UNIVERSITY OF KERALA

Scheme and syllabus for B.Voc Degree Programme in Software Development
(To be introduced from 2022 admissions)

SEMESTER 1

General Education				Skill Component			
No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
EN1111	Speaking Listening Skills	4	4	VS312	Introduction to IT	4	4
MM 1131.3	Algebra, Geometry and Trigonometry	3	4	VS313	Introduction to C Programming	4	4
VS311	Impact of Social Media Networks	5	4	VS314	Word Processing & Image Editing	4	4
				VS315	Word Processing & Image Editing Lab	3	3
				VS316	C Programming Lab	3	3
	Total	12	12		**Total**	18	18

SEMESTER II

				Skill Component			
No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
EN1211	Writing & Presentation Skills	4	4	VS 322	Animation Softwares	4	4
MM 1231.3	Calculus and Linear Algebra	3	4	VS 323	Computer Network & Internet Applications	4	4
VS 321	Environmental Studies	5	4	VS 324	Object Oriented Programming	4	4
				VS 325	Object Oriented Programming lab	3	3
				VS 326	Animation Softwares Lab	3	3
		12	12			18	18

SEMESTER III

General Education				Skill Component			
No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
VS 331	Business Statistics	4	4	VS 334	Web Application & Development	4	4

No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
VS 332	System Analysis & Design	4	4	VS 335	Computer H/W & Maintenance	4	4
VS 333	Management Information Systems	4	4	VS 336	Operating Systems	4	4
				VS 337	Web Application & Development Lab	3	3
				VS 338	Computer H/W & Maintenance Lab	3	3
	Total	**12**	**12**		**Total**	**18**	**18**

SEMESTER IV

General Education				Skill Component			
No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
VS341	Business Informatics	4	4	VS344	Python Programming	3	4
VS342	Financial Accounting	4	4	VS345	Database Administration	3	4
VS343	Aptitude & Logical Reasoning	4	4	VS346	PHP Framework	3	4
				VS347	PHP Framework Lab	3	3
				VS348	Python Programming Lab	2	3
				VS349	Industrial training	4	
	Total	**12**	**12**		**Total**	**18**	**18**

SEMESTER V

General Education				Skill Component			
No.	Title	Credit	Hrs/Week	No.	Title	Credit	Hrs/Week
VS 351	Introduction to Information Security	4	4	VS354	Programming in Java	4	4
VS 352	Digital Marketing	4	4	VS355	Network Administration	3	4
VS 353	Entrepreneurship Development	4	4	VS356	Software Engineering	3	4
				VS357	Java Lab	3	3
				VS358	Study Tour	2	
				VS359	Major Project Phase 1	3	3
	Total	**12**	**12**		**Total**	**18**	**18**

SEMESTER VI

General Education				Skill Component			
No.	Title	Credit	Hrs/ Week	No.	Title	Credit	Hrs/ Week
VS361	Human Resource Development	4	4	VS364	Mobile Application Development	4	4
VS362	Free and Open Source Softwares (FOSS)	4	4	VS365	Software Testing	4	4
VS363	IT& Society	4	4	VS366	Advanced Java	3	4
				VS367	Mobile Application Development & Java Lab	3	3
				VS368	Major Project Phase II	4	3
	Total	**12**	**12**		**Total**	**18**	**18**

SYLLABUS

SEMESTER I

VS311 IMPACT OF SOCIAL MEDIA NETWORKS

1.   **COURSE OUTCOME:** At the end of the course, the student will be able to:

C01	Remember basic concepts of Social media networks
C02	Impact of Social Media on Commerce
C03	Impact of Social Media on the Training & Development
C04	Challenges of Social Media

2.   COURSE CONTENT

Module I: Introduction to Social Media networks: Types of Social Media- Uses of Social Media Networks-Popular Social Media Websites-Mobile social media- Types of Users- Growth of social media networks Impact of Social Media on Society: Sharing of Information and its Need – Entertainment – Communication Tool -Influence-Social media activism-societal issues- social cause- Impacts on Politics- Pros and Cons- Positive and negative effects of Social media on Society.

Module II: Impact of Social Media on Commerce: Social media Marketing-Promotion of Business- Digital Marketing & SMM -Advantages to Business-Knowledge sharing and Collaborative Work Management- Customer Benefits-Impacts-pros and cons. Impact of Social Media on the World of Work: Job Recruitment and Hiring-Benefits- Researching Job Candidates-Impact of professional social media networks.

Module III: Impact of Social Media on the Training & Development: Social media in Learning-Online- Long Distance Learning-Impact of Blogs, Wikis, LinkedIn, Twitter, Facebook and

Podcast- Privacy and Frauds. Impact of Social Media on relationship: Bonding and Friendships – Pros and Cons- Issues Arising- Impact of Social Media on Kids, Teens & Youth.

Module IV: Challenges of Social Media- Criticism on Social Media-Cyber bullying-Lack of Privacy- Security Issues. Addictions to Social media – Games- Impact on Education: Positive and negative effects– Impact on Physical and Mental Health-Emotional Insecurities- Depression-Anxiety-Behavioural Issues-Wastage of Time etc. Future of Social Media Networks.

3. REFERENCES

CORE TEXT
Hana S. Noor Al-Deen, John Allen Hendricks, "Social Media-Usage & Impact", Rowman & Little field Publishing Group

ADDITIONAL REFERENCES
1. Dedria Bryfonski, "The Global Impact of Social Media"-Greenhaven Press
2. Dr.Sanjay Singh Baghel, Dr.Uma Singh,'Social Media and Indian Youth" Apple Books Publishers

VS 312 INTRODUCTION TO IT

1.   COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	introduce the basic terminology in the field of IT
CO2	impart functional knowledge about PC hardware
CO3	impart functional knowledge in a standard office package
CO4	impart functional knowledge about networks and internet
CO5	give an overview of computer application in various fields

2.   COURSE CONTENT

Module–I: Computer characteristics: Speed, storage, accuracy, diligence; Digital signals, Binary System, ASCII; Historic Evolution of Computers; Classification of computers: Microcomputer, Minicomputer, mainframes, Supercomputers; Personal computers: Desktop, Laptops, Palmtop, Tablet PC; Hardware & Software; Von Neumann model.

Module–II: Hardware: CPU, Memory, Input devices, output devices. Memory units: RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory; Auxiliary storage: Magnetic devices, Optical Devices; Floppy, Hard disk, Memory stick, CD, DVD, CD-Writer; Input devices - keyboard, mouse, scanner, speech input devices, digital camera, Touch screen, Joystick, Optical readers, bar code reader; Output devices: Display device, size and resolution; CRT, LCD; Printers: Dot-matrix, Inkjet, Laser; Plotters, Sound cards & speaker.

Module-III: Software- System software, Application software; concepts of files and folders, Introduction to Operating systems, Different types of operating systems: single user, multitasking, time-sharing multi-user; Booting, POST; Basic features of two GUI operating systems: Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases; Application softwares: Generic Features of Word processors, Spread sheets and Presentation

softwares; Generic Introduction to Latex for scientific typesetting; Utilities and their use; Computer Viruses & Protection, Free software, open source.

Module–IV: Computer Networks- Connecting computers, Requirements for a network: Server, Workstation, switch, router, network operating systems; Internet: brief history, World Wide Web, Websites, URL, browsers, search engines, search tips; Internet connections: ISP, Dial-up, cable modem, WLL, DSL, leased line; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, Web pages, introduction to HTML.

3. REFERENCES
Core
- E. Balaguruswamy, Fundamentals of Computers, McGraw hill, 2014

Additional
1.   Dennis P Curtain, *Information Technology: The Breaking wave*, McGrawhill, 2014
2.   Peter Norton, *Introduction to Computers*, McGrawhill, Seventh edition

VS 313 INTRODUCTION TO C PROGRAMMING
1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Remember the basics of computer
CO2	Understand the structure of program writing
CO3	Apply control structures and pointers
CO4	Analyze user defined functions
CO5	Evaluate dynamic memory allocation
CO6	Create string handling functions

2. COURSE CONTENT
Module–I: Introduction to programming: Character set, Variables and Constants, Rules for naming the Variables/Identifiers; Basic data types of C, int, char, float, double; storage capacity – range of all the data types; Storage classes;

Module-II: Basic Elements: Operators and Expressions: Assignment Operator, Arithmetic Operator and Arithmetic expression, Relational Operator and Relational exp., Logical Operator and how it is used in condition, Expression Evaluation (Precedence of Operators); simple I/O statements, Control structures, if, if else, switch-case, for, while, do-while, break, continue. Arrays, Defining simple arrays, Multi-dimensional arrays, declaration, initialization and processing;

Module-III: Functions & Pointers: concept of modular programming, Library, User defined functions, declaration, definition & scope, recursion, Pointers: The & and * Operators, pointer declaration, assignment and arithmetic, visualizing pointers, call by value, call by reference, dynamic memory allocation.

Module–IV: Advanced features: Array & pointer relationship, pointer to arrays, array of pointers. Strings: String handling functions; Structures and unions; File handling: text and binary files, file operations, Library functions for file handling, Modes of files.

REFERENCES
- Ashok N. Kamthene, *Programming in C*, Pearson Education, Second edition
- E.Balaguruswamy, *Programming in ANSI C*, McGrawhill, Sixth Edition

VS 314 WORD PROCESSING & IMAGE EDITING

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Prepare office document
CO2	Create presentation
CO3	Design multimedia presentation
CO4	Edit images

2. COURSE CONTENT

Module 1: Word processing: Word processing concepts, Editing, Formatting Text, Table Manipulation, Indexing, Mail merge, Documentation, Inserting Word Art, Inserting Picture and clip Arts, Auto formatting, Tools, Macros

Module II: Power Point: Beginning a presentation, Templates and Slide Master, Drawing Tools, ClipArt and WordArt, Organization Charts, Graph, Output and Presentation Options, Integrating with Animation and Multimedia packages.

Module III: 2D Animation: 2D Concepts – 2D elements, 2D transformation – translation, rotation, scaling. Animation – Key frame animation, key frames, tween frames. Effects – Post effects, motion blur, lens flares.

