powell
2. The ABC's of JavaScript –Lee Purcell & May Jane Mara
3. Internet Technology at work - Hofstetterfred
4. Beginning HTML5 & CSS3 - Christopher Murphy, Richard Clark &oliStudholme

Reference Books :

1. Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGL –Bayross Ivan
2. Internet Technology at work Hofstetterfred
3. Web Design Technology-D.P. Nagpal- S. Chand Technical
4. JavaScript Bible

Reference Sites:

1. www.w3schools.com
2. www.devguru.com

Suggested MOOC :

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan	
Unit	**Contents**
1	**Overview Of Internet And Intranet:** Understanding internet and its need, concept of intranet, difference between internet and intranet, a brief history, internet applications, Internet Service Providers (ISP) concept of client and server, concept of a web browser and web server, communicating on the internet, concept of domain- Physical domain, virtual domain, registering a domain, need of IP addressing, process to assign IP addresses, World Wide Web
2	**Introduction To HTML:** **Introduction:** Overview of HTML, need of HTML, Use of HTML **HTML Tags:** concept of Tag, types of HTML tags, structure of HTML program**Text formatting through HTML:** Paragraph breaks, horizontal rules, heading style, line breaks, background and BGcolor attributes **Emphasizing material in a web page:** Heading styles, drawing lines, text styles.**Text styles and other text effects-**centering, spacing, controlling font size & color**Lists:** Using unordered, ordered, definition lists**Adding Graphics To HTML Documents:** Using Image tag, attributes of Image tag, changing width & height of image
3	**Tables, Frames And Linking Documents:** **Handling Tables:** To define header rows & data rows, use of caption tag, changing height & width of table, cellpadding, cellspacing, bgcolor, colspan, rowspan**Linking Documents:** Concept of hyperlink, types of hyperlinks, linking to the beginning of document, linking to a particular location in a document, Images as hyperlinks**Frames:** Introduction To frames, using frames & frameset tags, named frames.**Forms :** INPUT tag, TYPE Attribute : text, password, button, checkbox, radio button, image
4	**Introduction to CSS:** Introducing CSS, Types of style sheets: inline, embedded and external Style.Working with CSS properties: text properties, color and background properties, border and shading, box and block properties, positioning with CSS, Various types of CSS selectors: universal, class, ID, child, descendent, adjacent sibling, attribute and query.
5	**Introduction To HTML5 and CSS3:** Features of HTML5 and CSS3 with few elements.
6	**Introduction To JavaScript:** **Introduction to scripting:** overview of Java Script, Advantages, Features of JavaScript, Client side java Script, writing JavaScript into HTML, First Hello World Program **Basic JavaScript Techniques**: Data types, literals, variables and operators, Java

	Script arrays, dense array, operators, expressions **Java Script Programming Construct**: Assignment, data declaration, if, switch, while, for, do while, label, break, Continue **Functions and Objects**-Built-In Function and User defined function. User defined functions, function declaration, passing parameters, variable scope, return values, recursive functions, String, Date, Math Objects **Dialog boxes** -Alert dialog box, prompt dialog box, confirm dialog box, **Working with form**- Forms and Form elements and the associated events. Form validation.

Course Number	Course Name	Credits	
502	Object Oriented Analysis and Design	3 Credits	

Course Objective :

- To Understand concept of system design using UML.
- 2. To understand system development through object oriented techniques.

Expected Outcome :

At the end of course students will know –

- Advantages of using OOP platforms for development.
- Process carried out while designing Object Oriented Systems.

References (Books, Websites etc) :

- The Unified Modeling Language User Guide by Grady Booch, James Raumbaugh, Ivar Jacobson.
- Object Oriented Software Engineering by Ivar Jacobson
- 3. Software Engineering by Pressman

Suggested MOOC : Refer **NPTEL**

Course Plan

Unit	Contents
1	**Object Oriented Concepts, Modeling and UML:** What is Object Orientation : (Introduction to class, object,inheritance, polymorphism), Model : Introduction of Modeling, Object Oriented Modeling , Object oriented system development: Function/data methods, Object oriented analysis,Object oriented construction, Object oriented testing
2	**Iterative Development and UML:** Understanding requirements, Rational Unified process &RUP Phases – Inception, Elaboration, Construction, Transition UML : Designing Tool for OOAD : Introduction to UML, Overview of UML, Conceptual Model of UML, Diagrams in UML, Advantages of UML **Behavioral Modeling** Use Case Diagram : Realization of Use Cases, Finding Actors, Defining Relations among Use case, Writing Use Cases, Activity Diagram
3	**Basic and Advanced Structural Modeling** Class Diagram : Identifying the elements of an object model, Identifying classes and objects, Specifying the attributes, Defining operations, Finalizing the object definition, Advanced class Modelling, Interface, Types and Roles **Diagrams Based on Classes :** State Chart Diagram, Package Diagram, Object Diagram

4	**Interaction Modelling :** Introduction to Interaction Diagrams, Need of Interaction Diagrams, Interaction Diagrams, Collaboration Diagram, Sequence Diagram
5	**Architectural Modeling** Component Diagram: Need of Component Diagram, Realization of Components, Relating Components. Deployment Diagram : Purpose of deployment diagram, Architecture of System, Different Architectures used for System, Representing Architecture using Deployment Diagram
6	**Object Oriented Programming Styles** Object Oriented Style with reference to Reusability and Extensibility, Robustness, 3 Programming in the Large, Discussion on case Studies e.g. Library Management System, Hospital Management System, . Online Shopping, Nukari.com website, Matrimonial website

Course Number	Course Name	Credits	
503	C# Programming	3 Credits	

Course Objectives

- Learn the fundamentals of C# programming in Visual Studio.
- To Use .Net Framework
- To Handle Exceptions in C#
- To implement Object oriented technology in C#
- To operate with Arrays
- To use Class Designer and Object Test Bench tools.

Expected Outcome :

This COURSE focuses on building applications with a graphical user interface (GUI) for the Microsoft Windows operating system although GUI interfaces on other operating systems, and on the Web Topics include: event-driven programming, Win32 API, dialog boxes and standard GUI controls, dynamic link libraries, .NET Framework. The C# programming languages will be used to build applications.

