

SYLLABUS

(With effect from 2015-2016 Academic year)

ಪಠ್ಯಕ್ರಮ

(ಶೈಕ್ಷಣಿಕವರ್ಷ 2015-16)

VII & VIII Semester Bachelor Degree in Information Science and Engineering

Out Come Based Education
with
Choice Based Credit System



P.E.S. College of Engineering, Mandya - 571 401, Karnataka

(An Autonomous Institution Affiliated to VTU, Belagavi)

Grant -in- Aid Institution

(Government of Karnataka)

Accredited by NBA, New Delhi

Approved by AICTE, New Delhi.

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಮಂಡ್ಯ-571 401, ಕರ್ನಾಟಕ

(ವಿ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)

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Preface

PES College of Engineering, Mandya, started in the year 1962, has become autonomous in the academic year 2008-09. Since, then it has been doing the academic and examination activities successfully. The college is running Eight undergraduate and Eight Postgraduate programs. It consists of Six M.Tech programs, which are affiliated to VTU. Other postgraduate programs are MBA and MCA.

India has recently become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degree globally but also establishes equivalence to our degrees with that of the member nations such as Taiwan, Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan. Among other signatories to the international agreement are the US and the UK. Implementation of Outcome Based Education (OBE) has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

Our Higher Educational Institution has adopted the CBCS based semester structure with OBE scheme and grading system.

The credit based OBE semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

The OBE, emphasize setting clear standards for observable, measurable outcomes of programs in stages. There lies a shift in thinking, teaching and learning processes moving towards Students Centric from Teacher Centric education. OBE standards focus on mathematics, language, science, attitudes, social skills & moral values.

The key features which may be used to judge, if a system has implemented an outcome based education system is mainly Standard based assessments that determines whether students have achieved the stated standard. Assessments may take any form, so long as the process actually measure whether the student knows the required information or can perform the required task. Outcome based education is a commitment that all students of all groups will ultimately reach the same minimum standards. Outcome Based Education is a method or means which begins with the end in mind and constantly emphasizes continuous improvement.

Choice Based Credit System (CBCS) provides choice for students to select from the prescribed courses (core, Foundation, Foundation Elective, elective, open elective and minor or soft skill courses). The CBCS provides a 'cafeteria' type approach in which the students can Choose electives from a wide range of courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, adopt an interdisciplinary approach to learning which enables integration of concepts, theories, techniques, and, perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline. These greatly enhance the skill/employability of students.

In order to increase the Industry/Corporate readiness, many Soft Skills and Personality Development modules have been added to the existing curriculum of the academic year 2015-16. Industry Interactions have been made compulsory to enhance the field experience. In order to enhance creativity and innovation Mini Project and Industrial visit & Interaction are included in all undergraduate programs.

Dr. Umesh D R
Deputy Dean (Academic)
Associate Professor
Dept. of CS & Engg.

Dr.P S Puttaswamy
Dean (Academic)
Professor
Dept. of Electrical & Electronics Engg

PES College of Engineering

Vision

“PESCE shall be a leading institution imparting quality engineering and management education developing creative and socially responsible professionals.”

Mission

1. Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.
 2. Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.
 3. Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.
 4. Promote research, product development and industry-institution interaction.
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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

About the Department

The Department of Information science and Engineering takes pride in producing quality engineers over the past 14 years. The credit for all the flowery results goes to the highly motivating staff, from whom all students draw inspiration. The Department was started in the year 2000. The present intake of the undergraduate program is 30. The department has well equipped classrooms, computer laboratories with high-end systems, department library and good collection of software's. Also a research centre is a major credential to our department. We are proud to produce the first PhD student in our college. Faculty members of the department are involved in research activities in different fields such as Medical Image Processing, Pattern Recognition, and Data Mining etc. The department is using Outcome-based education (OBE), which is a recurring education reform model, and it is affiliated to Visvesvaraya Technological University (VTU). The department has achieved good Placement, conducted International /national Conferences and other sponsored short-term courses, workshops, National seminars and symposia. The laboratory facilities and the Internet access are available round the clock to the staff and students of the Information Science and Engineering

Vision

“The department strives to equip our graduates with Knowledge and Skills to contribute significantly to Information Science & Engineering and enhance quality research for the benefit of society”.

Mission

- M1:** To provide students with state of art facilities and tools of Information Science & Engineering to become productive, global citizens and life-long learners.
- M2:** To prepare students for careers in IT industry, Higher education and Research.
- M3:** To inculcate leadership qualities among students to make them competent Information Science & Engineering professionals or entrepreneurs.

1.2. State the Program Educational Objectives (PEOs)

Graduates of the program will be able to

- PEO1:** Establish a productive Information Science & Engineering career in industry, government or academia.
- PEO2:** Interact with their peers in other disciplines by exhibiting professionalism and team work to contribute to the economic growth of the country.
- PEO3:** Promote the development of innovative systems and solutions to the problems in Information Science using hardware and software integration.
- PEO4:** Pursue higher studies in Engineering, Management or Research.

A. List of Program Outcomes (POs)

Engineering Graduates will be able to:

- PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2.Problemanalysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3.Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5.Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6.The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7.Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8.Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9.Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.
- PO10.Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11.Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
- PO12.Life-longlearning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. List of Program Specific Outcomes (PSOs)

Information Science & Engineering Graduates will be able to:

- PSO1.** Analyze, design, develop and test the principles of System software and Database concepts for computer-based systems.
- PSO2.** Develop computer communication systems and applications for Information security.
- PSO3.** Apply the knowledge of Information Science and Engineering to solve any software and hardware related problems and to organize, manage and monitor IT Infrastructure.

P.E.S. COLLEGE OF ENGINEERING, MANDYA (An Autonomous Institution)								
VII Semester B.E(IS&E)			Scheme of Teaching and Examination 2015-16					
Sl No	Course Code	Course Title	Teaching Dept.	Hrs/Week L:T:P:H	Total Credit	Examination Marks		
						CIE	SEE	Total
1.	P15IS71	Web services	IS&E	4:0:0:4	4	50	50	100
2.	P15IS72	Cloud Computing	IS&E	3:2:0:5	4	50	50	100
3.	P15IS73	Mobile App development	IS&E	4:0:0:4	4	50	50	100
4.	P15IS74*	Elective-IV	IS&E	4:0:0:4	3	50	50	100
5.	P15IS75*	Open Elective-I	IS&E	4:0:0:4	3	50	50	100
6.	P15ISL76	Mobile App development Lab	IS&E	0:1:2:3	1.5	50	50	100
7.	P15ISL77	Web Services Lab	IS&E	0:1:2:3	1.5	50	50	100
8.	P15ISL78	Project Work Phase - I	IS&E	0:0:4:2	2	--	50	50
Total					23	350	400	750

List of Electives					
Elective – IV			Open Elective - 1		
Sl. No.	Course Code	Course title	Sl. No.	Course Code	Course title
1.	P15IS741	Information & N/W Security	1.	P15IS751	Java Programming
2.	P15IS742	User Interface Design	2.	P15IS752	Introduction to Python Programming
3.	P15IS743	Artificial Intelligence	3.	P15IS753	Data structures
4.	P15IS744	Supply chain management	4.	P15IS754	Internet programming

P.E.S. COLLEGE OF ENGINEERING, MANDYA (An Autonomous Institution)								
VIII Semester B.E(IS&E)			Scheme of Teaching and Examination 2015-16					
Sl No.	Course Code	Course Title	Teaching Dept.	Hours Pattern L:T:P:H	Total Credit	Examination Marks		
						CIE	SEE	Total
1.	P15IS81	Big data	IS&E	4:0:0:4	3	50	50	100
2.	P15IS82*	Elective-V	IS&E	4:0:0:4	3	50	50	100
3.	P15IS83*	Elective-VI	IS&E	4:0:0:4	3	50	50	100
4.	P15IS84*	Open Elective-II	IS&E	4:0:0:4	3	50	50	100
5.	P15IS85	Project Work Phase - II	IS&E	0:0:16:16	8	50	100	150
6.	P15IS86	Internship	IS&E	0:0:2:2	2	50	--	50
Total					22	300	300	600

List of Electives								
Elective - 5			Elective - 6			Open Elective - 2		
Sl. No.	Course Code	Course title	Sl. No.	Course Code	Course title	Sl. No.	Course Code	Course title
1.	P15IS821	Pattern Recognition	1.	P15IS831	System Simulation & Modeling	1.	P15IS841	Software Engg
2.	P15IS822	Software Architecture	2.	P15IS832	Management Information System	2.	P15IS842	Basic of Research Development
3.	P15IS823	Cyber Security	3.	P15IS833	Software Project Management	3.	P15IS843	Operation Research
4.	P15IS824	Distributed system	4.	P15IS834	Network Management System	4.	P15IS844	Entrepreneurship Intellectual Property Rights

Course Title: Web Services			
Course Code: P15IS71	Semester: VII	L-T-P-H : 4:0:0:4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Computer Networks.