Module IV: Photoshop: Getting image into Photoshop, Selecting, Transforming and Retouching, Drawing, Painting, Applying Filters for special effects, Designing Web pages, Creating Rollovers and Animations, Preparing Graphics for the Web, Saving and exporting images

References
CORE
- Microsoft® Office Word 2003, Online Training Solutions Inc.
- PowerPoint 2003 Essential Training, David Rivers
- Computer Graphics C Version, Donald D Hearn, M. Pauline Baker; Pearson Education.

Additional Reference Books:
1. Exploring Microsoft Word 2003 Comprehensive, Robert T. Grauer and Maryann Barber
2. Microsoft® Office PowerPoint® 2003, Online Training Solutions Inc.

VS 315 WORD PROCESSING & IMAGE EDITING LAB

CO1	Understand techniques to Create, Save, Copy, Delete, Organise various types of files and manage the desk top in general
CO2	Develop skill to use a standard word processing package Exploiting popular features
CO3	Develop skill to use a standard spread-sheet processing package Exploiting popular features Use a standard presentation package Exploiting popular features

Students should provide hands-on knowledge with documentation, presentation, animation and image editing softwares (word processing, power point, 2D animation and photoshop) for preparing documents with the knowledge they acquired through the paper VS 314

VS 316 C PROGRAMMING LAB

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Remember the basics of computer operating system
CO2	Understand the structure of program writing
CO3	Apply control structures and pointers
CO4	Analyze user defined functions
CO5	Evaluate dynamic memory allocation
CO6	Create string handling functions

2. COURSE CONTENT

Familiarization of important   basic features of C programming language:

This course will provide hands-on practice in the following topics, under a variety of programming situations with a focus on writing, debugging and analyzing structured programs: basic data types in C. basic control structures in C. arrays, structures and files standard library functions in C language; solving moderately complex problems involving the above and requiring selection of appropriate data structures and efficient algorithms.

Part A
The C laboratory work will consist of 15-20 Experiments
1.   Testing out and interpreting a variety of simple programs to demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.

Part II
2.   1-D Arrays: A variety of programs to declare, initialize, read, print and process 1-D arrays of various basic data types. Processing to include, selection, sum, counting, selective sum, selective counting, reversing etc.
3.   Pointers: A large number of trivial programs involving all possible data types to familiarize the syntax of pointers in a variety of situations and to draw memory diagrams based on the observations.
4.   Structures: A variety of programs to declare, initialize, read, print and process structures made up of a variety of data types and structures.
5.   2-D Arrays: A variety of programs to declare, initialize, read, print and process 2-D arrays of various basic data types. Processing to include, selection, sum, counting, selective sum, selective counting, reversing etc.
6.   Array of Structures and Structure of Arrays: Programs to demonstrate declaration and processing of structure of arrays and array of structures.
7.   Pointers to Arrays: A number of programs to demonstrate handling of 1-D and 2-D arrays using pointers and to draw memory diagrams based on the observations.
8.   Pointers to Structures: A number of programs to demonstrate use of pointers to structures and to draw memory diagrams based on the observations.
9.   Functions –I: Simple Examples of declaring and using functions of the following categories (i) no argument, no return, (ii) argument, no return, (iii) no argument, return, (iv) argument, return, all pass by value
10. Functions –II: Declaring and using functions with pass by reference, Passing and Returning structures, Recursive functions.
11. Files: Simple Example involving use of multiple files: declaring, opening, closing, reading from and writing to text files.

12. Files: Example involving use of multiple files: declaring, opening, closing, reading from and writing to binary files.
13. Library functions: A variety of Examples demonstrating (i) string processing functions (ii) a variety of selected library functions
14. Debugging programs involving syntactic and/or logical errors
15-20: Developing programming solutions to problems including program design, algorithm development and data structure selection.

REFERENCES
Core
- Deitel & Deital, C: How to Program, Pearson
- Education Alan R Feuer, The C Puzzle Book, Pearson Education
- Yashvant Kanetkar, Test Your C Skills, BPB Publications, 3rd Edition

SEMESTER II

VS 321 ENVIRONMENTAL STUDIES

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Understand environmental systems
CO2	Understand the biodiversity and conservation concepts
CO3	Remember concepts of biodiversity and conservations
CO4	Understand natural systems and resources
CO5	Apply pollution management techniques

2. Course Content
Module–I: The Multi-disciplinary Nature of Environmental Studies: Definition, scope and importance, Need for Public Awareness, Ecology and Ecosystems: Definition of Ecology, 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 and function of – forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystem(ponds, streams, lakes, rivers, oceans, estuaries)

Module-II: Biodiversity and its conservation: Introduction, genetic, species and ecosystem diversity definition, value of biodiversity, biodiversity at global, national and local levels, India as a mega diversity nation, hot spots of biodiversity, threats to biodiversity – habitat lose, poaching of wild life, man wild life conflicts, endangered and endemic species of India, conservation of bio diversity in in-situ EX-situ

Module-III Natural Resources: Air resources-features, composition, structure, air quality management, forest resources-, water resources, mineral resources, food resources, energy resources, land resources, Environmental pollution: definition, air pollution, water pollution, marine pollution, thermal pollution, soil pollution, noise pollution, nuclear hazards, waste management, cleaner technologies, reuse and recycling, solid waste management, role of individuals to prevent pollution, pollution case studies, disaster management – floods, earthquake, cyclone and landslides

Module –IV: Social issues and the environment: From unsustainable to sustainable development, urban problems related to energy, water conservation, rain water harvesting, water shed

management, resettlement and rehabilitation of people- it's problems and concerns, case studies, environmental ethics- environmental value relationships, environmental ethics and species preservation, climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocaust, case studies, waste land reclamation, consumerism and waste products, legislation to protect the environment, environmental protection act, dir(prevention and control of pollution) act, water(prevention and control of pollution) act, wild life protection act, forest conservation act, environmental management systems(EMS), environmental information systems(EIS), P.I.L public hearing and role of NGOS, ISO 9000 and 14000, issues involved in enforcement of environment legislation, public awareness, environmental economics-environment and standard of living

References
- Kiran B Chokkas and others : "Understanding Environment", Sage 2004
- P. Venugopala Rao, Environmental Science & Engineering, PHI
- Benny Joseph: Environmental Studies, Tata McGraw Hill
- Lester R Brown, Plan B: rescuing a Planet under stress and a civilization in trouble, Orient Longman Kurien Joseph & R Nagendran, Essentials of Environmental Studies, Pearson

VS 322 ANIMATION SOFTWARES

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Create objects
CO2	Perform animation
CO3	Render textures and special effects using Blender software
CO4	Make geometric nodes

2. Course Content

Module I : Introduction to Blender – Requirements, Installation, Interface – UI layout, basic Keyboard Shortcuts, Creating objects, Selecting objects, Transforming objects.

Module II : Modeling - Edit Mode, Modifiers – Modifier Stack, Common Modifiers, Animation Basics, Key frame animation, Types of Key frames in Blender, Animation Graph Editor, Lights, Cameras.

Module III : Materials – PBR Materials, Node-based Material Editor, Nodes: Principled BSDF, Glass BSDF, Glossy BSDF, Textures: Image Textures, Generated Textures, Rendering: Eevee, Cycles, Render Settings, Photo-realism.

Module IV : Geometry Nodes – Introduction, Attributes, Fields, Node Types: Data-flow nodes, Field nodes, Groups: Make Group, Ungroup, Group Input, Group Output, Node Groups.

References
- Allan Britto, Blender 2.9: The Beginner's Guide
- Blain John M., The Complete Reference to Blender, Taylor and Francis Ltd.

VS 323 COMPUTER NETWORK & INTERNET APPLICATIONS

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Understand Network model
CO2	Learn fundamentals of Internet
CO3	Explain various applications of Internet
CO4	Make web pages

2. COURSE CONTENT

Module-I: Computer Network: Introduction, Uses of computer networks, Networks Hardware, LAN, MAN, WAN, Protocol hierarchies, OSI Model, TCP/IP reference model.

Module-II: History of internet, The early years, The global Internet, A global information infrastructure, Review of packet switching and its relevance to the internet, Incompatible topologies, Routers, Dial-up access, Software to create a virtual network, Datagrams, IP address. Transmission Control Protocol (TCP) :Software for reliable communication, Guaranteed delivery, Recovering the datagrams, Automatic retransmission, Brief discussion on distributed computing, Domain names, Names and IP address, TCP/IP, Flexibility, Reliability and efficiency.

Module III: Electronic mail, Mail box, Sending, Notification, Reading, How it works ?, Address format, E-mail to and from non-Internet sites, Access to service via E-mail, Speed and reliability, Impact and significance, Joining a mailing list. Bulletin Board Services (BBS), Network norms, News group, Selection, Subscription, Reading, submitting, article, How BBS woks File Transfer Protocol (FTP) Store/ retrieve, Binary and text files, How FTP works, Impact and significance, Remote login, How it works, TELNET

Module-IV: Browsing the World Wide Web (WWW), How a browser works, Software used to access, URLs, Browser. WWW documents, HTML, Web page design with HTML, Features and importance of HTML. Advanced WEB technologies, CGI, How it works. CGI and advertising Search engines, Browsing, Searching, and Search tool, Advanced search engines, Examples of search engines.

References
Core
- Ferozan. Introduction to Data Communication & Networking, TMH.
- Leon and Leon, Internet For Everyone, Leon Techworld, Chennai

Additional References:
1. Douglas E Comer, The Internet Book, 2nd Edition, Prentice Hall of India.
2. Nancy Cadeno, The Internet Tool Kit, BPB Publications.
3. Christian Crumlish, ABC's of the Internet, 2nd Edition, BPB Publications
4. Patrick Naugton, Java Hand Book, Tata McGraw Hill

VS 324 OBJECT ORIENTED PROGRAMMING

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Understand the concepts of classes and object
CO2	Define classes for a given situation and instantiate objects for specific problem solving reuse available classes after modifications

CO3	Possess skill in object oriented thought process
CO4	Demonstrate the Pillars of OOP

2. Course Content

Module–I: Concept of Object orientation – why related data and methods should be kept as a single unit – comparison with procedural and structured programming – Classes and objects – data abstraction, encapsulation, inheritance, polymorphism, dynamic binding, message passing. Advantages of object orientation – reusability, maintenance, security, comfort in programming. Input and output streams in C++; Basic data types and declarations.