Reference Books:

- The Complete Visual C# Programmer's Guide
- A Programmer's Introduction to C# 2.0, Third Edition
- 3. C# and the .NET Platform, Second Edition

Course Plan

UNIT	Contents
1	**The .net Framework:** Introduction, common language runtime, common type system, common language specification, the base class library, the .net class library, Intermediate language, Just in time compilation, garbage collection, assemblies, web services, COM, localization
2	**Introduction to C # :** Evaluation of C#, characteristics of C#, application of C#,difference between C++ and C#, difference between Java and C#.Introduction to C# environment : The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach, C# and .NET. Data types, identifiers, variables, constants, C# statements, OOPs concept,array and strings, operators, control statements, type conversions, Mathematical functions.
3	**Classes and Objects :** Basic principles of OOP's, class, objects, constructors, static members, static constructors, private constructors, copy constructors, destructors, member initialization, the this reference, nesting of classes, constant members, read only members, properties, indexers.Inheritance and polymorphism : overloading, inheritance, overriding, interfaces
4	**Visual studio IDE features, introduction to Window forms, components, control:** textbox, label, linklabel, status bar, checkedlistbox, combobox, listbox, listview,

	radiobutton, button, panel, groupbox, dialog box, menu control, properties, methods, events of controls.
5	**ADO.net:** the component model, creating database connection, database command, data repeater, connecting to data sources, choosing a .net data provider, manage a connection, building command objects, executing commands, building datasets and datatables, data adapter
6	**Managing Console I/O operations :** Console class, console input, console output, formatted output, numeric formatting, standard numeric format, custom numeric format. Managing Errors and Exceptions : Types of errors, exceptions, syntax of exception handling code, multiple catch statement, the exception hierarchy, general catch handler, using final statement, nested try blocks, throwing our own exceptions, checked and unchecked operators, using exceptions for debugging.

Course Number	Course Name	Credits	
504	Graph Theory	3 Credits	

Course Objective :

The aims of this Graph theory is a delightful playground for the exploration of proof techniques in discrete mathematics and its results have applications in many areas of the computing ,social and natural science

Expected Outcome :

At the end of the course student should be able to:

- Use graphs as models in a variety of areas.
- Formulate several real world problems in mathematical terms

References (Books, Websites etc) :

Introduction to Graph theory - PHI by Douglas B.West

Discrete Mathematics and its Applications Edition 6th - Tata McGraw Hill by Kenneth H. Rosen

Suggested MOOC :

NPTEL

Course Plan

Unit	Contents
1	**Fundamental Concepts** : Definition, Graph Models, Sub Graph, Decomposition and special Graphs, Connection in Graphs, Bipartite Graph, Degree, Directed Graph, Undirected Graph, weighted graph, Regular Graph, dual graph, Representing Graph in computer memory, **Examples**
2	**Connectivity**: Walk, paths, trail, circuits, Connected Graph, Bridge, Isomorphism, Eulerian Circuits, Euler's path, Euler graph, Hamiltonian Graph and Graph Algorithm, Konigsberge Bridge problem, shortest path problems, city route,puzzle problem, Seating arrangement problem, Travelling salesman problem, **Examples**
3	**Algorithms** : Fleury's algorithm, Warshall's algorithm, Floyde's algorithm, Dijkstra's algorithm, Depth-First Search/ Breadth First search in Directed Graph, **Examples**
4	**Coloring of Graphs and planarity**: Vertex Coloring and upper bonds, Graph with Large Chromatic Number, 4 color theorem,Applications of graph coloring, Planar Graph, Euler's Formula, Homomorphism, Theorems, **Examples**
5	**Trees and Distance**: Concept of Trees, Definition and properties of Trees, Application of Trees, Trees as Models, Game Trees, Tree Traversal, Infix and Postfix notation of arithmetic expression, Binary Trees and its Properties, Binary Search Trees, Spanning Tree, Minimum spanning Tree, Depth First search, Breadth –First search, Back tracking applications, Kruskal algorithm, Prims algorithm, Huffman's algorithm **Excercises**
6	**Matchings** : Matching, Hall's Condition, MinMax Theorem, covers, Maximum Bipartite Matching, Weighted Bipartite Matching, Maximum Networks Flow, Examples

Course Number	Course Name	Credits	
506	Lab on Internet Technology and C# Programming	3 Credits	

Course Objective :

- To teach the basic internet concepts and train them to develop internet applications.
- An overview of the HTML5 specification
- Practical knowledge to implement new HTML5 elements and attributes.
- Overview of Javascript
- Learn the fundamentals of C# programming in Visual Studio.
- To Use .Net Framework
- To Handle Exceptions in C#
- To implement Object oriented technology in C#
- To operate with Arrays
- To use Class Designer and Object Test Bench tools.

Expected Outcome :

- Describe and use client-side technologies of the World Wide Web: HTML5, CSS3, Javascript.
- To implement different constructs and programming techniques provided by Java Script.
- This COURSE focuses on building applications with a graphical user interface (GUI) for the Microsoft Windows operating system although GUI interfaces on other operating systems, and on the Web Topics include: event-driven programming, Win32 API, dialog boxes and standard GUI controls, dynamic link libraries, .NET Framework. The C# programming languages will be used to build applications.

References :

- Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGL –Bayross Ivan
- Internet Technology at work Hofstetterfred
- Web Design Technology-D.P. Nagpal- S. Chand Technical, JavaScript Bible
- The Complete Visual C# Programmer's Guide
- A Programmer's Introduction to C# 2.0, Third Edition
- 3. C# and the .NET Platform, Second Edition

Suggested MOOC :

Swayam

Course Plan

Unit	Contents
Internet Technology:	
Design A webpage which have student's biodata with proper formatting and having student name as title.	
Design a form using HTML that accepts information about your qualification, extra curricular activities, achievements, skill sets, hobbies, and expectation for a particular job.	
Design a website for a class which shows student's list linked with their biodata pages	

Design a website for PNG jewelers, having images of different types of jewelries which are linked with the pages giving details about the items.

Design a Style sheet to give following effects
The first leter of the paragraph should have 150% font size
The first line of the paragraph should have purple as background color and white as the fore color.

Design a website for the college which lists all the faculties(ordered lists), courses (definition lists) every course explains details (fees, duration, intake capacity) as unordered list.

Design a website for Samsung products using frames having design as-

<table>
<tr><td><logo></td><td colspan="3"><title></td></tr>
<tr><td colspan="2"><Links to various products></td><td><images of products></td><td><form to purchase the product></td></tr>
</table>

Design a website for a college showing features of the university, college and list of different courses running in the institute. Course names have links with the pages having details of the courses having similar design using stylesheets.