Course Learning Objectives (CLOs)

This course aims to

1. Summarize technologies for the design of web using XHTML and CSS.
2. Create XML documents using DTD/XML schema and style sheets.
3. Understand the basics of Web services.
4. Discuss the applications of Web services in e-business and enterprise computing, in particular, for business process integration.
5. Understand UDDI registry, synchronous and asynchronous web services.

Course Content

Unit - I

Introduction to XHTML and CSS:

Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags.

11 Hrs

Unit - II

XML:

Introduction, Syntax, Document structure, Document Type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors.

11 Hrs

Unit - III

Web services:

Introduction, Web Services Application Opportunities, Emergence of Web Services, Server Side Architecture Progression, Client Side Architecture Progression, Service Oriented Architecture and Web Services, Web Services Application Scenario.

10 Hrs

Unit - IV

SOAP and WSDL:

Simple Object Access Protocol: Introduction to SOAP, SOAP Interaction, Soap Modeling, Soap Encoding, Soap Binding.

Web Services Description Language: Web Service Invocation and WSDL, Web Service Description Details, Service Description through WSDL.

10 Hrs

Unit - V

UDDI Registry, RPC and Messaging, Orchestration and Choreography:

Introduction to UDDI, UDDI Nomenclature, Core UDDI, Service Publication, Service Discovery. Synchronous and Asynchronous web services, RPC or Messaging, Business Process/Workflow, Importance of Business Process, Orchestration and Choreography, Choreography.

10 Hrs

Text Books:

1. Programming of World Wide Web – Robert W Sebesta, 4th edition, Pearson education, 2014. [Unit 1 and Unit 2]
2. B V Kumar, S V Subramanya, Web Services: An Introduction, Tata McGraw Hill publications, second Edition, 2012. [Unit 3, Unit 4 and Unit 5]

Reference Books:

1. Service Design Patterns: Fundamental Design Solutions for SOAP/WSDL and Restful Web Services, Robert Daigneau Publisher: Addison-Wesley Professional;
2. Web Programming Building Internet Applications – Chris Bates,
3. James McGovern et al: Java Web Services Architecture, Elsevier.

Course Outcomes

After learning all the units of the course, the student is able to,

1. Apply XHTML and CSS tags to design static web pages.
2. Design XML documents using DTD/XML Schema along with CSS and XSLT style sheets.
3. Identify the need of web services and apply web services in industry prospective.
4. Apply the communication protocol as SOAP and develop web service using WSDL for the given application.
5. Develop online application integration by UDDI registry and synchronous/asynchronous web services.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	3	1				3	2				2	1	1
CO 2	2	2	3	2				3	2				2	1	1
CO 3	2	2	2	1				3	2				2	1	2
CO 4	2	2	3	1				3	2				2	2	2
CO 5	2	2	3	2				3	2				2	2	2

Course Title: Cloud Computing			
Course Code:P15IS72	Semester: VII	L-T-P-H : 3:2:0:5	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Computer Network

Course learning objectives (CLOs)

This course aims to

1. To learn how to use Cloud Services.
2. To implement Virtualization
3. To implement Task Scheduling algorithms.
4. Apply Map-Reduce concept to applications. And build Private Cloud.
5. To understand the concept of Virtualization and design of cloud Services.
6. To be familiar with the lead players in cloud.
7. To differentiate between full virtualization and para virtualization.
8. Works in teams to contribute, evaluate and feedback on case studies on different cloud computing solutions.
9. To know about security of virtualization.
10. To understand cloud Security Risks.

Course Content

Unit - I

Introduction, Cloud Infrastructure

Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, User experience and software licensing. **10 Hrs**

Unit - II

Cloud Computing: Application Paradigms.

Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper, The Map Reduce programming model, A case study: The GrepTheWeb application, Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research, Social computing, digital content and cloud computing. **10 Hrs**

Unit- III

Cloud Resource Virtualization.

Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and para virtualization, Hardware support for virtualization, Case Study: Xen a VMM based para virtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines, The dark side of virtualization. **10 Hrs**

Unit - IV

Cloud Resource Management and Scheduling.

Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling Map Reduce applications subject to deadlines, Resource management and dynamic scaling. **11 Hrs**

Unit- V

Cloud Security, Cloud Application Development.

Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it, How to use S3 in java, Cloud-based simulation of a distributed trust algorithm, A trust management service, A cloud service for adaptive data streaming, Cloud based optimal FPGA synthesis . **11 Hrs**

Text Book:

1. Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.

Reference Books:

1. RajkumarBuyya, James Broberg, AndrzejGoscinski: Cloud Computing Principles and Paradigms, Willey 2014.
2. John W Rittinghouse, James F Ransome:Cloud Computing Implementation, Management and Security, CRC Press 2013.
3. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.

4. Ronald L. Kurtz, Russell Dean Vines, “Cloud Security – A comprehensive Guide to Secure Cloud Computing”, Wiley – India, 2010.

Course Outcomes

After learning all the units, the student is able to

1. Demonstrate and experiment Simple Cloud Application and Compare the Strength and Limitation of Cloud Computing.
2. Apply resource allocation, scheduling algorithms and Implement Map-Reduce concept.
3. Create virtual machines from available physical resources and Familiarize with Open Stack.
4. Identify the architecture, infrastructure and delivery models of cloud computing.
5. Apply Suitable virtualization concept and Design Cloud Services and set a private cloud.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1		2	2								1		2
CO 2	2	3	2	2	2								1	2	2
CO 3	2	2	2	1	2								2	2	2
CO 4	1	2	2	2	2								2	2	2
CO 5	1	2	2	2	2								2	2	2

Course Title: Mobile App Development			
Course Code:P15IS73	Semester: VII	L-T-P-H : 4:0:0:4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Java, XML.

Course Learning Objectives (CLOs)

This course aims to

1. Define basic concepts of Mobile App development and marketing and identify the various mobile App Frameworks for implementing the App.
2. Implementing one of the mobile app using any one of the framework and explain the challenges in mobile application design and development.
3. Write mobile application for small devices and explain different techniques for developing applications for mobile devices.
4. Design an application for mobile devices and implement an application for a mobile device using current technologies.
5. Identify the challenges that mobile programming has in providing an effective user interface and apply Software Engineering techniques in practice.

Course Content

Unit - I

Preliminary considerations:

Why you might be here? Cost of development, Importance of mobile strategies, Why is mobile development difficult? Mobile development today, Mobile Myths, Third party Frameworks.

Diving into mobile: app or website? Mobile Web Presence, Mobile Applications, Marketing

Creating consumable web services for mobile devices:

What is a Web Service? Web Services Languages (Formats), Creating an Example Web Service, Debugging Web Services. **12 Hrs**

Unit - II

Mobile user interface design:

Effective Use of Screen Real Estate, Understanding Mobile Application Users, Understanding Mobile Information Design, Understanding Mobile Platforms, Using the Tools of Mobile Interface Design

Mobile websites:

Choosing a Mobile Web Option, Adaptive Mobile Websites, Dedicated Mobile Websites, Mobile Web Apps with HTML5. **10 Hrs**

Unit – III

Getting started with android:

Why Target Android? Who Supports Android? Android as Competition to Itself, Getting the Tools You Need, Connecting to the Google Play, Android Development Practices, Building the Derby App in Android

Getting started with iOS:

The iPhone Craze, Getting the Tools You Need, iOS Project, Debugging iOS Apps, Objective-C Basics, Hello World App, Building the Derby App in iOS, Other Useful iOS Things. **10 Hrs**

Unit - IV

Signing and Publishing your Application:

Test your application, Attach and end user License Agreement if desired, Create and attach an Icon and Label, clean Up for Release, Version Your Application, Obtaining a signing Certificate and API Key, Signing Your Application, Retesting your Application, publishing on Android Market, signing up As an Android Developer.

Persistent Data Storage: SQLite Databases and Content Providers:

Databases-Basic Structure of the Micro Jobs database Class, Reading Data from the Database, Modifying the Database. Content Providers-Introducing Notepad, Content Providers, consuming a Content Provider.

10 Hrs

Unit- V

Location and Mapping

Location-Based services, Mapping, The Google Maps Activity, The Map view and Map Activity, Working with Map views, Location without Maps.

Building a View

Android GUI Architecture, Assembling a graphical Interface, Wiring up the Controller, The Menu.

10 Hrs

Text Books:

1. Jeff McWherter, Scott Gowell, Professional Mobile Application Development, WROX, 2012
2. Rogers, Android Application Development, Shroff/O'Reilly Publications, 2009(chapter 7, 8, 9and 10)

Reference Books:

1. Neuburg, Programming iOS8, 5th edition, Shroff/O'Reilly Publications, 2014.

Course Outcomes

After learning all the units of the course, the student is able to,

1. Develop simple consumable web services for mobile devices
2. Design user interfaces for mobile application.
3. Develop simple mobile app either by using ANDROID mobile development framework or iOS mobile development framework.
4. Apply the number of steps that any application developer has to go through in order to prepare and submit an application to Android Market.
5. Develop views, Location-based services and mapping for a given problem.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2		2		3								1	1	
CO 2	1		1		3										
CO 3	2		2		3								1	1	1
CO 4	1		1		3										
CO 5	2		2		3									1	1

Course Title: Mobile App Development Lab			
Course Code:P15ISL76	Semester: VII	L-T-P-H : 0:1:2:3	Credit:1.5
Contact Period: Lecture: 39Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs):

This course aims to

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software development environment.