Module–II: Classes and objects in C++, access modifiers, static members, friend functions, Constructors and Destructors, polymorphism, Operator Overloading and type conversion, anonymous objects

Module-III: Inheritance- parent and child classes, private, public and protected inheritance, Multiple inheritance and multi-level inheritance, Virtual base classes. C++ and memory models – new and delete operators, Heap, dynamic objects.

Module–IV: Binding & Polymorphism: Early binding, Late Binding, Pointers to derived class objects, virtual functions, Pure virtual functions, abstract classes, object slicing, exception handling in C++: try, throw and catch.

REFERENCES
Core
- Ashok N. Kamthane, *Object oriented Programming with ANSI & Turbo C++,* Pearson

Additional
1. H M Deitel and P J Deitel, *C++: how to program*, Pearson Education
2. Robert Lafore, *Object Oriented Programming in Turbo C++*, Galgotia Publications

VS 325 OBJECT ORIENTED PROGRAMMING   LAB

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	basic data types and control structures in C++
CO2	managing classes and objects in a variety of situations
CO3	solving moderately complex problems involving the above and requiring selection of appropriate structures and algorithms
CO4	Demonstrate programs in OOP

2. COURSE CONTENT
The laboratory work will consist of 15- 20 experiments, only by using class concept
Part A
1. Testing out and interpreting a variety of simple programs to demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.
2. Solving a problem using (i) structures and (ii) classes and comparison between the two (the problem logic and details should be kept minimal and simple to enable focus on the contrast

between the two methods, for example declaring result of a set of students defining the name and total marks in the program itself).
3. Class definitions and usage involving variety of constructors and destructors
Part B
4. Programs involving various kinds of inheritances,
5. Programs involving operator overloading and type conversions
6. Programs involving virtual base classes, friend functions
7. Program to demonstrate early and late binding
8. Program to allocate memory dynamically
9. Program involving class and function templates
10.   programs to demonstrate(i) string processing (ii) file streams (iii) a variety of selected library functions
11.   Exception handling
12.   Handling of 2-D arrays using pointers
13.   Debugging programs involving syntactic and/or logical errors

REFERENCES
- Deitel & Deital, *C++: How to Program*, Pearson Education

VS 326 ANIMATION SOFTWARES LAB

Students should provide hands-on knowledge with the   software for creating animation with the knowledge they acquired in the paper VS 322 ANIMATION SOFTWARES

SEMESTER III

VS 331 BUSINESS STATISTICS
1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Gain understanding of statistical techniques as are applicable to business.
CO2	Apply statistical techniques for quantification of data in business.
CO3	Perform regression Analysis
CO4	Methods of constructing of index numbers

2. COURSE CONTENT
Module I-Introduction: Meaning, definition, functions, objectives and importance of statistics-Distrust of statistics - Collection, classification, tabulation and presentation of data. Measures of central tendency and Measures of dispersion - relevance and applicability of each technique in business. **Correlation:** Meaning and definition-correlation and causation – Types of correlation – Methods of measuring correlation for ungrouped data -Karl Pearson's co-efficient of correlation and its interpretation, Probable error, Coefficient of determination Spearman's rank correlation- co-efficient of Concurrent deviation- Application of different measures of correlation in business.

Module II-Regression analysis: Meaning and definition - Types of Regression -Regression lines-determination of simple linear regression-. Regression equations and their application in business. Properties of correlation and regression coefficients – Comparison of regression and correlation

Module III-Index numbers: Meaning and importance-Problems in construction of index numbers-Methods of constructing of index numbers- Simple aggregative, Average of Price relatives,

Lasperye's, Paasche's, Dorbisch- Bowley's, Marshall-Edgeworth's and Fisher's ideal index numbers, Test of Consistency: Time Reversal Test and Factor Reversal Test. Chain Base Index Nos. Shifting of Base year. Cost of living Index and its use in determination of wages –Wholesale Price Index Number, Population index, inflation index, Operational indices- Sensex and Nifty.

Module IV-Time series analysis: Meaning and definition- components- Measurement of long term trend- Moving average method- Method of Least squares- Application in business.

REFERENCES
* Gupta. S.P. Statistical Methods, Himalaya Publishing House, Mumbai.
* Elhance. D.L, Fundamentals of Statistics, Kitab Mahal, Allahabad.
* Gupta. B.N. Statistics - Theory and Practice, Sahitya Bhawan Publications, Agra.
* Sanchetti D.C and Kapoor V.K Statistics-Theory, Methods and Application, Sultan Chand & Sons
* Nabendu Pal and Haded Sarkar S.A, Statistics - Concept and Application, PHI, New Delhi.
* Agarwal B.M. Business Mathematics and Statistics, Ane Books Pvt. Ltd., New Delhi.
* Richard I. Levin and David S. Rubin, Statistics for Management, PHI

VS 332 SYSTEM ANALYSIS & DESIGN

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Explain the background study required for developing a system Design a new system
CO2	Discuss types of testing
CO3	Select the hardware and software required for a system
CO4	Design a software

2. COURSE CONTENT

Module I: Overview of System analysis and Design: Business system concepts, project selection, sources of project requests, preliminary investigation, System development life cycle - Feasibility analysis, design, implementation, testing and evaluation, project review. **Feasibility study** - technical and economical feasibility, cost and benefit analysis, fact finding techniques, DFD, Data dictionaries, Decision analysis, decision trees and tables.

Module II: System design-Design objectives, Process and stages of system design, Design methodologies, structured design, structured walkthrough, audit considerations, audit trials, detailed design, modularization, module specification, software design and documentation tools, top down and bottom up approaches

Module III: Testing & System Conversion: Unit and integration testing, testing practices and plans, system control and quality assurance, training, conversion, operation plans, system administration.

Module IV: Hardware and Software selection: Benchmarking, Financial considerations in selection software selection, vendor selection, performance and acceptance criteria.

REFERENCES
Core
- Award, EM, Systems Analysis and Design, Galgotia Pub, 1991

Additional
1. Lesson, System analysis and Design, SRA pub, 1985
2. Rajaraman V, Analysis and Design of Information systems, PHI, 1991

VS 333 MANAGEMENT INFORMATION SYSTEMS

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Role of Information systems
CO2	Merits and demerits of transaction processing system
CO3	Difference between transactional system and managerial system.
CO4	Optimization techniques,

2. COURSE CONTENT

Module I: An introduction to information systems, Information systems in organizations, Information Technology Concepts, The IS Revolution; Information requirement for the different levels lf management, transaction processing system, Management information system, Decision support system. Strategic Role of Information Systems. Business Processes; Information management, and Decision Making. Computers and Information Processing;

Module II: Transaction processing system; hardware and software requirements, tools used, case studies, merits and demerits of transaction processing system.

Module III: Managerial control, Information and tools required, difference between transactional system and managerial system. Frequency of taking outputs, Need for interconnected system, common database, Redundancy control, case studies. Decision support system, concept and tools, case studies, virtual organizations, strategic decisions-unstructured approach, cost and values of unstructured information.

Module IV: Optimization techniques, difference between optimization tools and DSS tools expert system, difference between expert system and management information system. Role of chief Information officer.

REFERENCES:
- Management Information Systems, by Rajaraman
- Management Information Systems, by By S. SADAGOPAN, Prentice-Hall of India
- Management Information Systems By Uma G. Gupta, Galgotia Publications
- Management Information Systems By JAWADEKAR, W.S., Tata McGraw-Hill

VS 334 WEB APPLICATION & DEVELOPMENT

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Impart basic skills in moderately complex use of the following tools/scripts/languages
CO2	HTML, DHTML, CGI Script, Perl, CSS, Java script, ASP and JSP

CO3	To impart necessary ability to choose the appropriate web tools/languages for creating state-of-the art web sites
CO4	To Expose students to current trends and styles in web design and applications

2. COURSE CONTENT

Module–I: HTML: General Introduction to Internet and WWW; Text tags; Graphics, Video and Sound Tags; Link and Anchor Tags; Table Tags; Frame Tags; Miscellaneous tags (layers, image maps etc); CSS; DHTML; Example Applications; simple introduction to XML and VRML

Module–II: CGI Programming: HTML Forms and Fields; Perl: Basic control structures, data types and basic features; CGI Programs: GET & POST methods, simple applications; Cookies; Server Side Includes; Example Applications;

Module–III: Javascript: Basic data types; control structures; standard functions; arrays and objects, event driven programming in Javascript; Example Applications;

Module–IV: Architecture of java Servelets; Servelet Structure; Servelet Life Cycle; Request and Response Objects; Sessions; Invoking Servelets;

REFERENCES
Core
- V.K. Jain, *Advanced Programming in Web Design*, Cyber Tech Publications

Additional
1. Joel Sklar, Principles of Web Design, Vikas
2. H M Deitel, P J Deitel& A B Goldberg, Internet and Worldwide web programming: How to Program, 3/e, Pearson Education

VS 335 COMPUTER H/W & MAINTENANCE

1. COURSE OUTCOMES::   At the end of the course, the student will be able to:

CO1	Explain motherboard and its components
CO2	Discuss various bus standards
CO3	Working of different peripherals attached with a computer
CO4	Discuss the types of memory

2. COURSE CONTENT
Module I: Study of PC/AT motherboards: Block diagram architecture of motherboard. CMOS setup and their features, configuring extended, expanded memory, cache memory, shadow memory, EDO RAM etc.

Module II: Buses: Study of Bus Standards: Brief study of various bus standards: ISA, EISA, VL, PCI, PCMCIA etc, Display Cards & Monitors: Description of different types of display cards Monitors: CRT construction and working, vertical stage, horizontal state, 9 pin input type -monitor, block diagram & description of color monitor.

Module III: Drive Systems: Various parts of FDD, types of floppies, geometry of floppy, various recording formats, interface signals, floppy drive alignment track 0, and adjustment, formatting of floppies, Types of hard disk drives, IDE, EIDE, SCSI, Geometry of hard disk drive, Interface signal, tape drives, DVD, introduction to RMD, various concepts of hard disk drives, types of formatting, partitioning and handling of hard disk drive.

Module IV: Types of memory: Physical Memory, Memory modules:- SIMMs, DIMMs, RIMMs, Brief study of conventional base memory, Upper memory area, High memory area, Extended memory, Expanded memory. General Troubleshooting and Maintenance, Type of maintenance: Preventive and break down maintenance, assembly and disassembly of PC and its various parts, startup problems, run problems their identification and remedy, Problem of keyboard, displays, printers, FDD's, HDD's, SMPS motherboard, their identification and remedy

References
Core
- B RAM -Fundaments of microprocessors and micro computers
- Lotia and Nair- Modern all about motherboard.
- Lotia and Nair- Modern all about Hard Disk.