Design a CSS(inline) that displays the regular text at the center with green as background color and white as fore color and should be bold, using class

Design a web page to display the following output

- List of subjects
  - Semester III
    - C++
    - Dot.Net
  - Semester IV
    - Java
    - Industrial Projects

Internet Programming

a. HTML
b. VBScript
c. Java Script
d. DHTML

Design a webpage which accepts users information with validations(name, std code(should not exceed 4 digits),landline number(no. of digits should be between 5 to 7), mobile number(exactly 10 digits),email(should have @ and .))

Write a HTML code to display timetable of your class.

Write a HTML code to display the mark sheet of entered seat number

Write an HTML code to accept the students's
Design a website which accepts a number from user and performs the selected operation(even/odd, prime/not prime, positive/negative)
Design a webpage which provides calculator facilities.
Design webpage which accepts no of lines and prints it in the form of triangular shaped pyramid.
Write JavaScript to display table of numbers 2-10 (use form and form elements)
Write a JavaScript code which contains "show" button. When user clicks on show button, first 10 terms of Fibonacci series will be displayed in text box on another HTML page. This page contains button "back". With this button user can come back to original page.
Create a from having textboxes, radio button and check boxes and reset button. On clicking the reset button the entire form should be reset.
Design a webpage for a restaurant which accepts online order from user and shows the calculated total amount.
Accept login name and password from user and display biodata of the corresponding user.
Design a page for a user to create his login by accepting desired login name, password and confirm the password.
Accept data of a student wants to appear for entrance(name, marks at matriculation, higher secondary and graduation). Ask student to select the course he want to take admission. If the student scores above 55 at matriculation, above 60 at higher secondary and graduation then he is eligible for any course. If he has science degree or maths at 11th and 12th then only he is eligible for MCA.Design the form accordingly. Give the according message.
Design a webpage to conduct aptitude for maths. The test is objective, each question having 4 options. Let the students select the option. For every correct option he scores 2 marks and for every wrong answer he loose 1 mark. Calculate & show score of a student.
Design the registration form for a Web site and when the user clicks on Submit button the login form should be appeared on screen.
Create a purchase order form using Javascript.
Create a Java script code with show button. User click on show button, all string functions should be implemented.
Write JAVA script that finds occurrence of letter "m" in the string entered by user in textbox and replace it with "a" and write string to page.
Develop HTML form to accept mathematical expression in one textbox and display its result in another textbox after clicking on button showing mathematical operations.

C#	
SET-I	Basic Console Applications
	• Write a C# Program to design simple calculator • Write a C# Program to Check whether the Entered Number is Even or Odd. • Write a C# Program to Swap 2 Numbers • Write a C# Program to Get a Number and Display the Sum of the Digits • Write a C# Program to Get a Number and Display the Number with its Reverse • Write a Program in C# to demonstrate Command line arguments processing • Write a Program in C# to demonstrate boxing and Unboxing.
SET-II	Date and Time
	• Write a C# Program to Display the Date in Various Formats • Write a C# Program to Check Whether the Entered Year is a Leap Year or Not • Write a C# Program to find difference between Two Dates
SET-III	Classes
	• Write a program to demonstrate abstract class and abstract methods in C#. • Find the sum of all the elements present in a jagged array of 3 inner arrays. • Write a program to demonstrate Operator overloading. • Demonstrate arrays of interface types (for runtime polymorphism) with a C# program.
SET-IV	• Consider the Database STUDENT consisting of following tables: Course (C_ID: int, C_Name: string) • Student (RollNo:int, S_ Name: string, Address: string, C_ID: int, Admissiyear: int) Develop suitable windows application using C#.NET having following options: 1. Entering new course details. 2. Entering new student details. 3. Display the details of students (in a Grid) who belong to a particular course. 4. Display the details of the students who have taken admission in a particular year • write a program in C# to demonstrate error handling.

Course Number	Course Name	Credits	
507	Minor Project II	1	

Course Objective :

Student has to complete a Minor project work under the guidance of the faculty member in the institute. Students has to develop any software using Java in a group of 2 to 3. Each team has to give 4 minimum PPT presentation to the Project Guide during the semester. Final project viva will be conducted as per University Time Table.

Learning Outcome:

- Acquire strong fundamental knowledge in fundamentals of computer science and software engineering to begin in practice as a software engineer.
- Analyze, plan, design, and implement computer systems.
- Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
- Apply new software models, techniques and technologies to bring out innovative and novelistic solutions

Course Number	Course Name	Credits	
508	Social Media Management	1 Credit	

Course Objective:

This Course Teaches student to use social media strategically to create value for a client or organization.

Expected Outcome :

- Students will learn by doing assignments focusing on social media, post writing and publishing, management and measurement tools, a social media audit, editorial calendar and crises management.
- Students will master the skills necessary to become successful social media managers.

Reference Books :

- Guy Kawasaki & Peg Fitzpatrick, "The art of social media: power tips for power users
- Social media marketing all in one for dummies, Jan Zimmerman & Deborah N
- Social media explained by Mark W. Schaefer

Online resources

http://www.gov.pe.ca/photos/original/IPEI_ebiz_smmkt.pdf

https://www.coursehero.com/file/10513028/Media-Management-Notes/

MOOCs:
Swayam

Course Plan

Unit	Contents
1	**Introduction To Social Media:** Introduction to Social Media, importance of social Media, History and evolution of Social Media, Managing Information, Aggregators. Facebook, Twitter, Instagram, LinkedIn, Youtube, Blogs.
2	**Using Social Media:** Strategy Plan for Social Media Management, Touchpoint, Analysis Scheduling, Creating Content, Managing Content programmes, Planning Worksheet, Social media campaign.
3	**Evaluating Social Media:** • Evaluation of Social Media Platforms • Tools to manage and measure performance of social media content and campaigns Handling critical issues in social media management and legal aspects of social media.

4	**Setting-up own professional site** Content management, design, connectivity with social media
	Assignments: 1. Explain atleast one social media management tool in detail. 2. Describe social media analytics tool in bried with example. 3. Detailed social media campmaign: The campaign can be any example presented in social media for Lead Generation. Describe the objectives for campaign, outline the tools, preapare budget for campaign. 4. Budget for social media plan: Based on the understanding of your client, prepare a budget for social media management. Include the individual cost of your tactis, your proposed social media campaign and social media tools. Include the total cost as a bottom line of your budget. Include the ROI of your plan and why that budget should be allocated to social media. List different types of content to be used in creating brand by using social media campaigns. Describe merits and demerits of each type of content used in social media.