List of Programs

1. Develop an application that uses GUI components, font and colours.
2. Develop an application that uses layout manager and event listener.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen in android.
5. Develop an application that makes uses of database.
6. Implement an application that implements multi-threading.
7. Develop a native application that uses GPS location information.
8. Develop an application that writes data to the SD card.
9. Develop an application that creates an alert upon receiving a message.
10. Develop a mobile application that creates alarm clock.

Course Outcomes

After learning all programs of the course, the student is able to,

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software development environment.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2		2		2								1	1	2
CO 2	2		2		3								1	1	2

Course title: Web Services Lab			
Course Code: P15ISL77	Semester: VII	L-T-P-H : 0-1-2-3	Credit:1.5
Contact Period: Lecture: 39Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Understand, analyze and apply the role of XML and protocols in the workings of the web and web applications.
2. Analyze a web page and identify its elements and attributes.
3. Create XML documents and XML Schema with CSS and XSLT style sheets.
4. Create and debug a Web Service.
5. Implement business UDDI Registry entry.

List of Programs

- 1
 - a Develop a XHTML document that illustrates the use external style sheet, Ordered list, table ,borders ,padding ,colour, and the span tag
 - b Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius.
- 2
 - a Design an XML document and DTD with XSLT style sheet to store information about patients in a hospital. Information of patients must include Name Social Security Number, Age, Room number, Primary Insurance Company –(including attributes like member identification number, group number, phone number and address) – secondary insurance company, known medical problems and drug allergies. Make up sample data for at least four patients
 - b. Write a program to create a simple web service calculator to add 2 numbers
- 3
 - a Create a DTD for a catalog of cars, where each car has a child elements make, model, year, color and engine, number of doors, transmission Type and accessories. The engine element has the child elements, the number of cylinders and fuel system. The accessories element has an attribute radio, AC, power Windows, power-steering, and power-brakes. Each of which is required and as a possible values Yes and No

Create an XML document with at least two instances of the car element defined in the above DTD with CSS style sheet.
 - b Write a program to create a simple web service that finds the square of a numbers.
- 4
 - a Create an XHTML document that includes 2 rows of frames with two frames in each row. the two left frames must occupy 25 percent of the width of the display. The two bottom frames. must occupy 40 percent of the height of the display. The two left frame must display the name of your mother and all of her siblings. The bottom left frames must display the name of your father and all of his siblings. Each name in the left frames must be a link to a document that is displayed in the right frame when the link is selected. The documents in the right frames are short descriptions of the people.
 - b Write a program to create a simple web service that finds the square of a numbers
- 5
 - a Create an XHTML document that defines a table that as two levels of column labels: An overall label an overall label ,meals, and three secondary labels, breakfast, lunch and dinner. There must be two levels of row labels: An overall label foods, and secondary labels bread, main course, vegetables and desert. The cells of the table must contain the number of grams for each of the food categories.

- b Write a program to create a simple web service that finds the square of a numbers
- 6 a Create an XHTML document that has five frames. There must be two rows of frames, the first with three frames and the other with two frames. The frames in the first row must have equal width. The left frame in the second row must be 55% of the width of the display. Each of the frames in the top row must display a document that has a form. The left top frame must have two text boxes each 30 characters wide, labeled name and address. The middle top frame must have 5 radio buttons with color name labels. The right top frame must have 4 checkboxes labeled with 4 kinds of car equipments such as CD player and AC. The two bottom frames must have images of two different cars. The top row frames must use 20% of the height of the display.
- b Write a program to create a simple web service that finds the factorial of a numbers.
- 7 a Create an Xml documents with Xml-schema with root element planes and only one child element make with three instances and apply css style sheet to it.
- b Write a program to create a simple web service that finds the reverse of a numbers.

Course Outcomes

1. Design a XHTML document for fully functional website using CSS style sheets
2. Implement XML document with CSS and XSLT style sheets
3. Develop application using web services

Course Articulation Matrix (CAM)

Course Outcomes	Program Outcomes (PO's)												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1		3	3													1
CO 2		3	2											1	2	
CO 3		3	2		2								2	1		

Elective - IV

Course Title: Information and Network Security			
Course Code:P15IS741	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This Course will enable students to

1. Learn basic principles of Information security and its applications
2. Design various cryptographic algorithms that used for encryption and decryption purposes
3. Understand the concept public key cryptography
4. Study different techniques used in key exchange protocols
5. Explain usages of email-security, IP security and web security

Course Contents

UNIT – I

PLANNING FOR SECURITY: Introduction; Information Security Policy, Standards, and Practices; The Information Security, Blue Print; Contingency plan and a model for contingency plan.

SECURITY TECHNOLOGY-1: Introduction; Physical design; Firewalls; Protecting Remote Connections **10 Hrs**

UNIT – II

SECURITY TECHNOLOGY – 2: Introduction; Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell, systems; Scanning and Analysis Tools.

CRYPTOGRAPHY: Introduction; A short History of Cryptography; Principles of Cryptography; Cryptography, Tools; Attacks on Cryptosystems. **10 Hrs**

UNIT – III

INTRODUCTION TO NETWORK SECURITY, AUTHENTICATIONAPPLICATIONS: Attacks, services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security. Internet Standards and RFCs. Kerberos, X.509 Directory Authentication Service.

ELECTRONIC MAIL SECURITY: Pretty Good Privacy (PGP); S/MIME. **12 Hrs**

UNIT – IV

IP SECURITY: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating, Security Payload; Combining Security Associations; Key Management. **10 Hrs**

UNIT – V

WEB SECURITY: Web security requirements; Secure Socket layer (SSL), Transport Layer Security, Secure Electronic Transaction. Intruders, Viruses, and Worms: Viruses and Related Threats, Firewalls: Firewall Design Principles, Trusted Systems. **10 Hrs**

Text Books:

1. Principles of Information Security - Michael E. Whitman and Herbert J. Mattord, 2nd Edition, Thompson, 2005.
2. Network Security Essentials Applications and Standards -William Stallings, Person Education, 2000

Reference Book:

1. Cryptography and Network Security - Behrouz A. Forouzan, Tata McGraw-Hill, 2007.

Course Outcomes

After learning all the units of the course, the student is able to

1. Understand the Structure of Security framework and Its Blueprints
2. Analyze the different Security technologies used 6
3. Know the basic standards of Security 6
4. Understand the basics of IP Security 4
5. Know the Mechanism of SET 5

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1								2						
CO 2				1		1		2		2		3			
CO 3		2	2		1		1				2				
CO 4		3									1				
CO 5			3	2	3	2		1							

Course Title: User Interface Design			
Course Code:P15IS742	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Programming Principles, Software Engineering

Course Learning Objectives (CLOs)

This course aims to

1. Describe basic user interface engineering definitions, concepts, and principles.
2. Discuss, analyse and evaluate a variety of approaches to user interface design.
3. Acquire an understanding of needs analysis of user interactions/interfaces, legal, ethical, and social issues.
4. Design, develop, implement, and present a new user interface for an application.
5. Explain Information Search and data visualization methods.

Course Content

Unit I

Introduction

Usability of Interactive Systems – Introduction, Usability Goals and Measures, Usability Motivations, Goals for Our Profession

Universal Usability – Introduction, Variations in Physical Abilities and Physical Workspaces, Diverse Cognitive and Perceptual Ability, Personality Differences, Cultural and International Diversity, Users with Disabilities, Older Adult Users, Children, Accommodating Hardware and Software Diversity

Guidelines, Principles, and Theories – Introduction, Guidelines, Principles, Theories.

12 Hrs

Unit II

Design Processes

Design – Introduction, Organizational Support for Design, The Design Process and Design Frameworks, Design Methods, Design Tools, practices and Patterns, Social Impact Analysis, Legal Issues Evaluation and the User Experience– Introduction, Expert Reviews and Heuristics, Usability Testing and Laboratories, Survey Instruments, Acceptance Tests, Evaluation during Active Use and Beyond, Controlled Physiologically Orientated Experiments **10 Hrs**

Unit III

Interaction Styles – I

Direct Manipulation and Immersive Environments – Introduction, What is Direct Manipulation?, Some Examples of Direct Manipulation, 2-D and 3-D Interfaces, Tele-operation and Presence, Augmented and Virtual Reality

Fluid Navigation– Introduction, Navigation by Selection, Small Displays, Content Organization, Audio Menus, Form Fill-in and Dialog Boxes **10 Hrs**

Unit - IV

Interaction Styles-II

Expressive Human and Command Languages – Introduction, Speech Recognition, Speech Production, Human Language Technology, Traditional Command Language

Devices – Introduction, Keyboards and Keypads, Pointing Devices, Displays **10 Hrs**

Unit V

Design Issues

Information Search – Introduction, Five-Stage Search Framework, Dynamic Queries and Faceted Search, Command Languages and “Natural” Language Queries, Multimedia Document Search and Other Specialized Search, The Social Aspect of Search Data Visualization– Introduction, Tasks in Data Visualization, Visualization of Data Type, Challenges of Data Visualization **10 Hrs**

Text Book:

1. **Designing the User Interface:** Strategies for Effective Human-Computer Interaction, 6th Edition by Ben Shneiderman, Catherine Plaisant, and Steven Jacobs. (2018, Pearson Education Company).