Additional References:-
1. R S. Gaonkar- Micro processor Architecture, Programming and applications with 8085.
2. Venugopal and Ravikanth- Introduction to assembly language programming in 8086.
3. Scottmuller with Creigzacker- Upgrading and repairing PCs.

VS 336 OPERATING SYSTEMS

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Explain need and types of operating systems
CO2	Installation and Administration of Windows and Linux
CO3	Troubleshooting disk management
CO4	Back-up Procedures & Disaster Prevention

2. COURSE CONTENT
Module I: Need for Operating System, Functions of Operating System, Types of Operating System-Interactive (GUI based), Time Sharing, Real Time and Distributed, commonly used Operating System: UNIX, LINUX, Windows, Differences between Windows and Linux operating systems

Module II: Installation and Administration of Windows and Linux: The minimum hardware requirements for the installation, the steps involved in installation. Booting process of Windows / Linux, Architecture of Windows, DLL files, The Windows registry and its importance, the device drivers, the addition of new hardware and software to a Windows and Linux system

Module III: Working With Disk Storage: Type of Disk Storage, Type of volumes, Implementing fault tolerance, Use disk management tools, Disk Quota, Troubleshooting disk management, Shadow copy.

Module IV: Windows based back-up Procedures & Disaster Prevention: Write protection of your software MS-Windows delete protection, crash recovery, preventing hard disk failure, Back-up & Restore procedures, types of back-up, media for back-up, Raid systems. Preparation of bootable CD and USB.

REFERENCES
- **Windows Internals 7th edition (Part 1)**

VS 337 WEB APPLICATION & DEVELOPMENT LAB

The laboratory work will consist of 15 - 20 Experiments
Part A (HTML)
Part B (Javascript, XML, Perl, CGI)
1. Practicing basic HTML tags, text tags test styles, paragraph styles, headings, lists
2. Tables in HTML, Frames in HTML, nested frames, Link and Anchor Tags
3. Including graphics, video & sound in web pages, including Java applets Layers & Image Maps
4. Creating animated Gifs, simple flash animations
5. Cascading Style sheets
6. DHTML
7. Creating and browsing XML database
8. Installing VRML plugins and viewing VRML source files
9. HTML forms and Fields
10. Exercises covering basic introduction to perl
11. Installing web server, setting CGI, connecting HTML forms to Perl Scripts (CGIprogramming)
12. Exercises covering basic introduction to Javascript
14-20: Development of a web site involving a variety of tools practiced above

REFERENCES
Core
- V.K. Jain, *Advanced Programming in Web Design*, Cyber Tech Publications
Additional
- H M Deitel, P J Deitel& A B Goldberg, *Internet and Worldwide web programming: How to Program*, 3/e, Pearson Education

VS 338 COMPUTER H/W & MAINTANANCE LAB
Students should be provided with hands-on experience on hardware assembling, trouble shooting, installation of operating system and other softwares, ensure security of systems and so on.

SEMESTER IV
VS 341 BUSINESS INFORMATICS
1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Role of IT in business
CO2	An awareness about Have knowledge of basic concepts of e-commerce
CO3	Different types of e-commerce web sites and different modes of payments
CO4	Security and legal issues in e-commerce

2. COURSE CONTENT

Module–I: History of e-commerce, definition, classification- B2B, B2C, C2C, G2C, B2G sites, ecommerce in education, financial, auction, news, entertainment sectors, Doing e-Commerce.

Module–II: Electronic payment systems – relevance of currencies, credit cards, debit cards, smart cards, e-credit accounts, e-money, security concerns in e commerce, authenticity, privacy, integrity, non-repudiation, encryption, secret key cryptography, public key cryptography, digital signatures, firewalls

Module–III: Mass marketing, segmentation, one-to-one marketing, personalization and behavioural marketing, web advertising, online advertising methods, advertising strategies and promotions, special advertising and implementation topics.

Module IV: Mobile Commerce: attributes and benefits, Mobile Devices, Computing software, Wireless Telecommunication devices, Mobile finance applications, Web 2.0 Revolution, social media and industry disruptors, Virtual communities, Online social networking: Basics and examples, Web 3.0 and Web 4.0, Civil law, intellectual property law, common law and EC legal issues

REFERENCES
Core
- Erfan Turban et.al., *Electronic Commerce–A Managerial Perspective*, Pearson Education

Additional
- R Kalokota, Andrew V. Winston, *Electronic Commerce – a Manger's guide*, Pearson

VS 342 FINANCIAL ACCOUNTING

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Basic accounting terminologies
CO2	Journalizing, posting
CO3	Preparing final accounts both manually and in computerized form
CO4	Recording of transactions

2. COURSE CONTENT
Module I: Introduction: Financial Accounting-definition and Scope, objectives of Financial Accounting, Accounting v/s Book Keeping Terms used in accounting, users of accounting information and limitations of Financial Accounting.

Module II: Conceptual Frame work: Accounting Concepts, Principles and Conventions, Accounting Standards

Module III: Recording of transactions: Journals, Subsidiary Books, Ledger, Cash Book, Bank Reconciliation Statement, Trial Balance. Depreciation**:** Meaning, need & importance of depreciation, methods of charging depreciation.

Module IV: Preparation of final accounts: Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietary business with adjustments.

REFERENCES
- Gupta R. I. and Radhaswamy M., Advanced accounting, Sultan Chand & Sons, New Delhi
- Sukla M. C., Grewal T.S and C.G Gupta., Advanced accounts. S. Chand Co. Ltd, New Delhi
- Jain S. P. and Narang K.I., Financial Accounting, Kalyani Publishers, New Delhi
- Naseem Ahmed, Nawab Ali Khan and Gupta M.I., Fundamentals of Financial Accounting Theory and Practice, Ane Books Pvt. Ltd., New Delhi

VS 343 APTITUDE& LOGICAL REASONING

1. COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1	Interpret different data
CO2	Establish relationship between numbers
CO3	Solve different logical problems
CO4	Problem solving

2. COURSE CONTENT

Module I: Data sufficiency, Measurement, Time and distance, Arithmetic, Relationship between numbers

Module II: Basic mathematical relations and formula, Computation, Data interpretation

Module III: Differences, Discrimination, Decision-making, Judgment, Problem-solving, Analogies, Analysis

Module IV: Arithmetic reasoning, Relationship concept, Arithmetic number series, Similarities, Verbal and figure classification, Space visualization, Observation

REFERENCES
- How to Prepare for Logical Reasoning for the CAT by Arun Sharma
- Logical and Analytical Reasoning by A.K. Gupta

VS344 PYTHON PROGRAMMING

1. COURSE OUTCOMES: At the end of the course, the student will be able to

CO1	Remember the concepts of python programming
CO2	Understand data types and differences
CO3	Apply CGI programming
CO4	Analyze the concepts of database programming in python
CO5	Evaluate the usage of Python package installer PIP
CO6	Create programs using libraries such as Flask, SQL Alchemy, Pandas, Numpy etc..

2. COURSE CONTENT

Module I: Introduction to Python - Features of Python, Identifiers, Reserved Keywords, Variables, Comments in Python, Input, Output and Import Functions, Operators; Data Types and

Operations - int, float, complex, Strings, List, Tuple, Set, Dictionary, Mutable and Immutable Objects, Data Type Conversion; Flow control - Decision Making, Loops-for, range() while, break, continue, pass;

Module II: Functions- Definition, calling, arguments, anonymous function, recursion, return; **Modules & Packages** - Built-in Modules, Creating Modules, import statement, Locating, modules, Namespaces and Scope, dir (), reload (), Packages in Python; File Handling- open, close, write, read, methods, rename, delete, directories;

Module III: Object oriented programming- class, object, method, attribute, destructor, encapsulation, data hiding; Exception handling- built in exceptions, Handling, Exception with arguments, Raising and User defined exceptions, Assertions in Python; Regular expressions – match, search, replace, patterns.

Module IV: Database Programming- Connection, Create, insert, update, delete, commit, rollback, disconnection, exceptions; Iterators- Data type supports iterators; CGI Programming-HTTP Header, Env variables, Forms, Radio button, Dropdown box, check box, text area, cookies, uploading file.

REFERENCES
CORE
- Jeeva Jose, "Taming PYTHON By Programming", Khanna Publications, 2017

ADDITIONAL REFERENCES
1. Allen B. Downey," Think Python- How to think like a computer scientist", Second Edition, O'Reilly, 2016.
2. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

VS 345 DATABASE ADMINISTRATION

1. **COURSE OUTCOMES: At the end of the Course, the student will be able to**

CO1	Understand the concept of database.
CO2	Develop skills to design an ER diagram.
CO3	Create database using SQL and perform operations in SQL.
CO4	Familiarize the management of concurrent transactions.
CO5	Apply the design concepts and normalization in database easily.

2. **COURSE CONTENT**

Module I: Introduction to Databases, Database Environment, The Relational Model and Languages: The Relational Model, Relational Algebra and Relational Calculus, QBE, Database Design:, ER diagrams and their transformation to relational design, Normalization, Security, Transaction Management: Transaction Support, Concurrency Control, Database Recovery.

Module II: Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL) commands, Database objects like – Views, indexes, sequences, synonyms and data dictionary, SQL.