Course Number	Course Name	Credits	
508	Road Safety Management	1 Credit	

Course Objective:

The vehicle population in India is growing at an exponential rate. This phenomenon is bringing in its wake a host of health related, environmental, safety and behavioral problems in the society. The problem is compounded due to absence of effective means of mass transportation system in most big cities in India.

Reference Books :

- Pratibha Shastri Ranade , Road Safety Management, ICFAI University
- Vijay Vinayak Revankar, Road Safety – Vimleshwar Automobile Industry and Road Safety Community Forum

MOOCs:

Alison

Course Plan

Unit	Contents
1	**Introduction to Road Safety Management:** Importance and need of road safety management.
2	**Management of Traffic and Traffic Rules:** Use of traffic signals, signs by hand, knowledge/applications of automatic signals, parking rules, driving around, Traffic islands ,traffic joints, subways and flyovers. Signs of roads: meaning of yellow, green and red lights, zebra crossings, bus stops, use of road by physically disadvantaged persons, elderly persons, women and children, special right of way for ambulance, firefighting vehicles, school bus and V.I.P vehicles.
3	**Management of Road Mishaps and Accidents:** First aid to accident victims- First aid techniques, co-ordination with hospitals and other health centres for emergency treatment of accident victims, role of Insurance companies in providing relief to accidents victims, Management of Ambulance Services, Importance of voluntary blood donation in saving accident victims,Rehabilitation of persons affected by accidents. Qualities of a good Driver: Good health, tolerance, responsibility, knowledge of rules and laws, self confidence, politeness, familiarity with the vehicle and its maintenance requirements, self discipline.

Course Number	Course Name	Credits	
508	Event Management	1 Credit	

Course Objective:

The basic purpose and spirit of this course is to expose the students to hands- on experience of event management.

Expected Outcome :

The students are oriented to event management in order to strengthen their skills of planning, organizing and other such management functional skills.

Reference Books :

- S. R. Singh, Event Management, HPH.
- Alex Genadelik, Event Planning: Management & Marketing For Successful Events: Become an event planning pro & create a successful event series

Online Resources:

https://blog.komodoplatform.com/notes-on-social-media-and-community-management-for-blockchain-cryptocurrency-and-ico-projects-4d0f328bdfb3

MOOCs:

Alison

Course Plan

Unit	Contents
1	**Introduction to Event Management:** The concept of event. need and importance of events.
2	**Types of Events :** Different types of event in Corporates, Social Programmes and Private Programmes. Following units are entirely based on practice part of the event management
3	**Assessment of Events :** Post event assessment of any 05 programmes A student or a group of 03 students shall be assigned the event which has taken place in near past at any place and they shall make an inquiry into its success and effectiveness by rating them on the basis of appropriate parameters and shall submit the assignment to the respective teacher . Preparation of Learning Value report : A student shall prepare a report on what he learnt from the events and submit it to the concerned teacher. The report shall include mainly the description of occasion, the person involved and what guiding principles they have received from them.

SEMESTER VI

Course Number	Course Name	Credits	
601	Data Warehousing And Data Mining	3 Credits	

Course Objective :

- To introduce the basic concepts of Data Warehouse and Data Mining techniques.
- Examine the types of the data to be mined and apply preprocessing methods on raw data.
- Discover interesting patterns, analyse and estimate the accuracy of the algorithms.

Expected Outcome : At the end of this course, student should be able to understand

- Process raw data to make it suitable for various data mining algorithms.
- Discover and measure interesting patterns from different kinds of databases.
- Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

References (Books, Websites etc) :

- Jiawei Han and Micheline Kamber , "Data Mining Concepts and Techniques" ELSEVIER
- M.Humphires, M.Hawkins, M.Dy,"Data Warehousing: Architecture and Implementation", Pearson Education
- Kargupta, Joshi., "Data Mining: Next Generation Challenges and Future Directions", Prentice Hall of India

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to Data warehousing:** Data Warehousing, Difference between operational database system and data warehouse, Data Warehouse Users, Benefits of Data Warehousing, Metadata, Classification of Metadata, and Importance of Metadata. Data Marts, Reasons for creating Data Marts, Building Data Marts: Top down Approach & Bottom up Approach, Data Warehouse Architecture, Two Tier Architecture, Three Tier Architecture. Data Warehouse Schema, Star, Snow Flake & Fact Constellation Schema. OLAP, Need for OLAP, OLAP Operations, OLAP Models.
2	**Data Preprocessing:** Need, Objectives and Techniques, Descriptive data summarization, Data Cleaning, Data Integration, Data Transformation, Data Reduction.

3	**Introduction to Data Mining:** Introduction, Need for Data Mining, KDD Process, Data Mining Architecture, Data Mining Functionalities, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System
4	**Mining Frequent Items and Associations:** Frequent Item Set, Closed Item Set, Association Rule Mining, Market Basket Analysis, Classification of Association Rules, Apriori Algorithm
5	**Classification and Prediction:** Classification & Prediction, Issues regarding classification & Prediction, Comparing Classification Methods, Classification by Decision Tree Induction
6	**Clustering:** Introduction, Cluster Analysis, Need, Categorization of Major clustering methods. Types of Data in Cluster Analysis, Partitioning Methods: K-Means Method, K-Mediods Method, Applications of data mining in various sectors

Course Number	Course Name	Credits	
602	Web Programming	3 Credits	

Course Objective :

To make students able to design, develop the various types of web based applications.