Reference Books:

1. User Interface Design And Evaluation by Debbie Stone, Mark Woodroffe, Caroline Jarrett, Shailey Minocha, Morgan Kaufmann Publishers, ISBN: 0120884364
2. The Design of Everyday Things: Revised and Expanded Edition by Don Norman, November 5, 2013

Course Outcomes

After learning all the units of the course, the student is able to

1. Apply basic user interface engineering definitions, concepts, and principles.
2. Analyse and evaluate a variety of approaches to user interface design.
3. Analysis of user interactions/interfaces, legal, ethical, and social issues.
4. Design, develop, implement, and present a new user interface for an application.
5. Apply powerful search and visualization methods.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2		2		1								1	1	1
CO 2	2		2		1								1	1	1
CO 3	2		2		1	1	1	1					1	1	1
CO 4	2		2		1								1	1	1
CO 5	2		2		1								1	1	1

Course Title: Artificial Intelligence			
Course Code:P15IS743	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to:

1. Outline the various characteristics of intelligent agents.
2. Understand the different search strategies in AI.
3. Learn to represent knowledge in solving AI problems.
4. Understand the different ways of designing software agents.
5. Summarize the various applications of AI.

Course Content

Unit – I

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems. **9 Hrs**

Unit – II

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games. **11 Hrs**

Unit – III

Knowledge Representation First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering- Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information **11 Hrs**

UNIT-IV

Software Agents

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems. **10 Hrs**

UNIT-V**Applications**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving **11 Hrs**

Text books:

- 1 S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2015.
- 2 I. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

Reference Books:

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer,.
4. Gerhard Weiss, —Multi Agent Systems, Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

Course Outcomes

After learning all the units of the course, the student is able to

1. Identify and apply intelligent agents for typical AI problems.
2. Develop search algorithms for any AI problem.
3. Analyze a problem using first order and predicate logic.
4. Design software agents to solve a problem.
5. Develop applications for NLP that uses Artificial Intelligence.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	3					1					2	2	1
CO 2	2	2	3	1				2					2	2	1
CO 3	3	2	1					1					2	1	1
CO 4	2	2	3	2				2					2	3	2
CO 5	2	2	3	2				2					2	2	3

Course title: Supply Chain Management			
Course Code: P15IS744	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Understand the concept of strategic fit between the SC strategy and the competitive strategy of the firm and how to achieve it. Identify the main drivers of Supply Chain performance and measure them using precise metrics.
2. Use decision trees to evaluate supply chain decisions under uncertainty. Understand situations in which aggregate planning is appropriate and the role it plays in the supply chain.
3. Use safety inventory to deal with demand uncertainty in the supply chain.
4. Understand the importance of transportation in the SC, and identify the different modes of transportation and the role played by infrastructure and policies. Discuss sourcing decisions in the supply chain and the increasing importance of auctions and negotiations.
5. Understand pricing and revenue management and their role in the Supply Chain. Assess the importance of the role played by information technology in a supply chain, and identify major IT applications.

Course Content

Unit I

Building A Strategic Framework To Analyze Supply Chains

Understanding the Supply chain: introduction to Supply Chain, The Objective of a Supply Chain, The Importance of Supply Chain Decisions, Decision Phases in a Supply Chain, Process View of a Supply Chain, Examples of Supply Chains; **Supply Chain Performance: Achieving Strategic Fit and Scope:** Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope.

10Hrs

Unit II

Designing the supply chain network

Designing Distribution Networks and Applications to e-Business: The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network, e-Business and the Distribution Network, Distribution Networks in Practice; **Network Design in the Supply Chain:** The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation, The Role of IT in Network Design, Making Network Design Decisions in Practice.

11Hrs

Unit III

Planning demand and supply in a supply chain

Demand Forecasting in a Supply Chain: The Role of Forecasting in a Supply Chain, Characteristics of Forecasts, Components of a Forecast and Forecasting Methods, Basic Approach to Demand Forecasting, Time-Series Forecasting Methods, Measures of Forecast Error, Forecasting Demand at Tahoe Salt, The Role of IT in Forecasting, Risk Management in Forecasting, Forecasting in Practice; **Planning Supply and Demand in a Supply Chain: Managing Predictable Variability:** Responding to Predictable Variability in a Supply Chain, Managing Supply, Managing Demand, Implementing Solutions to Predictable Variability in Practice.

10Hrs

Unit IV

Planning and managing inventories in a supply chain

Managing Economies of Scale in a Supply Chain: Cycle Inventory: The Role of Cycle Inventory in a Supply Chain, Economies of Scale to Exploit Fixed Costs, Economies of Scale to Exploit Quantity Discounts, Short-Term Discounting: Trade Promotions, Managing Multiechelon Cycle Inventory, Estimating Cycle Inventory-Related Costs in Practice; **Managing Uncertainty in a Supply Chain: Safety Inventory:** The Role of Safety Inventory in a Supply Chain, Determining Appropriate Level of

Safety Inventory, Impact of Supply Uncertainty on Safety Inventory, Impact of Aggregation on Safety Inventory, Impact of Replenishment Policies on Safety Inventory, Managing Safety Inventory in a Multiechelon Supply Chain, The Role of IT in Inventory Management, Estimating and Managing Safety Inventory in Practice. **10Hrs**

Unit V

Managing cross-functional drivers in a supply chain

Sourcing Decisions in a Supply Chain: The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Supplier Scoring and Assessment, Supplier Selection-Auctions and Negotiations, Contracts and Supply Chain Performance, Design Collaboration, The Procurement Process; **Pricing and Revenue Management in a Supply Chain:** The Role of Pricing and Revenue Management in a Supply Chain, Pricing and Revenue Management for Multiple Customer Segments, Pricing and Revenue Management for Perishable Products, Pricing and Revenue Management for Seasonal Demand, Pricing and Revenue Management for Bulk and Spot Contracts. **10Hrs**

Text book:

1. Chopra Sunil and Peter Meindl - Supply chain management, Pearson, 6th edition, 2013

Reference books:

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning,
2. Supply Chain Logistics Management, Donald J Bowersox, Dand J Closs, M Bixby Coluper, TMH.

Course Outcomes

After learning all the units of the course, the student is able to'

1. Understand concepts in Supply Chain Management and its benefits and learn the significant factors of SCM, and Distribution Networks.
2. Get familiarized with network design, Cash flow concepts.
3. Understand Demand Forecasting, Aggregate Planning and Inventory Management.
4. Get familiarized with design of Transportation Networks, Routing and Scheduling in transportation.
5. Gain knowledge about Revenue Management, Pricing and IT, Internet in Supply Chain Management

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	2							1		2		1	
CO 2	1	3	2							2		2		1	
CO 3	1	1	1							2		2			1
CO 4		2	3							1		1			1
CO 5	2	2	2							1		2		1	1

Open Elective – I

Course title: Java Programming			
Course Code:P15IS751	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Understand the need of using Object Oriented Programming in the real world
2. Apply the fundamentals of Object-Oriented programming in java using arrays, strings and interfaces
3. Analyze the real world problem to solve using Object-Oriented approach
4. Write java programs for automatic initialization of objects and destroy objects that are no longer required and discuss the mechanism of deriving new classes from older classes through inheritance
5. Write simple java programs to demonstrate the use of multithreading and exception handling, applets and various GUI

Course Content

Unit-I

Fundamentals of Object-Oriented Programming: Introduction, Object-Oriented paradigm, basic concepts of Object-Oriented Programming, Benefits of OOP, applications of OOP. **Java Evolution:** Java History, Java features, Multithreaded and interactive, high performance, dynamic and extensible, ease of development, scalability and performance, monitoring and manageability, desktop clients, how java differs from C and C++, Java and Internet, Java and WWW, Web browsers, hardware and software requirement, Java Support systems, Java Environment. **Overview of Java Language:** Introduction, simple java program, more of java, an application with two classes, java program structure, java tokens, java statements, implementing a java program, java virtual machine, command line arguments, programming style. **10Hrs**

Unit-II

Constants, Variables and Data Types: Introduction, Constants, Variables, Data types, declaration of variables, giving value to variable, scope of variable, symbolic constants type casting, getting values of variables, standard default values. **Operators and Expressions:** Introduction, Arithmetic Operations, relational operators, logical operators, assignment operators, Increment and decrement operators, conditional operators, bitwise operators, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associativity, mathematical functions. **Decision Making and Branching:** Introduction, decision making with IF statement, simple If statement, the If...Else statement, the else If ladder, the Switch statement, the ?: operator **12Hrs**