Module III: Object Oriented Database Management Systems: Concepts, Composite objects, Integration with RDBMS applications, Issues in OODBMSs, Advantages and Disadvantages of OODBMSs

Module IV: Object-Oriented Database Design. Decision making processes, evaluation of DSS, Group decision support system. Distributed Databases

REFERENCES
- Database Administration: The Complete Guide to DBA Practices and Procedures by Craig S.Mullins
- MySQL Database Usage & Administration by Vikram Vaswani
- Understanding Database Administration by Pablo Berzukov

VS346 PHP FRAMEWORK

1. **COURSE OUTCOMES: At the end of the Course, the student will be able to**

CO1	Familiarized to Php frame work
CO2	Arrays , functions, object oriented PHP, forms, strings
CO3	Using SQL in framework
CO4	Laravel Basics

2. **COURSE CONTENT**

Module I: I**ntroduction to PHP Fundamentals**: Introduction to WWW, History of WWW, Client/Server Model, Apache Webserver, PHP, MySQL, LAMP, WAMP, Installation: Windows, Linux, PHP Basic syntax, PHP Keywords, PHP Data Types, PHP Variables, PHP Constants: user-defined constants, PHP SuperGlobals, PHP Expressions, PHP Operators, PHP Control Structures: simple-if, if-else, if-else if ladder, switch, conditional operator, PHP Loops: while, do-while, for.Output functions: echo, print, print_r. **PHP Arrays & Functions:** PHP Arrays: Organisation, Indexing, Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array Functions, Looping with associative array using each () and foreach(), PHP Functions, Defining function, Calling functions, Arguments: default arguments, Pass by Value & Pass by references, Return Values, Variable Scope, PHP include(), PHP require().

Module II: PHP OOP, Forms & Strings: Object-Oriented PHP: Creating Classes and Objects, Class Members, Accessibility of Members, Inheritance: Simple, Multilevel, Hierarchical, PHP Form handling: PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization, PHP Cookie handling, PHP Session Handling, PHP Login Session, Managing user ACL, File Uploading, Strings and Patterns, Matching, Extracting, Searching Replacing, Formatting, PCRE.

Module III: Introduction to MySQL: Introduction to MySQL, datatypes, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation- mysql_connect, mysql_select_db, mysql_query, mysql_fetch_row, mysql_fetch_array, mysql_result, mysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

Module IV: PHP Frameworks: Introduction to frameworks, common frameworks, MVC: Model, View, Controller, PHP framework -Laravel: Requirements, Installation, Configuration, Directory Structure, Session, Laravel Basics: Routing, Middleware, Controllers, Models, Views, Request/Responses, Blade Templates.

References
1. Advanced PHP Programming: George Schlossnagle, Pearson Education
2. PHP and MYSQL Web Development- Luke Welling & Laura Thomson
3. Julius Sumbler: LARAVEL Introduction: The PHP Framework For Web Artisans: Laravel For Beginners
4. Rufus Stewart, The Ultimate Beginner's Guide to Learn Laravel Step by Step, Second Edition

VS347 PHP FRAMEWORK LAB
Practice php framework as per the syllabus in paper VS346 PHP Framework

VS 348 PYTHON PROGRAMMING LAB
The laboratory work will consist of 10- 15 Experiments
PART A
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops. (square root, gcd, exponentiation,
- sum of an array of numbers, linear search, binary search, bubble sort
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.

PART B
- Read and write data from/to files in Python.
- Programs to demonstrate creating and handling of modules and packages
- Programs involving a variety of Exception Handling situations
- Programs involving Database manipulation
- CGI programming

References
- Jeeva Jose, "Taming PYTHON By Programming", Khanna Publications, 2017

VS 349 INDUSTRIAL TRAINING
Students should go to a software firm and undergo training on an emerging tool.

SEMESTER V

VS 351 INTRODUCTION TO INFORMATION SECURITY

1. **COURSE OUTCOMES:** At the end of the Course, the student will be able to

CO1	aware of principles and protocols of internetworks
CO2	Understand the basic issues in information security
CO3	Understand the concept of ciphers and cryptography
CO4	Understand the concept of digital signatures and e-mail security policies

2. COURSE CONTENT

Module I: Information Security: Network security, Confidentiality, integrity, authentication, security policy, basic network security terminology, cryptography, symmetric encryption, substitution ciphers, transposition ciphers, steganography, Block ciphers, modes of operation, Data Encryption Standard, Public key cryptography, applications, strength and weakness, RSA algorithm, key distribution (concepts only).

Module II: Authentication, authentication methods, message digest, digital signatures, digital signature algorithm, DSS, E-mail security: Pretty Good Privacy, working of PGP, S/MIME, MIME, IP Security, Architecture, IPSec: strengths and benefits, IPv4, IPv6, ESP protocol, Web Security: Secure Socket layer, SSL session and connection.

Module III: Malicious Software, viruses, working of anti-virus software, worms, Trojans, spyware, firewall, characteristics of firewall, packet filters, application level gateways, firewall architecture, trusted systems.

Module IV: Security and Law:- Regulations in India. Information Technology Act 2000/2008.Cyber Crime and the IT Act 2000/2008.Indian Contract Act 1872, Indian Penal Code, Indian Copyright Act, Consumer Protection Act. Future Trends – The Law of Convergence.

REFERENCES
Core
- Brijendra Singh, *Cryptography & Network Security*, PHI.
- Pachghare, V.K., *Cryptography and Information Security,* PHI.

VS352 DIGITAL MARKETING

1. **COURSE OUTCOMES:** At the end of the Course, the student will be able to

CO1	Understand different digital marketing types
CO2	Understand main concets and technologies of digital marketing
CO3	Remember the concets of e-banking and cyber security
CO4	Analyze services using digital marketing

2. **COURSE CONTENT**

Module I: Introduction: Nature, Scope and Importance of Digital Marketing; Evolution of Digital Marketing; Core Concepts-Inbound Marketing, Content Marketing, Email Marketing, Influential Marketing; Holistic Digital Marketing Concept, 10Ps of digital marketing; Digital Marketing Environment: Macro and Micro Environment.

Module II: E-banking: approaches, devices, services, benefits, drawbacks, Electronic payment systems-credit cards, debit cards, smart cards, credit accounts, cyber security, encryption, secret key cryptography, public key cryptography, digital signatures, firewalls

Module III: Digital Marketing: Search Engine Optimization (SEO), Social Media, Content Marketing; Email Marketing, Mobile Marketing. Challenges for Digital Marketing: Increased Security Risk, Cluttered Market, Less Focus on Keywords, More Ad Blockers, Increased Ad Costs.

Module IV: Digital Marketing: Pay per Click-Search Engine Advertising, Advantages, Factors, Conversion Rate Optimization (CRO); Digital Marketing- Web Analytic. Social Media Marketing: Face book, Pinterest, Twitter, LinkedIn, YouTube, Google Adwords, Google Analytics; Issues and Future enhancement of Digital Marketing.

References
CORE
- Ian Dodson-The art of Digital Marketing, Wiley
ADDITIONAL REFERENCES
- Puneet Singh Bhatia- Fundamentals of Digital Marketing, Pearson Education

VS 353 ENTREPRENEURSHIP DEVELOPMENT

1. **COURSE OUTCOMES: At the end of the Course, the student will be able to**

CO1	Characteristics of entrepreneur
CO2	Institutional support and incentives to entrepreneurs
CO3	Micro Small and Medium Enterprises
CO4	Setting up of Industrial unit

2. **COURSE CONTENT**

Module I: Concepts of entrepreneur: Entrepreneur- Definitions-Characteristics of entrepreneur-Classification of entrepreneur-Entrepreneurial traits- Entrepreneurial functions-role of entrepreneurs in the economic development- Factor effecting entrepreneurial growth-Entrepreneurship - Meaning- definition- Entrepreneur Vs Intrapreneur- Women Entrepreneurs-Recent development-Problems-Entrepreneurial Development Programmes- Objectives of EDP-Methods of training- Phases of EDP

Module II: Institutional support and incentives to entrepreneurs- Functions of Department of Industries and Commerce (DIC) - Activities of Small Industrial Development Corporation (SIDCO)-Functions of National Small Industries Corporation(NSIC)-Functions of Small Industries Development Bank of India (SIDBI)-Khadi Village Industry Commission (KVIC)-Small Industries Service Institute (SISI)- Functions and services of Kerala Industrial Technical Consultancy Organisation (KITCO)-Activities of Science and Technology Entrepreneurship Development Project (STEDP)-Strategies of National entrepreneurship Development Board(NEDB)-Objectives of National Institute for entrepreneurship and small business development (NIESBUD)- Techno park-Functions of techno park Incentives-Importance- Classification of incentives- Subsidy- Types of Subsidy

Module III: Micro Small and Medium Enterprises- Features- Objectives- Importance- Role of SME in the economic development- MSME Act 2006- Salient features- Credit Guarantee Fund Trust Scheme for MSMEs - Industrial estates-Classification-Benefits-Green channel-Bridge capital-Seed capital assistance-Margin money schemes –Single Window System-Sickness- Causes – Remedies- Registration of SSI

Module IV Setting up of Industrial unit-(Only Basic study) Environment for Entrepreneurship – Criteria for selecting particular project- Generating project ideas-Market and demand analysis-Feasibility study- Scope of technical feasibility- Financial feasibility-Social cost benefit analysis-

Government regulations for project clearance- -Import of capital goods- approval of foreign collaboration-Pollution control clearances- Setting up of micro small and medium enterprises-Location decision- Significance. Project Report-Meaning-Definition-Purpose of project reports-Requirements of good report-Methods of reporting-General principles of a good reporting system-Performa of a project report-Sample project report.

REFERENCES

- Shukla M.B. Entrepreneurship and small Business Management, Kitab Mahal Allahabad.
- Sangram Keshari Mohanty, Fundamentals of entrepreneurship, PHI, New Delhi.
- Nandan H. Fundamentals of Entrepreneurship, PHI, New Delhi.
- Small-Scale Industries and Entrepreneurship, Himalaya Publishing, Delhi
- C.N. Sontakki, Project Management, Kalyani Publishers, Ludhiana.
- Sangam Keshari Mohanty. Fundamentals of Entrepreneurship, PHI, New Delhi
- Peter F. Drucker- Innovation and Entrepreneurship.
- Vasanth Desai, Small Business Entrepreneurship, Himalaya Publications.
- MSME Act 2006.

VS 354 PROGRAMMING IN JAVA

1. **COURSE OUTCOMES: At the end of the Course, the student will be able to**

CO1	Practice basic data types, operators and control structures in Java
CO2	Practice basic handling of classes and objects in Java
CO3	Introduce the following selected APIs: I/O, Strings, Threads, AWT, Applet, Networking
CO4	Idea to approach and use a new package

2. **COURSE CONTENT**

Module–I: Brief History of Java, Special Features of Java, Data Type & Operators in Java, Arrays, Objects, the Assignment Statement, Arithmetic Operators, Relational and Logical Operators in Java, control Structures, The Java Class, Constructor, Simple Java Application, simple Java Applet, Finalizers, Classes inside classes: composition.