Expected Outcome :

By using JavaScript, PHP and My SQL, at the end of the course student should be able to :

- Design web pages
- Knowledge about different types of web sites
- Navigation amongst web pages
- Knowledge about presenting information on web interfaces

References (Books, Websites etc) :

- PHP and MySQL Web Development by Welling Thomson Fourth Edition, Pearson publication
- Teach Yourself PHP, MySQL and Apache by Julie C. Meloni Pearson publication

Suggested MOOC :

Please refer these websites for MOOCS:

NPTEL / Swayam

www. edx.com

www.coursera.com

Course Plan

Unit	Contents
1	**Introduction To PHP:** Installing and configuring PHP, Building blocks of PHP:PHP tags, variables, data types, operators, expressions, constants, Control Structures: conditional statements, loops, switch statement
2	**Working With Functions And Arrays:** Working with functions: What is a function? Function declaration and definition, Calling function, user defined functions, variable scope, working with arrays: Creating, sorting and reordering arrays, PHP classes.
3	**String Manipulation:** Working with strings, dates and time: Formatting, investigating and manipulating strings with PHP, using date and time functions in PHP, working with forms: Creating a simple input form. File Handling: Saving data, storing and retrieving Bob's order, processing files, opening file, writing to a file, closing a file, reading from a file, uses other useful file functions.
4	**Working With Cookies And Sessions :** Working with cookies: Introducing cookies, setting and deleting cookies with PHP Working with session: starting a session, working with session variables, passing session IDs in the query string, destroying sessions and unsetting variables, using sessions

5	**MYSQL :** Creating web database: Using MySQL monitor, logging into MySQL, creating databases and users, setting users and privileges, column data types Working with MySQL database: Inserting data into database, retrieving data from the database, retrieving data with specific criteria, retrieving data from multiple tables, retrieving data in particular order, grouping and aggregate data, using sub queries, updating records, deleting records from databases, dropping table and database.
6	**Accessing MYSQL Database From Web With PHP :** Web database architecture, Querying database from the web: checking and filtering input data, setting up connection, Choosing database to use, querying database, retrieving the query result, disconnecting from the database.

Course Number	Course Name	Credits	
603	Software Project Management	3 Credits	

Course Objective :

To provide basic project management skills with a strong emphasis on issues and problems associated with delivering successful IT projects. The course is designed to provide an understanding of the particular issues encountered in handling IT projects and to offer students methods, techniques and 'hands-on' experience in dealing with them.

Expected Outcome :

At the end of this course, student should be able to understand

- Understand and practice the process of project management and its application in delivering successful IT projects;
- Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities;
- Identify the resources required for a project and to produce a work plan and resource schedule.

References (Books, Websites etc) :

- Information Technology Project Management: Kathy schwalbe, International student edition, THOMSON course Technology, 2003.
- B)Software project management : Bob Hughes and Mike Cottrell, Third edition, Tata McGraw-Hill
- Microsoft office Project 2003 Bible: Elaine Marmel, Wiley publishing Inc.
- **Software Requirement:** Microsoft project Tool.

Suggested MOOC:

Please refer these websites for MOOCS:
NPTEL / Swayam
www. edx.com
www.coursera.com

Course Plan

Unit	Contents
1	**Introduction to project management:** Project, project management, Importance, characteristics of project how software projects are diff. than other projects, Problems with software projects, Phases: Initiation phase, planning phase, execution phase, monitoring and controlling phase, and closing phase. All parties involved in project, Role of Project Manager, Project management framework, Software tool for project management
2	**Project planning:** Integration management: What is integration management, plan development and execution, What is scope management, methods for selecting project, scope statement, Work Breakdown Structure, main steps in Project planning: identify project scope and

	objective, identify project infrastructure, analyze project characteristics, identify project products and activities, estimate effort for each activity, identify risk activity, allocate resources, review plan, execute plan. Use of software (Microsoft Project) to assist in project planning activities.
3	**Project scheduling:** Time management: importance of Project schedules, schedules and activities, sequencing and scheduling activities, Network Planning models, duration estimation and schedule development, Critical path analysis, PERT, Use of software(Microsoft project) to assist in project scheduling.
4	**Project cost management:** Importance and principles of project cost management, Resource planning, Attributes to be considered in cost estimation, factors affecting the cost, various costs involved in it. Traditional method: Estimation by analogy, Expert judgment, Parkinson, price to win, top down, bottom up. COCOMO Model, Function point analysis, Function point analysis, Cost control, Use of software(Microsoft project) to assist in cost management.
5	**Project quality management:** Quality of information technology project, Stages of software quality management, PMBOK, Quality standards, Tools and techniques for quality control.
6	**Project risk management:** The importance, Top risk in projects, Common sources of risk in IT projects, elements in risk mgt., Risk identification, Risk quantification, Risk response development and control, using software to assist in project risk management.

Course Number	Course Name	Credits	
604	Business Analytics	3 Credits	

Course Objective :

- To gain an understanding of how decision makers use business analytics to formulate and solve business problems and to support Information System based decision making.
- To become familiar with the processes needed to develop, report, and analyze business data

Expected Outcome : At the end of this course, student should be able to understand

- Identify and prioritize information & data modelling.
- Identify and prioritize threats to information assets.
- Define an Geographical information system.
- Understand various types of Analytics and its significance.
- Understand text & web mining
- Applications of business analytics

References (Books, Websites etc) :

1. Efraim Turban, Ramesh Sharda : Decision Support and Business Intelligence systems : PHI 8th Edition

Suggested MOOC :
NPTEL, SWYAM

Course Plan

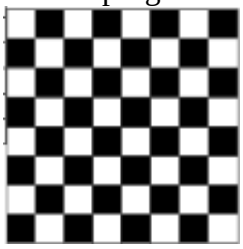
Unit	Contents
1	**Business Analytics & Data Visualization:** Business Analytics (BA), Overview of Areas where Business Analytics is applied, OLAP, Reports & Queries, Multidimensionality, Advanced Business Analytics, Data Visualization, Geographical Information system, Real time Business Intelligence Automated Decision support, and Competitive Intelligence, BA & Web, Usage benefits & success
2	**Visualization and Data Issues:** Organization of Source of Data, Importance of Data Quality, Dealing with Missing or incomplete data, data classification, Introduction to Data Mining, Data mining process, data mining tools XL MINER.
3	**Data, Text & Web Mining :** Data Mining concepts & applications, Data Mining Techniques & Tools, Data Mining Project Processes, Text Mining, Web Mining
4	**Applications of Business Analytics :** Risk - Fraud Detection and Prediction, Recovery Management, Loss Risk Forecasting, Risk Profiling, Portfolio Stress Testing, Market share estimation and Sensitivity Analysis
5	Loyalty Analytics, Customer Life Time Value, Propensity Analytics, Churn Analytics, Customer Analytics Customer Segmentation, Cross- Sell or Up sell Models
6	Recruitment Analytics, Compensation Analytics, Talent Analytics, Training Analytics, Human Resource Retention Analytics, Workforce Analytics Project Work