Unit-III

Decision Making and Looping: While Statement, the do statement, for statement, jumps in loops, labelled loops. **Classes, Objects and Methods:** Introduction, Defining Classes, Field Declaration, Methods Declaration, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static members, Nesting of Methods, Inheritance, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control, **Arrays, Strings and Vectors:** Introduction, One-dimensional arrays, Creating an Array, Two Dimensional Arrays, Strings, Vectors **10Hrs**

Unit-IV

Interfaces: Introduction, defining interfaces, extending interfaces, implementing interfaces, accessing interface variable. **Multithreaded Programming:** Creating threads, extending the threads class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority,

synchronization, implementing the runnable interface. **Managing Errors and Exceptions:** Types of errors, exceptions, syntax of exception handling code, multiple catch statements, using finally statement, throwing our own exceptions, using exceptions for debugging. **10Hrs**

UNIT-V

Applet Programming: Introduction, how applets differ from applications, preparing to write applets, building applet code, creating an executable applet, designing a web page, Applet tag, adding applet to HTML file, Running the applet, More about Applet tag, Passing parameters to Applets, Aligning the display, More about HTML tags, displaying Numerical values, getting input from the user. **Graphics Programming:** Introduction, the graphics class, lines and rectangles, circles and ellipses, drawing arcs, drawing polygons, line graphs, using control loops in applets, drawing bar charts. **10Hrs**

Text Books:

1. Programming with JAVA 5th Edition –E Balaguruswamy, ISBN: 9789351343202, 9351343200, Mcgraw Higher Ed.2014

Reference Books

1. Java - The Complete Reference 9th Edition-Herbert Schildt, ISBN: 9789339212094, 9339212096, Mcgraw Higher Ed,2014

Course Outcomes

After learning all the units of the course, the student is able to

1. Develop different application in java programming language using basic Object Oriented Concepts
2. Recognize the object oriented concepts & apply them to create java applications
3. Develop simple java applications using arrays and strings
4. Demonstrate the use of Multithreading programming and exception handling
5. Develop java applications using applets and graphics programming

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	3	3	2	2	1	2	1	1	2	2	3	2	1
CO 2	3	2	2	2	1	1	2	2	1	1	2	2	1		
CO 3	3	1	2	1	2	2	2	2	1	1	2	2	2		
CO 4	3	3	3	3	2	1	2	2	1	1	2	2	3		2
CO 5	3	2	2	2	2	2	1	2	1	1	2	2	3		2

Course title: Introduction to Python Programming			
Course Code:P15IS752	Semester: VII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Computer Concepts and C Programming

Course Learning Objectives (CLOs)

This course aims to

1. Introduce core programming basics - including data types, control structures, algorithm development, and program design with functions - via the Python programming language.
2. Discuss the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. Solve problems.
4. Explore real-world software development challenges
5. Create practical and contemporary applications.

Course Content

Unit I

Conceptual introduction: topics in computer science, algorithms; modern computer systems: hardware architecture, data representation in computers, software and operating system; installing Python; basic syntax, interactive shell, editing, saving, and running a script.

The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages. **10 Hrs**

Unit II

Conditions, Boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation

Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers. **10 Hrs**

Unit III

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions. **10 Hrs**

Unit IV

Simple Graphics and Image Processing: “turtle” module; simple 2d drawing - colors, shapes; digital images, image file formats, image processing; Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).

Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block. **11 Hrs**

Unit V

Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames. Multithreading, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form. **11 Hrs**

Text Book:

1. Fundamentals of Python: First Programs- Kenneth Lambert, Course Technology, Cengage Learning, 2012, ISBN-13: 978-1-111-82270-5

Reference Books:

1. Introducing Python- Modern Computing in Simple Packages – Bill Lubanovic, O’Reilly Publication
2. How to Think Like a Scientist –Learning with Python “, Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press, 2002, First Edition.
3. Introduction to Computer Science Using Python- Charles Dierbach, Wiley Publication Learning with Python “, Green Tea Press, 2002, First Edition.
4. Beginning Python –From Novice to Professional, - Magnus Lie Hetland, Second Edition, APress Publication

Course Outcomes

After learning all the units of the course, the student is able to

1. Apply core programming basics - including data types, control structures, algorithm development, and program design with functions - via the Python programming language.
2. Demonstrate the uses of Operators, Control statements, Strings and File Handling.
3. Implement the concepts of Lists, tuples, dictionaries and functions.
4. Illustrate simple image manipulations and apply the fundamental principles of Object-Oriented Programming.
5. Develop programs using Graphical user interfaces and Multithreading, Networks programming.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO’s)												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	2		2								1	1	1
CO 2	2	1	2		2								1	1	1
CO 3	2	1	2		2								1	1	1
CO 4	2	1	2		2								1	1	1
CO 5	2	1	2		2								1	1	1

Course title: Data Structures			
Course Code:P15IS753	Semester: VII	L-T-P-H : 4:0:0:4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Analyze the need for data structuring techniques,
2. Design and Implement standard data structures like stack using recursion.
3. Learn the different types of linked list
4. Design and implement operations on SLL, DLL, Circular SLL and Circular DLL using header nodes.
5. Learn the Basic operations on - Linear queue, Circular queue, Priority Queue and double ended Queue.
6. Design and Implement different types of queues Using SLL.
7. Identify the different tree traversal techniques
8. Design and implement different tree traversal techniques using iteration and recursion.
9. Learn the different sorting and searching techniques.
10. Analyze the performance of the different sorting and searching techniques.

Course Content

Unit – I

Structures and Pointers: structure definition, initialization, pointers to a structure.

Stacks: Representing stack in C- Implementation of Push, Pop and display operations using arrays and pointers. Example of Stacks: Infix, Postfix, Prefix, Infix to postfix, prefix to postfix, Evaluation of postfix.

Recursion: Definition, Writing Recursive programs-Factorial Numbers, Fibonacci Numbers and Tower of Hanoi Problem. **10 Hrs**

Unit – II

Linked Lists: Static Memory Allocation and Dynamic Memory Allocation, Basic operations on SLL, DLL, Circular SLL and Circular DLL: insertion, deletion and display. Implementation of SLL with Header nodes. **10 Hrs**

Unit – III

Applications of Linked Lists: Merging, Reversing, Searching, Addition of two polynomials using SLL.
Queues: Definition, Representation, operations, implementation using arrays and linked lists. Different types of queues, Basic operations on - Linear queue, Circular queue, Priority Queue and Double ended Queue (Using SLL), Applications of Queues. **10 Hrs**

Unit – IV

Trees: Introduction-Definition, Tree Representation, Properties of Trees, Operations on Binary tree, Binary Search Tree [BST] - Definition, searching BST, Insertion to BST, Deletion from BST, Display BST. Tree and their Applications- Tree Traversal, General Expression as a tree, evaluating an Expression Tree. **12 Hrs**

Unit – V

Sorting Techniques: Insertion sort, Quick sort, Binary tree sort, Heap sort, Merge sort.

Searching Techniques: sentinel search, probability search, ordered list search (Text Book - 2);

10 Hrs

Text Books:

1. “Data Structures using C and C++”, YedidyahLangsam and Moshe J. Augenstein and Aaron M.Tenanbaum , 2nd Edition , PHI.
2. “Data Structures – A pseudo code Approach with C”, Richard F Gilberg and Behrouz A frozen, 2nd Edition.

Reference Books:

1. “Fundamentals of Data Structures in C”, Horowitz, Sahani, Anderson-Freed, Second Edition, University Press.

Course Outcomes

After learning all the units of the course, the student is able to

1. Solve the given problems using the concepts of stacks
2. Apply the concepts of linked list
3. Design an application using the concepts of queues
4. Design different types of trees for a given problem
5. Demonstrate the sorting and searching techniques for a given set of Numbers.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	3	3										1		
CO 2	1	3	2												2
CO 3	1	3	2										1		
CO 4	2	3	2										2	2	
CO 5	2	3	2										2		

Course title: Internet Programming			
Course Code: P15IS754	Semester: VII	L-T-P-H : 4:0:0:4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Basics of Internet

Course Learning Objectives(CLOs)

This course aims to

1. Understand the World Wide Web and XHTML related tags.
2. Describe visual design using CSS and logic design using JavaScript.
3. Describe dynamic documents using DOM with elements.
4. Recognize extended tags by XML.
5. Understand a server-side scripting language using PHP.

Course Content

Unit I

Fundamentals: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, Security, The Web Programmer's Toolbox.

Introduction to HTML/XHTML: Origins and Evolution of HTML and XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic difference between HTML and XHTML. **10 Hrs**

Unit II

Cascading Style Sheets: Introduction, Levels of Style Sheets, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color, The Box Model, Background Images, The and <div> Tags, Conflict Resolution.