Module-II: Inheritance & Interface, Deriving Classes, Method Overriding, Method Overloading, Access Modifiers, Abstract Class and Method, Interfaces, Packages, Imports and Class Path.

Module-III: Exception Handling, The Try-Catch Statement, Catching more than one Exception, The Finally Clause, Generating Exceptions, Threads: Introduction, Creating Threads in Applications, Method in Thread Class, Threads in Applets.

Module-IV: Java APIs – overview of APIs, IO Packages, Java Input Stream Classes, Java Output Stream Classes, File Class, Graphic & Sound: AWT and Swing, Graphic methods, Fonts, Loading and Viewing Images, Loading and Playing Sound, AWT & Event Handling, Layouts, JDBC.

REFERENCES

Core
- Java Programming, Schaum Outline Series
Additional
- Deitel, Java: How To Program, Pearson Education

VS 355 NETWORK ADMINISTRATION

1. COURSE OUTCOMES: At the end of the Course, the student will be able to

CO1	Fundamentals of networks and communication
CO2	Layers in Network
CO3	Error Detection and Correction
CO4	Network Security

2. COURSE CONTENT

Module I: Network fundamentals and Data Communication: Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN), Wireless Networks, Internetworks; Data Communication: Channel capacity. Transmission media-twisted pair, coaxial cables, fibre-optic cables, wireless transmission, multiplexing, switching, narrowband ISDN, broadband ISDN, ATM, High speed LAN's, The Web and HTTP; File Transfer: FTP; Electronic Mail in the Internet; DNS-The Internet's Directory Service.

Module II: Transport Layer- Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control, Networking Layer & Routing- Introduction and Network Service Model, Routing Principles, Hierarchical Routing, Internetworking: Switch/Hub, Bridge, Router, Gateways, Concatenated virtual circuits, Fragmentation, Firewalls. The Internet Protocol, Routing and the Internet, What's Inside a Router, IPv6, Multicast Routing, Mobility and the Network Layer.

Module III: Link Layer- Data Link Layer: Introduction and Services, Error Detection and Correction Techniques, Multiple Access Protocols, LAN Addresses and ARP, Ethernet. Hubs, Bridges and Switches, Wireless Links, PPP: The Point-to-Point Protocol, Asynchronous Transfer Mode (ATM), Frame Relay

Module IV: Network Security-cryptography-public key, secret key. Wireless & Mobility- Introduction to Wireless and Mobility. Wi-fi, Mobility Principles, Cellular Telephony, Mobile IP, Ad hoc Networks, Moving Beyond the Link Layer-An Interlude.

REFERENCES
- TCP/IP Network Administration by Craig Hunt
- The Practice of System and Network Administration by Thomas A. Limoncelli and Christina J. Hogan
- Windows XP Professional Network Administration (Networking Series) by Toby Velte

VS 356 SOFTWARE ENGINEERING

1. COURSE OUTCOMES: At the end of the course, the students should be able to:-

CO1	Understand the importance of having a process for software development.
CO2	Familiarize with various software testing techniques and tools.
CO3	Apply various models in the software development projects.
CO4	Analyze the process of software development

2. COURSE CONTENT

Module 1: Introduction : Characteristics of Software, Product and Process, Need for Software Process, Characteristics of a Software Process, Software Development Process models, Software Development Life Cycle Model: Waterfall Model, Prototyping, iterative development, Spiral Model, time-boxing model; Comparison of different Life Cycle Models, Software Project Management, Project Estimation Techniques, Software Requirements Analysis and Definition: Software Requirements, Overview of SA/SD Methodology, Requirements Specification: Need for SRS, Characteristics of an SRS, Components of an SRS, Specification Languages, Structure of a Requirements document. Functional Specification with Use cases, developing use cases, Structured Analysis, Matrics, quality metrics, Planning a project, effort estimation, COCOMO model, quality plan, risk management-assessment, control.

Module II: Function oriented design: Problem partitioning, abstraction, modularity, Top-down and Bottom-up Strategies, coupling, cohesion, design notations-structure charts, structured design, Data Flow Diagrams, Developing the DFD Model of a system, Entity Relationship Diagram, Developing ERD of a system, Decision Trees, Decision Tables, Structured English, first-level factoring, factoring input, output and transform branches, transaction analysis, verification.

Module III: Object-oriented design: Object-oriented design concepts, Comparison between Algorithmic Decomposition and Object Oriented Decomposition Unified Modeling Language, Object Oriented Design using UML, Class Diagram, Sequence Diagram, Collaboration Diagram; detailed design, PDL, algorithm design, state modeling of classes, design walkthroughs, critical design review, consistency checkers, other UML diagrams.

Module IV: Coding and testing: common coding errors, structured programming, coding standards, incremental coding process, test driven development, source code control and build, refactoring, verification- code inspections, static analysis, unit testing, combining different techniques. Testing- error, fault and failure, test oracles, test cases, Black Box Testing, Equivalence Class Partitioning, Boundary Value Analysis, Cause Effect Graphing, White Box Testing- control flow based and data-flow based testing, test plan, test case specifications, defect logging and tracking, Comparison of Different Techniques.

REFERENCES
Core
*   Rajib Mall, *Fundamentals of Software Engineering,* Second Edition, PHI
Additional
*   Pankaj Jalote**,** *An Integrated Approach to Software Engineering***,** Narosa
*   Waman S Jawadekar, *Software Engineering*, McGraw hill, 2013

Journals and Magazines: *(i*) Software Development, CMP Media. (ii) Software Quality Professional, ASQ.

VS 357 JAVA LAB
The laboratory work will consist of 15 - 20 Experiments
Part A
1. Testing out and interpreting a variety of simple programs to demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.

2. Class definitions and usage involving variety of constructors and finalizers
3. Programs involving various kinds of inheritances,
4. Program involving Method Over-riding, Method Over-loading
5. Program involving Abstract Class and Methods

Part B

6. Program involving Interface,
7. Program to demonstrate creation and handling of packages, their imports and Class Path.
8. Programs involving a variety of Exception Handling situations
9. Program to define a class that generates Exceptions and using objects of the class.
10.   Program involving creating and handling threads in applications and applets.
11-12: Programs to demonstrate methods of various i/o classes
13 Programs to demonstrate methods of string class
13.   Program to demonstrate AWT/Swing graphic methods
14.   Program for Loading and Viewing Images, Loading and Playing Sound
15.   Programs to demonstrate various Layouts
17-18 Programs to demonstrate event handling
19.   Program to demonstrate simple server-client (using a single as client and server)
20.   Debugging programs involving syntactic and/or logical errors

VS 358 STUDY TOUR

Students should be taken for at least 3-5 day tour any of the software industry and the credits should be awarded based on the study tour report submitted

VS 359 MAJOR PROJECT (PHASE I)

- The guide lines given for the course VS368 has to be followed for this course.
- An analysis and design report should be submitted at the end of this course. This report should be valued internally and marks should be awarded.
- Up to coding should be finished in 5th semester. Coding should begin in the 6th semester

SEMESTER VI

VS 361 HUMAN RESOURCES DEVELOPMENT

1. **COURSE OUTCOMES:** At the end of the course, the students should be able to:-

CO1	Scope and objectives of HRM
CO2	Familiarize with personal skills
CO3	Personality Development
CO4	Presentation skills

2. **COURSE CONTENT**

Module I: Introduction to Human Resource Management—Importance--scope and objectives of HRM. Evolution of the concept of HRM- Approaches to HRM- Human Resource Development-HRD and competitive advantage

Module II: Personal Skills- Knowing oneself- confidence building- defining strengths-thinking creatively- personal values-time and stress management. Social Skills- Appropriate and contextual use of language- non-verbal communication- interpersonal skills- problem solving.

Module III: Personality Development-Personal grooming and business etiquettes, corporate etiquette, social etiquette and telephone etiquette, role play and body language.

Module IV: Presentation skills - Group discussion- mock Group Discussion using video recording-public speaking, Professional skills - Organisational skills- team work- business and technical correspondence- job oriented skills-professional etiquettes

REFERENCE
- MatilaTreece: Successful communication: Allyun and Bacon Pubharkat
- Human Resource Management- Text and Cases-- VSP Rao
- Jon Lisa Interatid skills in Tourist Travel Industry Longman Group Ltd.
- Robert T. Reilly – Effective communication in tourist travel Industry Dilnas Publication
- Boves. Thill Business Communication Today Mcycans Hills Publication
- Dark Studying International Communication Sage Publication
- Murphy Hidderandt Thomas Effective Business Communication McGraw Hill

VS 362 FREE AND OPEN SOURCE SOFTWARES (FOSS)

1. **COURSE OUTCOMES**: At the end of the course, the student will be able to

CO1	Remember FOSS concepts, features
CO2	Understand Linux OS
CO3	Apply shell programming
CO4	Analyze various Linux commands
CO5	Evaluate conditional and looping statements
CO6	Create user defined function

2. **COURSE CONTENT**

Module I: Open source software: Features, advantages over proprietary software, examples**, Free software:** concepts, features, Free software Vs Open Source software, Free software movements. Policies, GPL, Free OS, History and Features of Linux, Various flavours of Linux, Linux Kernel and Shell, Graphical Desktops- GNOME, KDE, Linux File System and Directories

Module-II: The building blocks of PHP: variables, globals & super globals **Data types**: Settype, type casting, test type, **Operators & Expressions**, **Flow control functions in PHP**, **Functions**: Defining a function variable scope, calling a function, returning values ,setting default values for arguments, passing variable reference **Arrays**: creating arrays(associative multidimensional), Array related functions **Working with strings:** Formatting strings, indexing, strlen() functions

Module-III: Forms in PHP: Creating a simple input form, combining   HTML & PHP code on a single page, redirecting the user, creating a send mail form, File upload form **Cookies**: Introduction, setting a cookie with PHP, deleting a cookie, session function overview: starting a session, working with session variables, passing session IDs in the query string, destroying sessions &unsetting variables

Module-IV: Database concepts: Open source database software: MySQL features MySQL data types: Numeric, date & time, string. Table creation in MySQL: insert, select, where clause, ordering the result, like operator Selecting Multiple tables: using join, using queries Modifying records: update command, replace command, delete command date & time functions in MySQL Interacting with MySQL using PHP: connecting to MYSQL, Executing queries, Retrieving error messages, inserting data with PHP, retrieving data with PHP

REFERENCES
Core
- Julie C.Meloni, PHP, MySQL and Apache, Pearson Education
- Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

VS 363 IT & SOCIETY

1. **COURSE OUTCOMES**: At the end of the course, the student will be able to

CO1	Having a clear view of what professionalism is
CO2	Aware of ethical issues in computing profession Aware of managing quality
CO3	Aware of quality certifications
CO4	Having an Exposure to Cyber law and women security

2. **COURSE CONTENT**

Module–I: What is a profession – who is a professional – core qualities of a professional – Environments and their impact and complexity – social attitudes, beliefs and values, Codes of ethics - solving ethical conflicts, moral reasoning and ethical theories–responsibilities and rights. Computer ethics : ethics and the internet – hacking – netiquette – privacy

Module-II: Quality Management. Concept of quality, total quality management, 7 sigma principles, ISO certifications, Component maturity models, CMM Levels.