Course Number	Course Name	Credits	
606	Lab on Web Programming	1 Credits	

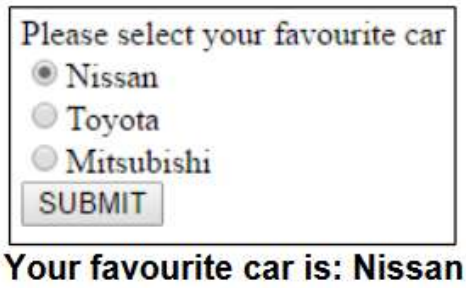
1. Write a Program for finding the biggest number in an array without using any array functions.
2. Write a program to square of a number.
3. Write a program to print Factorial of any number.
4. Write a program in PHP to print Fibonacci series.
5. Write a program to find whether a number is Armstrong or not.
6. Write a program to find HCF of two numbers
7. Write a program to demonstrate four built in functions.
8. Program to print the below format

```
* * * * * * * * * * * * * * *
* * * * * * * * * * * * * *
* * * * * * * * * * * *
* * * * * * * * * *
* * * * * * *
* * * * *
* * *
*
```

9. Write a program to make a chess:



10. Create the following form and based on the user selection print a message in the format given below:



11. Write a PHP script to accept personal details of student (rno, name, class) on first page. On second page accept marks of six subjects (out of100). On third page print marklist (rno, name, class, marks, total, percentage)
12. Write a PHP file that will output a form containing 2 fields: username and password. Upon submission of the form, the code should check against the database to see whether the username-password pair was correct. If so, display a welcome message. If not,

display the message “Invalid username or password” followed by the same login form.

13. Write a PHP file that can be added to other PHP files using the include or require functions. This file should:

a. Make a connection to a MySQL database, and log in with valid credentials. The connection resource should be stored in a variable with an appropriate name.
b. Create a database TEST if it does not exist.
c. Select the TEST database.
d. Create a table USER exerciseusers if it does not exist with the following fields:
    i. USERNAME VARCHAR(100) , PASSWORD_HASH CHAR(40), PHONE VARCHAR(10)
e. The USERNAME field should be designated as UNIQUE.
f. If any of these operations cause an error, stopexecution and print the error message

14. Design a web page that accepts inputs(username and password) and authenticate the username and password from a given database using PHP.

Note : Similar experiments can be designed.

Course Number	Course Name	Credits	
607	Major Project	1	

Course Objective :

Student has to complete a Major project work under the guidance of the faculty member in the institute. Students has to develop any software using Web Development / Dot Net Framework in a group of 2 to 3. Each team has to give 4 minimum PPT presentation to the Project Guide during the semester. Final project viva will be conducted as per University Time Table.

Learning Outcome:

- Acquire strong fundamental knowledge in fundamentals of computer science and software engineering to begin in practice as a software engineer.
- Analyze, plan, design, and implement computer systems.
- Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
- Apply new software models, techniques and technologies to bring out innovative and novelistic solutions

Course Number	Course Name	Credits	
608	Business Ethics	1 Credit	

Course Objective:
The objective of this paper is to make the students more clear about the importance of ethics in business and practices of good corporate governance. It also talks about the corporate social responsibility

Expected Outcome :
This course exposes the student to the issues of values and ethics in management so that decision making and decision execution are undertaken in a human manner, as this will add to the flexibility and dynamism of the corporate culture.
The course will take the student from managerial ethics to organizational ethics and business sustainability.

Reference Books :

- Management by Values; Chakraborty S.K.; OxfordUniversity Press, Kolkata 2005.
- Professional Ethics by R. Subramanian, Second Edition, OXFORD
- Theory and Practice of Managerial Ethics; Jayashree S. Sadri S. and Dastoor D.S.; Jaico , Mumbai.
- New Mantras in Corporate Corridors, Sharma Subash New age International Publishers, New Delhi 2007.
- Business Ethics and Corporate Governance (towards excellence and sustainability); Sadri S., Jayashree. Himalaya Publishing Co. Mumbai 2011.
- Managing from the Heart: Unfolding spirit in people and organization; Wakalu, Arun: Response Books, New Delhi
- Manuel G Velasquez : Business ethics- concepts and cases Pearson.
- Bhanumurthy K V: Ethics and Social Responsibility of Business, Pearson Education India.

Online Resources:
https://managementhelp.org/businessethics/index.htm\

MOOCs:
https://www.edx.org/learn/business-ethics

Course Plan

Unit	Contents
1	Ethics – Meaning, and Nature of Ethics. Types of Ethics, Importance of Ethics. Business Ethics : Meaning, Nature and Importance of ethics in business, meaning of corporate social responsibility, Relation between corporate responsibility & Business Ethics.
2	Concept of Morals, Values, Beliefs; Moral issues in business, Spirituality and Ethics; Influence of Major religions on ethics: Hinduism, Islam, Christianity, Buddhism, Sikhism, and Zoroastrianism. Influence of spirituality on ethics.
3	Relationship between Business, Business Ethics & Business Development, Role of Business ethics in building a good society. Case Studies on Business Ethics

Course Number	Course Name	Credits	
608	Basics of Hospitality Management	1 Credit	

Course Objective:

- Recognize scope and career in the hospitality industry.
- 2. Identify the major segments and specialization of the industry and their operations.

Reference Books :

- Introduction to Hospitality Management, John R. Walker ,Pearson
- Food and Beverage Service, D.R. Lillicrap,John A. Cousins & Suzanne Weekes, Book Power.
- Food and Beverage Management, Bernard Davis , Sally Stone, Butterworth Heineman Ltd.
- Hotel House Keeping and Management, Raghubalan, Oxford University Press.
- Managing Front Office Operations, Michael Kasavanna, Richard Brooks , Charles Steadmon, AH&LA.

Online Resources:

www/youtube.com

MOOCs:

https://www.ifitt.org/hospitality-and-tourismmoocs/

Course Plan

Unit	Contents
1	**Introduction to the Hospitality Industry:** a. History and scope of the hospitality industry. b. Economic impact of the hospitality and tourism industries. c. Careers in the industry. d. Link between hospitality and travel and tourism. e. Major segments and specialization of the industry. f. medical tourism
2	**Recreation/Travel and Tourism:** a. Operation of recreational facilities such as resorts, spas, theme parks, and clubs. b. Meetings, conventions, exhibitions, banquets, and other events. c. Travel agencies and concierge desks. d. Gaming entertainment industry.
3	**Operations:** a. Leadership and management in the industry. b. Hospitality marketing. c. Human resources and risk management and safety procedures.