The Basics of JavaScript: Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, An Example, Constructors, Pattern Matching Using Regular Expressions, Another Example, Errors in Scripts. **11 Hrs**

Unit III

JavaScript and HTML Documents: The JavaScript Execution Environment, The Document Object Model, Elements Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements.

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements. **11 Hrs**

Unit IV

Introduction to XML: Introduction, The Syntax of XML, XML Document Structure, Document Type Definitions, Namespaces, XML Schemas, Displaying RAW XML Documents, Displaying XML Document with CSS, XSLT Style Sheets, XML Processors, Web Services. **10 Hrs**

Unit V

Introduction to PHP: Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. **10 Hrs**

Text Books:

1. Robert W. Sebesta : Programming the World Wide Web, Seventh Edition, Pearson Education, 2014.

Reference Books:

1. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5 th Edition, 2011.

2. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.

Course Outcome

After learning all the units of the course, the student is able to

1. Create a static Webpages using XHTML.
2. Develop a Webpages with visual effect using Cascading Style Sheets and dynamic Webpages by JavaScript.
3. Develop dynamic web page by DOM with elements.
4. Write a well formed extended tags for given problem statements by XML with XML & CSS style.
5. Design and implement server-side scripting using PHP.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	3	1	2			1					2	1	1
CO 2	2	2	3	1	2			1					2	1	2
CO 3	2	2	3	1	2			1					2	1	2
CO 4	2	2	3	1	2			1					2	1	2
CO 5	2	2	3	1	2			2					2	1	2

VIII Syllabus

Course title: Big Data			
Course Code:P15IS81	Semester: VIII	L-T-P-H : 4:0:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives

This course aims to:

- 1.To know the fundamental concepts of big data and analytics.
- 2.To explore tools and practices for working with big data
- 3.To gain knowledge on Hadoop related tools such as HBase, Pig, and Hive for manage and analyze big data
- 4.To understand the need and application of Map Reduce
- 5.To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit – I

Introduction to Big Data

Overview of Big Data: What is Big Data? History of Data Management-Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Characteristics, Types of Big Data Big Data Analytics, Traditional Versus Big Data Approach, Technologies Available for Big Data Careers in Big Data, Future of Big Data.

Exploring the Use of Big Data in Business Context: Use of Big Data in Social Networking, Use of Big Data in Preventing Fraudulent Activities, Use of Big Data in Detecting Fraudulent Activities in Insurance Sector, Use of Big Data in Retail Industry. **10Hrs**

Unit –II

Overview of the Big Data Technology

Hadoop: Introduction, What is Hadoop? Core Hadoop Components, Hadoop Ecosystem, Physical Architecture, Hadoop Limitations.

NoSQL Data Management: Introduction to NoSQL, Types of NoSQL, Data Models, Schema-Less Databases, Materialized Views, Distribution Models, Sharding

MapReduce: MapReduce and The New Software Stack, MapReduce, Algorithms Using MapReduce. **10Hrs**

Unit –III

Understanding Hadoop Ecosystem and MapReduce Fundamentals and Hbase

Understanding Hadoop Ecosystem: Hadoop Ecosystem, Hadoop Distributed File System, MapReduce, Hadoop YARN, Introducing Hbase, Combining HBase and HDFS, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie,

Understanding MapReduce Fundamentals and Hbase: The MapReduce Framework, Techniques to Optimize MapReduce Jobs, Uses of MapReduce, Role of HBase in Big Data Processing. **10 Hrs**

Unit –IV

Processing Your Data with MapReduce

MapReduce Programming: Recollecting the Concept of MapReduce Framework, Developing Simple MapReduce Application, Points to Consider while Designing MapReduce.

Customizing MapReduce Execution and Implementing MapReduce Program: Controlling MapReduce Execution with Input Format, Reading Data with Custom RecordReader, Organizing Output Data with OutputFormats, Customizing Data with RecordWriter, Optimizing MapReduce Execution with Combiner, Controlling Reducer Execution with Practitioners, Customizing the MapReduce Execution in Terms of YARN, Implementing a MapReduce Program for Sorting Text Data

Testing and Debugging MapReduce Applications: Debugging Hadoop MapReduce Locally, Performing Unit Testing for MapReduce Applications, Performing Local Application Testing with

Eclipse, Logging for Hadoop Testing, Application Log Processing, Defensive Programming in MapReduce. **12 Hrs**

Unit –V

Understanding YARN Architecture, Hive and Pig

Understanding YARN Architecture: Background of YARN, Advantages of YARN, YARN Architecture, Working of YARN, YARN Schedulers, Backward Compatibility with YARN, YARN Configurations, YARN Commands, YARN Containers, Registry, Log Management in Hadoop.

Exploring Hive: Introducing Hive, Getting Started with Hive, Hive Services, Data Types in Hive, Built-In Functions in Hive, Hive DDL, Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive.

Analyzing Data with Pig: Introducing Pig, Running Pig, Getting Started with Pig Latin, Working with Operators in Pig, Debugging Pig, Working with Functions in Pig, Error Handling in Pig. **10Hrs**

Text Books:

1. RadhaShankarmani, M Vijayalakshmi, "Big Data Analytics", Wiley Publications, first Edition 2016.
2. DT Editorial Services, "Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)", Dream tech Press edition 2016.

Reference Books:

1. Seema Acharya, SubhashiniChellappan, "Big Data and Analytics", Wiley Publication, first edition. Reprint in 2016
2. O'Reilly Media, Big Data now: Current Perspective from O'Reilly Media, 2013 Edition.
3. VigneshPrajapati, Data analytics with R and Hadoop, Copyright © 2013, Packt Publishing.

Course Outcomes

After learning all the units of the course, the student is able to

1. Describe big data and its importance
2. Apply tools and techniques to analyze Big Data
3. Perform map-reduce analytics using Hadoop.
4. Understand the technologies Pig and Hive and various NoSql alternative database models for big data analytics.
5. Use Hadoop tools and Methodologies for modeling large databases and real time applications.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	1				2				2				
CO 2	2	2	2				3			2				1	1
CO 3	2	1	2				2				2			1	
CO 4	1	2	2												1
CO 5	2	2	2				2				2			1	

Elective-5

Course Title: Pattern Recognition			
Course Code: P15IS821	Semester : VIII	L- T – P - H - 4 : 0 : 0 : 4	Credit : 3
Contact period : Lecture: 52 Hrs, Exam:3 hrs		Weightage: CIE: 50;SEE:50	

Course Learning Objectives(CLOs)

This course aims to:

1. Understand basic concepts in pattern recognition
2. Gain knowledge about pattern recognition theories, such as **Maximum-likelihood** and **Bayesian Parameter**
3. Understand the techniques used recognize patterns, such as statistical approaches, data clustering, neural networks, etc.
4. Understand **Non-Metric Methods of pattern recognition like** Decision Trees, CART, Recognition with Strings and Grammatical Methods.
5. Understand and apply unsupervised classification methods to detect and characterize patterns in real-world data

Course Content

Unit I

Introduction

Machine perception, an example, Pattern Recognition System, The Design Cycle, Learning and Adaptation. Bayesian Decision Theory: Introduction, Bayesian Decision Theory, Continuous Features, Minimum error rate, classification, classifiers, discriminant functions, and decision surfaces, the normal density, Discriminant functions for the normal density. **10 Hrs**

Unit II

Maximum-likelihood and Bayesian Parameter Estimation: Introduction, Maximum-likelihood estimation, Bayesian Estimation, Bayesian parameter estimation: Gaussian Case, general theory, Hidden Markov Models. Nonparametric Techniques: Introduction, Density Estimation, Parzen windows, KN – Nearest- Neighbor Estimation, The Nearest- Neighbor Rule, Metrics and Nearest-Neighbor Classification. **12Hrs**

Unit III

Linear Discriminant Functions: Introduction, Linear Discriminant Functions and Decision Surfaces, Generalized Linear Discriminant Functions, The Two-Category Linearly Separable case, Minimizing the Perception Criterion Functions, Relaxation Procedures, Non-separable Behavior, Minimum Squared-Error procedures, The Ho-Kashyap procedures. Stochastic Methods: Introduction, Stochastic Search, Boltzmann Learning, Boltzmann Networks and Graphical Models, Evolutionary Methods. **10 Hrs**

Unit IV

Non-Metric Methods: Introduction, Decision Trees, CART, Other Tree Methods, Recognition with Strings, Grammatical Methods. **10 Hrs**

Unit V

Unsupervised Learning and Clustering: Introduction, Mixture Densities and Identifiability, Maximum-Likelihood Estimates, Application to Normal Mixtures, Unsupervised Bayesian Learning, Data Description and Clustering, Criterion Functions for Clustering. **10 Hrs**

Text Book:

1. Richard O. Duda, Peter E. Hart, and David G. Stork: Pattern Classification, 2nd Edition, Wiley-Interscience, 2012.

Reference Book:

1. Earl Gose, Richard Johnsonbaugh, Steve Jost: Pattern Recognition and Image Analysis, HAR/DSK Edition, Pearson Education, 2007.