Module-III Cyber law: Intellectual property rights – basic ideas – copyright concepts – copyrights applied to softwares – software licensing – patents in software – Indian copyright law and provisions for software – Indian patent law and provisions for software – various licencing models - arguments against copyrights and patents in software – free softwares – GPL software freedoms– open source softwares.

Module-IV: Women and Human Rights under International Law; Women and the Constitution of India; Women's Commissions and the National Commission for Women Act, 1990; Women and Criminal Law; The Law relating to Dowry Prohibition (Protection against Dowry); Protection of Women form Domestic Violence Act, 2005, Cyber-crimes-against-women and remedy; IT Support for women security from government of Kerala- Women and child helpline phone numbers, Nirbhayam mobile application from police department etc.

REFERENCES
Core References
- M Govindarajan, S Natarajan, V S Senthil Kumar, Engineering Ethics, PHI
- Poornima M. Charantimath, Total Quality Management, Pearson Education
- Richard Stallman, Free Software: A Perspective, Prajasakthi Book House, Hyderabad
- Indian Copyright Act and Indian Patent Acts

Additional References
1. Deborah G Johnson, Computer Ethics, Pearson Education
2. Shailendra Nigam, Total Quality Management, , Excel Books
3. Charles B Fleddermann, Engineering Ethics, Pearson Education
4. James S Bowman, et. Al., The Professional Edge, PHI
5. NIIT, Building a Portfolio, A career enhancement guide, PHI
6. Kenneth Kensington, Deepak Kumar, Experience in India : Bridging the Digital Divide, Sage Publishers
7. Lectures on Women and Law (Paperback) – 1 January 2021, Dr. Rega Surya Rao (Author)
8. https://vikaspedia.in/social-welfare/women-and-child-development/women-development-1/legal-awareness-for-women/criminal-law-and-women
9. https://vikaspedia.in/social-welfare/women-and-child-development/women-development-1/legal-awareness-for-women/cyber-crimes-against-women

VS 364 MOBILE APPLICATION DEVELOPMENT

1. **COURSE OUTCOMES**: At the end of the course, the student will be able to

CO1	Introduction to Mobile Technology
CO2	Introduction to Android OS
CO3	UI Elements and Layouts
CO4	Performing network operations in Android

2. **COURSE CONTENT**

Module I: Introduction to Mobile Technology: Introduction to Mobile Phone Generations, Mobile Computing, Mobile Computing Framework: Wireless Delivery Technology and Switching methods, Mobile Information access devices, Mobile data internetworking standards and equipments, Mobile Computing based applications.

Module II: Introduction to Android OS: Android Features, Android Architecture, Getting started with Android: Setting up Android Studio, Android SDK, Creating a new project, Project structure, Android Manifest.xml, Layout resource, Android Virtual Device (AVD), Android Emulator, Creating a Hello world Application, Dalvik Debug Monitor Server (DDMS), LogCat, Application Framework. Activities, Services, Activity Life Cycle: Callbacks and activity pyramids, Instantiation, Destroying activities, Pausing, resuming, starting and stopping activities, saving and restoring activities.

Module III: UI Elements and Layouts: XML Fundamentals: Trees, Elements, Attributes, Button, TextView, ChekBox, Listview, Grid view, Date Picker, Recycler view, Creating Toast, Layouts: Relative Layout, Constraint Layout, Linear Layout, Frame Layout.

Module IV: Intents: Intents in Android, Intent types, Passig data between activities, Fragments in Android, Example of fragments, Location aware Apps, Performing network operations in Android, MediaPlayer, Android sound and media, Localisation in Apps. **DataStorage:** Shared Preferences, Android file system, Internal storage, External storage, SQLite. Introducing SQLite, SQLiteOpenHelper class.

References:
- Valetino Lee, Heather Schneider, Robbie Schell, "Mobile Applications: Architecture, Design and Development", Prentice Hall, ISBN - 13: 978-0131172630.
- Android Notes for Professionals. GoalKicker.com, Free Programming Books.

VS 365 SOFTWARE TESTING

1. **COURSE OUTCOMES:** At the end of the course, the student will be able to

CO1	Discuss the basic concept of testing
CO2	Explain different types of testing
CO3	Describe the tools used for testing
CO4	Explain Logic Based Testing

2. **COURSE CONTENT**

Module-I: Introduction:- Purpose of testing, testing and debugging, model for testing, types of testing, types of bugs Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation

Module-II: Transaction Flow Testing:-transaction flows, example of transaction testing. Dataflow testing:- Basics of dataflow testing, example of dataflow testing, Domain Testing:-domains and paths, Nice & ugly domains, Interfaces testing

Module-III: Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, regular expressions & flow anomaly detection**.**

Module-IV: Logic Based Testing:- overview, decision tables, path expressions, kv charts, State Graphs and Transition testing:- good & bad state graphs, state testing.

REFERENCES
Core
- BarisBeizer, Software Testing techniques, Dreamtech, second edition.
Additional
- Edward Kit, Software Testing in the Real World, Pearson Education of India.
- K.K.Prasad, Software Testing Tools, Dreamtech

VS 366 ADVANCED JAVA

1. **COURSE OUTCOMES**: At the end of the course, the student will be able to

CO1	Introduction to Swing Japplet
CO2	Introduction to Servlets
CO3	Introduction To Java Beans
CO4	Advantage of JSP technology

2. COURSE CONTENT

Module I: Introduction to Swing Japplet, Icons and Labels, Text Fields, Buttons, Jbutton Class, Check Box, Radio Buttons, The Container, Panel, Windows and Frame Classes, Combo Box, Tabbed Panes, Scroll Panes, Trees, Tables, Custom Rendering of Jlist Cells, JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL statements, Working with Result Set Object & Result Set Meta Data

Module II: Servlets: Introduction to Servlets (Life cycle of servlets, Java Servlets Development Kit, creating, Compiling and running servlet, The servlet API : javax.servlet package, Reading the servlet Parameters, Reading Initialization parameter, The javax.servlet.http. Package, Handling HTTP Request and Response (GET / POST Request) vi) Using Cookies, Session Tracking

Module III: Introduction To Java Beans, What is Java Bean?, Advantage, Installing / Starting / Using BDK (Bean Development Kit, JAR Files, Using the Java Beans API

Module IV: JSP: Advantage of JSP technology (Comparison with ASP / Servlet), JSP Architecture, JSP Access Model, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets, Comments, JSP Implicit Object, Object Scope, Synchronization Issue, Exception Handling, Session Management

REFERENCES
  Herbert Schildt, "The Complete Reference Java" Seventh Edition, McGraw Hill
  Education(India) Pvt. Ltd, NewDelhi.

VS 367 MOBILE APPLICATIONS DEVELOPMENT & JAVA LAB
- Familiarization with the Android Development Platform
- Configure the settings of the Eclipse Integrated Development Environment (IDE) for Android development.
- Use the IDE to create an Android programming project. Write a short introductory program.
- Connect to an Android device and run the program on the device. Writing Android Programs
- Use the IDE to create an app project that has buttons, string resources, View and ViewGroup objects.
- Experiment with XML, activities, manifests and intents in this project. Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware. Expanding the App Capabilities with Lifecycles and more UI options
- Use the IDE to create an app that has an activity lifecycle including some of the following: pause, resume, start, stop, destroy and restore.
- Experiment with UI fragments, and flexible UIs in this project. Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware. Demonstrating Inter-App Interaction
- Use the IDE to create an app that has inter-application interaction.
- Experiment with sending and getting messages to other apps in this project. Use the emulator to test the app

- Load the app onto an Android device and test it on actual hardware. Demonstrating Location Awareness
- Use the IDE to create an app that is location-aware. Experiment with the location manager in this project. Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware. Building a program that demonstrates layout hierarchies
- Use the IDE to create an app that has multiple layout hierarchies. Experiment with ListView, Lint, and ViewStubs in this project.
- Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware. Building a program that demonstrates network operations
- Use the IDE to create an app that has network awareness. Experiment network and cloud messaging in this project. Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware Incorporating audio and/or video into app projects
- Use the IDE to create an app that has either audio or video (or both) incorporated into its design.
- Experiment with volume, playback, photo-capture and/or video control in this project. Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware. Building a program around 2-D or 3-D graphics
- Use the IDE to create an app that uses OpenGL ES with 2-D and/or 3-D graphics.
- Experiment with projections, shapes, motion transformations and renderers in this project.
- Use the emulator to test the app
- Load the app onto an Android device and test it on actual hardware.

VS 368 MAJOR PROJECT PHASE II

1.   AIM:
To expose student to industry-standard project practices, through a real-life project work under time and deliverable constraints, applying the knowledge acquired through various courses.

2.   OBJECTIVES:
▪ To provide an opportunity to apply the knowledge gained through various courses in solving a real life problem
▪ To provide an opportunity to practice different phases of software/system development life cycle
▪ To introduce the student to a professional environment and/or style typical of a global IT industry
▪ To provide an opportunity for structured team work and project management
To provide an opportunity for effective, real-life, technical documentation
To provide an opportunity to practice time, resource and person management.

3.   PROJECT GUIDELINES
Group Size – Maximum 3

No. of records – No. of group members + 1 (Department copy) Certificate should include the names of all members

The minimal phases for the project are: Project search, finalization and allocation, Investigation of system requirements, Data and Process Modelling, System Design, Program design, Program coding and unit testing, System integration, System implementation and acceptance testing.