Course Number	Course Name	L-T-P- Credits	
608	Aptitude	1Credit	

Objectives:

The objective of this paper is to increase the capabilities of the student required by the industry. As per the need of the industry, the students will be trained in the latest Mathematical, Statistical,Logical, Vebal Ability, Current Trends in IT etc by the industry experts.

Expected Outcomes:

Students will be able to:

- apply general mathematical models to solve a variety of problems
- solve problems and correctly arrive at meaningful conclusions regarding their answers
- manipulate equations and formulas in order to solve for the desired variable
- interpret given information correctly, determine which mathematical model best describes the data, and apply the model correctly.
- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.

ELECTIVES:

Elective Group: (I) Information Security

Course Number	**Course Name**	**Credits**	
505-1-A	Information Security Concepts	2	
Course Objective: Introduce the learner to concepts involved in Information Security domain			
Expected Outcome : Theoretical understanding of Information Security Concepts			
References (Books, Websites etc) : CEH Study Guide - Sybex			
Suggested MOOC : SWAYAM			
Syllabus			
Unit	Contents		
1	**Information Security Concepts:** Confidentiality, Integrity and Availability of Information, Identification, Authentication and Authorization, Security Principles and Models		
2	**Physical Security:** Facility Requirement, Perimeter Security, Fire Protection, Fire Suppression, Power Protection, General Environmental Protection, Equipment Failure Protection		
3	**Network Security:** Secure Network design, Firewalls, WLAN Security, VPNs, Types and Sources of Network Threats		
4	**Operating System Security:** Windows, Linux/UNIX		
5	**Database Security:** MS SQL		
6	**Web Application Security:** Web Application Vulnerabilities, Secure Coding Techniques, Continuous Security Testing and Assessments		
7	**Compliance Standards :** IT Act, ISO 27001, ITIL Framework		

Elective Group (I) Information Security

Course Number	Course Name	Credits	
605-1-B	Information Security Administration	2	

Course Objective:
Introduce the learner to concepts involving security administration

Expected Outcome :
Practical understanding of setting, managing and securing Information Systems

References (Books, Websites etc) :
Red Hat Linux Bible: Fedora and Enterprise Edition - by Christopher Negus

Suggested MOOC :
SWAYAM

Syllabus

Unit	Contents
1	**Setup a Client:** Introduction to client-side devices, Setup, Manage and Secure a Desktop PC Setup, Manage and Secure a Mobile Device
2	**Setup a LAN:** Introduction to LAN devices, Simulate a LAN, Setup, Manage and Secure a Local Area Network
3	**Connect a LAN to the Internet:** Introduction to WAN devices, Setup, Manage and Secure a Connection to the Internet
4	**Share an Internet Connection across a LAN:** Introduction to Internet Connection sharing, Introduction to NAT and PAT Setup, Manage and Secure a Proxy Server
5	**Share resources over a LAN:** Setup, Manage and Secure a Print Server, Setup, Manage and Secure a File server
6	**Host a Website:** Introduction to website hosting, Setup, Manage and Secure a Web Server
7	**Setup support servers:** Setup, Manage and Secure a Mail Server, Setup, Manage and Secure a FTP Server, Setup, Manage and Secure a Boot Server, Setup, Manage and Secure a DNS Server

Elective Group II- Big Data

Course Number	Course Name	Credits	
505-2-A	Introduction to Big Data	2	

Course Objective :

To introduce learner with Big Data Concept, decision making by doing analysis on the data and managing the data using Big Data Tools like Apache Hadoop, Pig and Hive. What are the problems of Big Data and how it can be solved by different tools.

Pre-requisites: Preliminary knowledge of computer, Data Mining, Data Warehousing Concepts.

Expected Outcome :

- Good knowledge of Big Data Concepts
- Knowledge of Decision making using analysis on the Big Data
- Introduction to Big data Tools like Hadoop and Weka.

Reference Books :

1. Big Data- Understanding How Big Data Power Big Business –By Bill Schmarzo
2. Edureka lectures **Link:-** https://www.youtube.com/watch?v=A02SRdyoshM

Course Plan

Unit	Contents
1	**Introduction:** Big Data History, The Big Data Business Opportunity- Business Transformation Imperative, Big Data Business Model, Business Impact of Big Data
2	**Big Data In Organization:** Data Analytics Lifecycle, **Data Scientist Roles and Responsibilities** – Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, New Organizational Roles, Liberating Organizational Creativity.
3	**Decision Theory And Strategy:** Business Intelligence Challenge, Big Data User Interface Ramifications, Human Challenge of Decision Making, **Strategy for Decision Making**- Big Data Strategy Document, Case Study.
4	**Value Creation Process:** Understanding Big Data Value Creation, Value Creation Drivers, **Michael Porter's Value Creation Models**- Michael Porter's Five Forces Analysis, Michael Porter's Value Chain Analysis, Case Study.
5	**Big Data User Experience:** The Unintelligent User Experience, Understanding the Key Decisions to Build a Relevant User Experience, Using Big Data Analytics to Improve Customer Engagement, Uncovering and Leveraging Customer Insights, Big Data can Power a New Customer Experience.

6	**Big Data Use Cases:** **The Big Data Envisioning Process** –1. Research Business Intiatives, 2. Acquire and Analyze your Data, 3. Brainstorm New Ideas , 4. Prioritize Big Data Use Cases, 5. Document Next Steps, The Prioritization Process.
7	**Big Data Architecture:** New Big Data Architecture, **Introducing Big Data Technologies** – Apache Hadoop, MapReduce, R, WEKA etc.

Elective Group II Big Data

Course Number	Course Name	Credits	
605-2-B	HADOOP	2	

Course Objective :

To introduce learner with HADOOP Tool for Business Intelligence, decision making by doing analysis on the data using HADOOP Tool and also managing the Big Data using HADOOP.

Pre-requisites: Preliminary knowledge of computer, Big Data Analysis and Business Intelligence. Also students must know Core Java, C Programming and Data Structure Languages.