Course Outcomes

After studying this course, students will be able to

1. Understand Bayesian Decision Theory, the canonical classifier model, and how different classification methods define decision boundaries.
2. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models. Students will be able to analyze classification problems probabilistically and apply performance evaluation methods for pattern recognition.
3. Select appropriate techniques for addressing recognition problems.
4. Implement basic pattern recognition algorithms.
5. Students will be able to summarize current pattern recognition research verbally and in writing.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	3	1	2	2	1	2	1	1	1	1	3	1	2
CO 2	3	3	3	1	2	1	1	2	1	1	2	1	3	1	2
CO 3	3	3	3	1	2	1	1	2	2	1	2	1	3	1	3
CO 4	3	3	3	1	2	1	1	2	1	1	2	1	3	2	3
CO 5	2	2	3	1	2	1	1	2	1	1	2	1	2	2	1

Course title: Software Architecture			
Course Code:P15IS822	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Software Engineering, Object Oriented System Development.

Course Learning Objectives (CLOs)

This course aims to,

1. Discuss the need for a Software Architecture.
2. Compare and Contrast various architecture styles.
3. Build robust, scalable, and reliable software intensive systems in an extremely effective way.
4. Make optimal architectural choices and employ the most relevant methods, best practices, and technologies for architecting and implementing a software product, regardless of its complexity and scale.
5. Discuss appropriate models to document software architecture.

Course Content

Unit - I

Introduction: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle, what makes a “good” architecture? What software architecture is and what it is not, other points of view, Architectural patterns, reference models and reference architectures, Importance of software architecture, Architectural structures and views. **10Hrs**

Unit - II

Architectural Styles and Case Studies: Architectural styles, Pipes and filters, Data abstraction and object-oriented organization, Event-based, implicit invocation, Layered systems, Repositories, Interpreters, Process control, other familiar architectures, Heterogeneous architectures. Case Studies: Keyword in Context, Instrumentation software, Mobile robotics. **10Hrs**

Unit - III

Quality: Functionality and architecture, Architecture and quality attributes, System quality attributes, Quality attribute scenarios in practice, other system quality attributes, Business qualities, Architecture qualities. Achieving Quality: Introducing tactics, Availability tactics, Modifiability tactics, Performance tactics, Security tactics, Testability tactics, and Usability tactics, Relationship of tactics to architectural patterns, Architectural patterns and styles. **10Hrs**

Unit - IV

Architectural Patterns: Introduction, From mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker, Interactive Systems: MVC, Presentation- Abstraction-Control. Adaptable Systems: Microkernel, Reflection. **10Hrs**

Unit - V

Some Design Patterns: Structural decomposition: Whole-Part, Organization of work: Master-Slave, Access Control: Proxy. Designing and Documenting Software Architecture: Architecture in the life cycle, designing the architecture, forming the team structure, creating a skeletal system. Uses of architectural documentation, Views, Choosing the relevant views, documenting a view, Documentation across views. **12Hrs**

Text Books:

1. Len Bass, Paul Clements, Rick Kazman: “Software Architecture in Practice, 3rd Edition”, Pearson Education, 2013.
2. Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal: “Pattern-Oriented Software Architecture, A System of Patterns, Volume 1”, John Wiley and Sons, 2007.

Reference Books:

1. Mary Shaw and David Garlan: “Software Architecture-Perspectives on an Emerging Discipline”, 1st edition, Prentice-Hall of India, 2011.
2. E. Gamma, R. Helm, R. Johnson, J. Vlissides: “Design Patterns-Elements of Reusable Object-Oriented Software”, 1stedition, Addison-Wesley, 2006.

Course Outcomes

After learning all the units of the course, the student is able to

1. Apply the concept of software architectures along with its motivation.
2. Characterize some important software architecture styles.
3. Able to achieve qualities through tactics.
4. Apply software architectural patterns based on the given requirements.
5. Design architecture for the given requirement and documenting the same.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	2	1										1	1	1
CO 2	1	1													1
CO 3	1	1											1	1	1
CO 4	1	2	1										1	1	1
CO 5	1	1	1										1	1	1

Course title: Cyber Security			
Course Code:P15IS823	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisite: Computer Network

Course Learning Objectives (CLOs)

This course aims to

1. Identify the key components of cyber security network architecture and security tools and hardening techniques.
2. Distinguish system and application security threats and vulnerabilities.
3. Describe and Analyze different classes of attacks Define types of incidents including categories, responses and timelines for response and threats and risks within context of the cyber security architecture.
4. Appraise cyber security incidents to apply appropriate response and current structure of cyber security roles across the enterprise, including the roles and responsibilities of the relevant organizations.
5. Evaluate decision making outcomes of cyber security scenarios and trends and patterns that will determine the future state of cyber security and the Assess the strengths and weaknesses of the certification and accreditation approach to cyber security.

Course Content

Unit I

Introduction to Cyber Security: Definition of Cyber Security and Cyber Security Policy, Domains of Cyber Security Policy, Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration, Strategy versus Policy; **Cyber Security Evolution:** Productivity, Internet, e-Commerce, Countermeasures, Challenges. **11Hrs**

Unit II

Introduction to Cyber Crime: Definition and evolution of Cyber Crimes, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes; **Cyber offenses:** Introduction, How criminal plan the attacks, Social engineering, Cyber stalking, Cyber cafe and cybercrimes, Botnets: The fuel for cybercrime. **10Hrs**

UNIT III

Tools and method used in Cybercrime: Introduction, Proxy servers and anonymizers, Phishing, Password cracking, Key loggers and spywares, Virus and worms, Trojan horses and backdoors, Steganography, DoS and DDoS attacks, SQL injection, Buffer overflow. **10Hrs**

Unit IV

Phishing and Identity Theft: Introduction, Phishing: methods of phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, phishing countermeasures; identity Theft (ID Theft): personally identifiable information, types of identity theft, techniques of ID theft, identity theft countermeasures, how to efface your online identity. **10Hrs**

Unit V

Cybercrimes and Cyber Security: The legal perspectives: Introduction, Cybercrime and the legal landscape around the world, why do we need cyber laws: the Indian context, The Indian IT act, Challenges to Indian law and cybercrime scenario in India. **11Hrs**

Text books:

1. Nina Godbole, SunitBelapur, “**Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives**”, Wiley India Publications, copyright 2011, reprint 2015
2. Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, “**Cyber Security Policy Guidebook**” Wiley Publications.

Reference book:

1. James Graham, Richard Howard, Ryan Olsan, “Cyber Security Essentials” CRC Press.

Course Outcomes

After learning all the units of the course, the student is able to

1. Explain the concepts of confidentiality, availability and integrity in Information Assurance, including physical, software, devices, policies and people.
2. Explaining important principles, and theories used throughout the field of cyber security.
3. Applying knowledge in the field of cyber security to analyze real world problems.
4. Effectively integrating knowledge in the field of cyber security to propose solutions to real world problems.
5. Understand the legal perspectives in cyber security and challenges to Indian law.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2											2		
CO 2	2	2		2	1								2	2	
CO 3	2	2		2	2								2	2	
CO 4	1	2		2	2								2	2	2
CO 5				1	1	2		2			2			2	

Course title: Distributed Systems			
Course Code:P15IS824	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Operating system, computer networks

Course Learning Objectives (CLOs)

This course aims to:

1. Understand the fundamental principles of distributed system.
2. Implement the mechanism of RPC and file system in distributed environments.
3. Summarize process synchronization and thread synchronization in distributed systems.
4. Understand concurrency control methods and deadlock occurrence in Distributed systems.
5. Analyze security algorithms and replication services in distributed environment.

Course Content

Unit – I

INTRODUCTION: Introduction to Distributed systems-examples of distributed systems- Trends in distributed system-Focus on resource sharing and the challenges- Introduction to system Models-physical models-architectural models- fundamental models - Introduction to networking and internetworking-types of network-network principles-internet protocols. Introduction to inter-process communications-external data representation and marshalling. **12Hrs**

Unit – II

DISTRIBUTED OBJECTS AND FILE SYSTEM

Introduction to distributed objects - Introduction to remote invocation-request reply protocols-Remote procedure call - Java RMI case Study - Introduction to Distributed File System - File service architecture - Sun network file system - Introduction to Name Services- Name services and DNS - Directory and directory services. **10Hrs**

Unit - III

DISTRIBUTED OPERATING SYSTEM SUPPORT

The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Distributed debugging – Distributed mutual exclusion. **11Hrs**

Unit-IV

TRANSACTION AND CONCURRENCY CONTROL – DISTRIBUTED TRANSACTIONS

Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery **10Hrs**

Unit-V

SECURITY AND REPLICATION

Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – Replication Introduction –system model and the role of group communication ,fault tolerant services, transactions with replicated data. **10Hrs**

Text books:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design", Fifth Edition, Addison-Wesley, 2011.

Reference Books:

1. A.t S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, PHI, 2012.
2. MukeshSinghal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", Tata Mcgraw - Hill Education, 2011.