3.1 Planning the Project: The Major Project is an involved Exercise which has to be planned well in advance. The topic should be chosen in Semester 4 itself and the case study of Course CS1302 should as far as possible, be based on the project topic, though on Exceptional cases, for valid reasons, the project guide may waive this condition. Related reading, training and discussions should start from semester 5 itself.

3.2 Selection of project work: Project work could be of 3 types:
a)   Developing solution for a real-life problem: In this case, a requirement for developing a computer based solution already Exists and the different stages of system development life cycle is to be implemented successfully. Examples are Accounting Software Package for a particular organization, Computerization of administrative functions of an organization, Web Based Commerce, etc. The scope for creativity and Exploration in such projects is limited, but if done meticulously, valuable Experience in the industrial context can be gained.

(b)   Innovative Product development: These are projects where a clear-cut requirement for developing a computer based solution may not be Existing, but a possible utility for the same is conceived by the proposer. An Example is a Malayalam Language Editor with Spell Checker, Computer Music Software for Indian Music, Heat Engines Simulation Software for eLearning, Digital Water Marking Software,

(c)   Research level project: These are projects which involve research and development and may not be as structured and clear cut as in the above case. Examples are Malayalam Character Recognition, Neural Net Based Speech Recogniser, Biometric Systems, Machine Translation System etc. These projects provide more challenging opportunities to students,
but at EX level is a difficult choice. If any student identifies proper support in terms of guidance, technology and references from External organizations and also the supervisors are convinced of the ability of the student(s) to take up the project, it shall be permitted. The methodology and reporting of such projects could be markedly different from type (a) and is left to the proposer/external supervisor of the projects.

3.3 Selection of Team: To meet the stated objectives, it is imperative that Major Project is done through a team effort**.** Though it would be ideal to select the team members at random (drawing lots) and this should be strongly recommended, due to practical considerations, students may also be given the choice of forming themselves into teams with 3 to 5 members (teams less than 3 members may be permitted in Exceptional cases, for valid reasons). A gender mix should also be strongly suggested. A team leader shall be elected through drawing lots. Teams shall maintain team meeting minutes and ensure that every team member has tasks assigned in writing. Team meeting minutes shall form a part of the Project Report. Even if students are doing projects as groups, each one must independently take up different modules of the work and must submit the reports also independently (though, in such cases, some common materials is permissible). Evaluation will also be done independently.

3.4 Selection of Tools: No restrictions shall be placed on the students in the choice of platforms/tools/languages to be utilized for their project work, though open source is strongly

recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

3.5 Selection of Organisation & Guide: No restrictions shall be placed on the students in the choice of organization where project work may be done, in terms of locality, type (public/private) etc. It is the duty of the Head of Institute/Principal of College to ensure that the Aim, Objectives and full project guidelines are communicated to the external organization. The guide should ideally be a post-graduate with minimum 2 years of work experience.

Students may also choose to do project in the college/institute (or partially in the college/institute and partially in an external organization), especially product-based work, but in such cases the supervisors must ensure that (i) industry practices are followed (ii) the students undertake a planned visit to an IT industry with international operations to make up for the loss of experience and (iii) the services of an external guide with industry experience is obtained.

3.6 Project Management: Head of Institute/Principal of College should publish a list of students, projects topics, internal guide and external organization (if any) and teams agreed, before the end of semester 5. Changes in this list may be permitted for valid reasons and shall be considered favorably by Head of Institute/Principal of College any time before commencement of the project. Any request for change after commencement should considered by a committee of 3 teachers and their recommendation shall be accepted by Head of Institute/Principal of College.

Gantt-chart of proposed activities and a draft statement of project deliverables (which may subsequently be altered if justified) should be prepared before the commencement of the project. The actual completion of each phase should be noted on the chart in the course of the project work. Students should submit a fortnightly report of progress which could be indication of percentage of completion marked on the original Gantt-chart, with any notes attached. Students should ideally keep a daily activity log sheet. Team meetings should be documented in the format given at the end. Changes in the submitted documents are possible, as project development is essentially an evolutionary process. The project guide must ensure that changes are necessary due to the knowledge gained in succeeding phases of the project. The date of completion of a phase should be brought forward if the changes made are deemed to be errors and not due to additional knowledge gained from a succeeding phase.

3.7 Documentation:
The following are the major guidelines: The final outer dimensions of the report shall be 21 cm X 30 cm. The colour of the flap cover shall be light green. Only hard binding should be done, with title of the thesis and the words "<BRIEF TITLE> B.Voc Software Development Project Report 200…" displayed on the spine in 20 point, Bold, Times New Roman, as in example below. In case the title is too long, a shorter version of it may be used (Like "Image Pro" instead of "Image Pro – An Interactive Image Processing package"). It is highly recommended that Latex be used for documentation.

• The text of the report should be set in 12 pt, Times New Roman, Single Spaced.
- Headings should be set as follows: CHAPTER HEADINGS 20 pt, Times New Roman, Bold, All Caps, Centered.

1.   SECTION HEADINGS 12 pt, Times New Roman, Bold, All Caps, Left Adjusted.

1.   1 Section Sub-headings 12 pt, Times New Roman, Bold, Left Adjusted.

Titles of Figures, Tables etc are done in 12 point, times New Roman, Italics, Centered.

<div align="center">

<PROJECT TITLE>

<STUDENT'S NAME>

<COLLEGE NAME>

PROJECT REPORT

Submitted in partial fulfilment of the

Requirements for the award of Degree of

B.Voc Software Development

University of Kerala

2025

</div>

Some general guidelines on documentation stylistics are:
•   Double quotes and single quotes ("", ") should be used only when essential. In most cases words put in quotes are better highlighted by setting them in italics. Eg: This process is known as "morphing". This process is known as morphing.
•   Page numbers shall be set at right hand top corner, paragraph indent shall be set as 3.
•   Only single space need be left above a section or sub-section heading and no space may be left after them.
•   Certificate should be in the format: "Certified that this report titled....................... is a bonafide record of the project work done by Sri/Kum....................... under our supervision and guidance, towards partial fulfillment of the requirements for the award of the Degree of B.Voc Software Development of the University of Kerala" with dated signatures of Internal; Guide, external guide and also Head of Institute/College.
•   If the project is done in an external organization, another certificates on the letterhead of the organization is required: "Certified that his report titled.............................. is a bonafide
record of the project work done by Sri/Kum............................ under any supervision and guidance, at the ....Department of.................... (Organization) towards partial fulfilment of the requirements for the award of the Degree of B.Voc Software Development of the University of Kerala".

•   References shall be IEEE format (see any IEEE magazine or transaction). Take care in use of italics and punctuation. While doing the project, keep note of all books you refer, in the correct format, and include them in alphabetical order in your reference list. Eg: A book is cited as: Kartalopoulos, S V Understanding Neural Networks and Fuzzy Logic, BPB Publishers, 1996, pp. 21-27. (pp.21-27 indicates that pages 21-27 have been referred. If the whole book is being referred, this may be omitted. If a single page is referred, say 7, it may be cited as p.7 Report writing is NOT

a hasty activity done after finishing the project. Students must try to develop the report along with the work, so as to give it flesh and blood. Drafts should be read, modified, spell checked and grammar checked at least thrice during the course of the project and before a final printout is taken, the same may be got approved from the internal guide. The students should send two interim reports to internal guides. This will also help the students in their report writing.

The Gantt chart, fortnightly progress reports, and team meeting minutes mentioned in section 3.5 should appear as appendix to the project report. Regarding the body of the report, as an indicative Example, the following is given (though students should not attempt to fit every kind of project report into this format):

– Organizational overview (of the client organization, where applicable)

– Description of the present system

– Limitations of the present system
– The Proposed system- Its advantages and features

– Context diagram of the proposed system.

– Top level DFD of the proposed system with at least one additional level of Expansion

– Structure Chart of the System

– System flowchart

– Menu Tree

– Program List

– Files or tables (for DBMS projects) list. Class names to be entered for each file in OO systems.
– List of fields or attributes (for DBMS projects) in each file or table.

– Program – File table that shows the files/tables used by each program and the files are read, written to, updated, queried or reports were produced from them.

– Reports List with column headings and summary information for each report.

– System Coding and variable/file/table naming conventions

– System controls and standards

– Screen layouts for each data entry screen.

– Report formats for each report.

– Program id

– Program level run chart

- Program function Explanation
- Data entry screen (reproduced from system documentation).

- Report layout (reproduced from system documentations)
- Program level pseudo code or flowchart.

- Decision tables, decision trees, with English Explanation where necessary.

- Program listing

- Test data

- Test results.

3.8 Methodology:

Wherever applicable, object oriented approach should be used for software development. The project report should generally contain details of the following steps *(though students should not attempt to fit every kind of project into this format):*

(a)   Analysis
- Study of existing systems and its drawbacks (general)
- Understanding the functionalities of the system (detailed)

- Preparation of requirement

- Conduct of Feasibility study

- Identification of relevant Objects

- Abstraction of each object (attributed and methods)

- Relationship between objects

(b)   Design
- Design of each subsystems

- Design of each classes

- Design of communications between objects

- Design of Algorithms for problem solving

- User interface Design

- Any other steps if necessary

(c)   Coding and Impletion

(d)   Testing

(e)   Security, Backup and Recovery Mechanisms

(f)   On line help and User Manuals

(g)   Upgradability Possibilities

3.9 Project IPR & Utilisation: The intellectual property rights in all project work done by the students shall vest with the University of Kerala, except in cases where some external organizations seek undertaking from students to concede IPR in all work done in their organization or under their guidance. Where possible, students should attempt to obtain at least a joint IPR for the University. In cases where project works are of public utility, students shall be asked to publish their work including source code and documentation, in so far as their rights are clear.

Evaluation of Project

- Documentation   – 80 marks
- Content & Methodology   - 80 marks
- Viva Voce   - 80 marks

REFERENCES
Core
- S A Kelkar, Software Project Management, Prentice Hall of India
- W Alan Randolph, Barry Z. Posner, Effective project planning and management, PHI

Additional
- Greg Mandanis, Software Project Management Kit for Dummies, IDG Books
- Joel Henry, Software Project management
- Frederic P B, Mythical Man-month, Essays on Software Engineering, Addison Wesley
- David Lamport, Latex: A document Preparation System, 2/e, Pearson Education