Expected Outcome :

- Good knowledge of HADOOP Tool.
- Knowledge of Decision making using HADOOP analysis on the Big Data
- Hands-on Big Data tools- Hadoop, Pig, Hive, HBase

Reference Books :

1. Big Data- Understanding How Big Data Power Big Business –By Bill Schmarzo
2. www.tutorialspoint.com

Course Plan

Unit	Contents
1	**BIG DATA Overview** : What is Big Data?, What Comes Under Big Data?, Benefits of Big Data, Big Data Technologies Operational vs. Analytical Systems, Big Data Challenges.
2	**Introduction To HADOOP**: Hadoop Architecture, MapReduce, Hadoop Distributed File System, How Does Hadoop Work?, Advantages of Hadoop.
3	**HDFS Overview:** Features of HDFS, HDFS Architecture, Starting HDFS, Listing Files in HDFS, Inserting Data into HDFS, Retrieving Data from HDFS, Shutting Down the HDFS.
4	**MAPREDUCE:** What is MapReduce?, The Algorithm for MapReduce, Inputs and Outputs (Java a Perspective), Analyze different use-cases where MapReduce is used, Differentiate between traditional way and MapReduce way.
5	**Introduction To Hadoop Features:** New Big Data Architecture, Introducing HADOOP Features – Apache Hive, Apache HBase, Pig.
6	**Multi Node Cluster:** Multi Node Cluster, Install Java, Creating User Account, Mapping the Nodes, Installing Hadoop, Configuring Hadoop, Start Hadoop Services, Adding New Data Node in the Hadoop Cluster, Removing New Data Node from the Hadoop Cluster.

7	**Environment Setup:** Pre-installation Setup, Installing Java Downloading Hadoop Hadoop Operation Modes Installing Hadoop in Standalone Mode Installing Hadoop in Pseudo Distributed Mode Verifying Hadoop Installation, Implement basic Hadoop commands on terminal.

Elective Group: (III) Information Systems

Course Number	Course Name	Credits	
505-3-A	E-Commerce	2	

Course Objective :

- To thoroughly understand the information technology for supporting E-commerce;
- To understand the necessary infrastructure and functional components to develop Ecommerce systems;
- To understand the design and application of E-commerce systems.

Expected Outcome :

Upon successful completion of the course students will be able to:

• Recognize the impact of Information and Communication technologies, especially of the Internet in business operations

• Recognize the fundamental principles of e-Business and e-Commerce

• Use tools and services of the internet in the development of a virtual e-commerce site

References :

- E-commerce - C.S.V. Murthy, Himalaya Publishing House
- E-commerce A Managerial Perspective - P.T. Joseph, Prentice Hall Of India
- Frontiers of Electronics Commerce - Kalakota and Whinston, Pearson Education

Suggested MOOC :

Swayam

Course Plan

Unit	Contents
1	**Introduction to E-Commerce:** Definition, E-commerce fundamentals, different types of E-commerce E-Commerce Infrastructure - The Internet and World Wide Web, Web system, Internet basics, Characteristics of Internet, Components of Internet – Uniform Resource Locators, Internet Protocol, Hypertext Transfer Protocol (HTTP), Internet Service Provider (ISP), Types of ISP, domain name, domain name types E-commerce vs Traditional Commerce, Networking Categories, Mobile Commerce
2	**Business Models for e-commerce:** Business-to-Consumer (B2C), Consumer-to-Consumer (C2C), Business-to-Business(B2B) **Electronic Data Interchange** Requirement of EDI, types of EDI, Advantages and Disadvantages of EDI
3	**E-commerce Payment System:** Limitations of traditional payment system, requirement of e-payment system, Internet payment systems - Credit card payment (e.g., SET protocol), E-cash, E-

	check, smart card, Electronic Funds Transfer, Digital Token Based E-Payment Systems, Modern Payment Systems, Steps for Electronic Payment, Payment Security, Net Banking
4	**Applications of E-Commerce:** E-commerce in banking, retailing, online publishing, online marketing, e-advertising, e-branding.
5	**E-commerce Security:** Security issues, Privacy issues, Computer Security, security threats, security tools, Denial-of-Service attacks, Viruses, Unauthorized access to a computer network, Vulnerability of Internet Sites requirements, malicious code, intruders, attacking methods, Cryptography- encryption and decryption, public key encryption, private key cryptography, message digest, digital signature, digital certificate, firewalls, SSL. Firewall – Packet filtering, Application gateways.
6	**Implementation of E-Commerce:** WWW.EBAY.COM - B2C Website – Registration, Growth of eBay, PayPal – New Trend in Making Payments Online, National Electronic Funds Transfer.

Elective Group: (III) Information Systems

Course Number	Course Name	Credits	
605-3-B	Knowledge Management	2	

Course Objective:

The objective of the course is to provide the basic skills of managing knowledge in organizations. Knowledge is an asset for retaining the competitive advantage of the organization. This course develops the capabilities of towards managing students to manage knowledge in organizations.

Pre-requisites:

Knowledge about Information System and MIS with Implementation of MIS

Expected Outcome :

After going through this course a student should be able to understand :

- Will be able to understand the concepts of Knowledge and knowledge management .
- Can be able to design and develop Knowledge management systems for Business applications .
- Implementation of KM to various areas of Interest in Business Organizations .

References (Books, Websites etc.):

1. Madhukar Shukla:Competing Through Knowledge-Building a learning Organisation(Responsce Books, New Delhi.
2. Tiwana, The Knowledge Management Toolkit: Practical Techniques for building a Knowledge Management Systmes, 2/e, Pearson Edu.
3. Honey Cutt : "Knowledge Management Strategies", PHI, New Delhi.
4. A wad, KM, Pearson Edn, 2007.
5. Barnes, Knowledge Management Systems, 1/e, Thomson 2006.
6. Ikudiro Nonka & Hirotaka Takeuchi, " The Knowledge – Creating Company", Oxford University Press, London.

Suggested MOOC:

Please refer these websites for MOOC's:

NPTEL / Swayam

www.edx.com

www.coursera.com

Syllabus

Unit	Contents
1	**Introduction:** Definition, Scope and Significance of Knowledge Management , Difficulties of Knowledge Management, Techniques of KM – Implementation of KM, Organizational knowledge, Characteristics and Components of Organizational Knowledge
2	**Drivers of knowledge Management:** Pillars of knowledge Management, KM framework , Supply Chain of KM , Formulation of KM strategy.

3	**Technology and KM:** Technology components of KM – IT & KM , Ecommerce and KM
4	**Total Quality Management and KM:** TQM and KM , Bench marking and KM.
5	**Implementation of KM:** Discussion on Roadblocks to success, Implementing a KM programme , Critical Success Factors in KM , Implementation of KM
6	**KM and Organizational Restructuring:** The Mystique of Learning, Organization:- Outcomes of learning, Learning and Change – Innovation, continuous Improvements, Corporate Transformation.
7	**Case studies in Knowledge Management** Knowledge management in Health Care, Knowledge Management in Human Resource Management