Course Outcomes

After learning all the units of the course, the student is able to

1. Demonstrate principles used in distributed environment.
2. Develop RPC mechanism to access remote application and demonstrate file system in distributed systems.
3. Identify process and thread based synchronization in various distributed systems.
4. Describe concurrency control methods and deadlock occurrences in Distributed systems.
5. Compare security algorithms and fault tolerance services in distributed environment.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	1	1	1		1		2					2	1	1
CO 2	3	2	2	2		1		2					2	2	1
CO 3	1	2	1	1		1		2					2	2	1
CO 4	2	1	1	2		2		2					2	2	1
CO 5	2	2	2	1		2		2					2	3	1

Elective – 6

Course title: System Simulation & Modeling			
Course Code:P15IS831	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Software Engineering,

Course Learning Objectives(CLOs)

This course aims to

1. Outline the basic concepts of simulation.
2. Understand general principles and related software and statistical model.
3. Explain various Statistical and Queuing modeling.
4. Generate different random number generations.
5. Summarize input model, verification and validation of simulation models.

Course Content

Unit I

Introduction to Simulation: When Simulation Is the Appropriate Tool, When Simulation Is Not Appropriate, Advantages and Disadvantages of Simulation, Areas of Application, Systems and System Environment, Components of a System, Discrete and Continuous Systems, Model of a system, Types of Models, Discrete-Event System Simulation, Steps in a Simulation Study; **Simulation examples:** Simulation of Queuing Systems, Simulation of Inventory Systems, Other Examples of Simulation **10Hrs**

Unit II

General Principles: Concepts in Discrete-Event Simulation, The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing, **Simulation software:** Selection of Simulation Software, An Example Simulation, Simulation in JAVA, Simulation in GPSS, Simulation in SSF, Simulation Software. **10Hrs**

Unit III

Statistical Models in Simulation: Review of terminology and concepts, Useful Statistical Models, Discrete Distributions, Continuous distributions, Poisson Process, Empirical Distributions.

Queuing Models: Characteristics of Queuing Systems, Queuing Notation, Long-Run measures of Performance of Queuing Systems; Steady State Behavior of Infinite-Population Markovian Models, Steady State Behavior of Finite-Population Models, Networks of Queues. **12Hrs**

Unit IV

Random-Number Generation: Properties of Random Numbers, Generation of Pseudo-Random Numbers; Techniques for Generating Random Numbers; Tests for Random Numbers.

Random- Variate Generation: Inverse Transform Technique, Acceptance-Rejection Technique, Special Properties. **10Hrs**

Unit V

Input Modeling: Data Collection, Identifying the Distribution with Data, Parameter Estimation, Goodness-of-Fit Tests, Fitting a Non stationary Poisson Process, Selecting Input Models without Data. Multivariate and Time-Series Input Models.

Verification and Validation of Simulation Models: Model Building, Verification and Validation, Verification of Simulation Models, Calibration and Validation of Models.

Output Analysis for a Single Model: Types of simulation with respect to output analysis, Stochastic Nature of Output Data, Measures of Performance and their estimation, Output Analysis for terminating Simulations. **10Hrs**

Text Books:

1. Jerry Banks, John Carson, Barry Nelson, David Nicol: Discrete-Event System Simulation, Fifth Edition, Pearson New International Edition, 2013.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson / Prentice-Hall.
2. Sheldon M. Ross: Simulation, Fourth Edition, Elsevier.
3. Averill M. Law: Simulation Modeling and Analysis, Fourth Edition, Tata McGraw-Hill.

Course Outcomes

After learning all the units of the course, the student is able to

1. Describe discrete-Event system simulation concepts with examples.
2. Analyze general principles, simulation software and construct statistical model.
3. Explore the various techniques to random number generation and random variates generation.
4. Compare Statistical model and queuing model.
5. Verify, Validate and perform output analysis of a simulation model.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	2											1	1	1
CO 2	1	2	3	1	1			1							1
CO 3	2	2	1	1	1			1					1	1	1
CO 4	1	1	2	2	1			1					2	1	1
CO 5	1	2	2	3	1			1					2	1	1

Course title: Management Information System			
Course Code:P15IS832	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives(CLOs)

This course aims to,

1. Define the process of an information system development life cycle to support organizational operations.
2. To create awareness in upcoming managers, of different types of information systems in an organization so as to enable the use of computer resources efficiently, for effective decision making.
3. To provide an orientation about the increasing role of management information system in managerial decision making to gain Competitive edge in all aspects of Business.
4. To learn about computer waste and cybercrimes.
5. Demonstrate their abilities to plan, design, develop and evaluate information systems using different approaches that align with organization's needs, and meet their objectives.
6. To learn about social and ethical issues.

Course Contents

Unit - I

Overview of Information Systems

Business Information Systems in Your Career: The Role of Information Systems in Business Today, Perspectives on Information Systems and Information Technology, Understanding Information Systems: A Business Problem-Solving Approach, Information Systems and Your Career.

E-Business: How Businesses Use Information Systems: Components of a Business, Types of Business Information Systems, Systems That Span the Enterprise, The Information Systems Function in Business, Hands-On MIS.

Achieving Competitive Advantage with Information Systems: Using Information Systems to Achieve Competitive Advantage, Competing on a Global Scale, Competing on Quality and Design, Competing on Business Processes, Hands-On MIS. **10Hrs**

Unit – II

Information Technology Infrastructure

IT Infrastructure: Hardware and Software: Computer Hardware, Computer Software, Managing Hardware and Software Technology.

Achieving Competitive Advantage with Information Systems: The Database Approach to Data Management, Database Management Systems, Using Databases to Improve Business Performance and Decision Making, Managing Data Resources.

Telecommunications, the Internet, and Wireless Technology: Telecommunications and Networking in today's Business World, Communications Networks, The Global Internet, The Wireless Revolution. **10Hrs**

Unit – III

Business Information Systems -I:

Electronic and Mobile Commerce: An Introduction to Electronic Commerce, An Introduction to Mobile Commerce, Electronic and Mobile Commerce Applications, Threats to Electronic and Mobile Commerce, Strategies for Successful E-Commerce and M-Commerce, Technology Infrastructure Required to Support E-Commerce and M-Commerce,

Enterprise Systems: An Overview of Enterprise Systems: Transaction Processing Systems and Enterprise Resource Planning, Transaction Processing Activities, Control and Management Issues, Enterprise Resource Planning, Supply Chain Management, and Customer Relationship Management, International Issues associated with Enterprise Systems. **11Hrs**

Unit – IV

Business Information Systems -II:

Information and Decision Support Systems: Decision Making and Problem Solving, An Overview of Management Information Systems, Functional Aspects of the MIS, An Overview of Decision Support Systems, Components of a Decision Support System, Group Support Systems, Executive Support Systems.

Knowledge Management and Specialized Information Systems: Knowledge Management Systems, an Overview of Artificial Intelligence, an Overview of Expert Systems, Virtual Reality. **10Hrs**

Unit – V:

Information Systems in Business and Society

The Personal and Social Impact of Computers:

Computer Waste and Mistakes, Preventing Computer-Related Waste and Mistakes, Computer Crime, The Computer as a Tool to Commit Crime, The Computer as the Object of Crime, Preventing Computer-Related Crime, Privacy Issues, The Work Environment, Ethical Issues in Information Systems.

Ethical and Social Issues in Information Systems: Understanding Ethical and Social Issues Related to Systems, Ethics in an Information Society, the Moral Dimensions of Information Systems, Hands-On MIS. **11Hrs**

Text Books:

1. Kenneth C. Laudon and P. Laudon, “Management Information Systems”, 13th Edition, Pearson Education Limited 2014.
2. **Ralph M. Stair and George W. Reynolds**, “Principles of Information Systems - A Managerial Approach”, 9th edition, Course Technology 2013.

Reference Books:

1. James A. O’ Brien, George M. Marakas: “Management Information Systems”, 7th Edition, Tata McGraw Hill, Reprint 2013.
2. W.S. Jawadekar: Management Information Systems, Tata McGraw Hill 2008.

Course Outcomes

After learning all the units of the course, the student is able to

1. Understand the business applications in MIS.
2. Understand the Changing Business Environment for Information Technology.
3. Illustrate the Computer Hardware and Software Work Service Level Agreements
4. Implementation of information technology solutions in organization.
5. Write issues and challenges in security and professional ethics

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO’s)												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1				3		2					2			1	
CO 2		2						3				2			1
CO 3	1		3				2								
CO 4	2	1	2											1	
CO 5	2	2	2												

Course Title: Software Project Management			
Course Code:P15IS833	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Overview of software project management and the project planning. It also covers the Step Wise framework in project planning.
2. Imparts knowledge to the students on how to evaluate and assess the projects and to find the cost of the project using cost benefit evaluation techniques. It also discusses the risks involved in the project and the appropriate strategies for minimizing potential risks.
3. To produce an activity plan for a project and to estimate the overall duration of the project by analyzing the risks involved in it.
4. Monitor the progress of projects and to assess the risk of slippage so that project's requirements can be controlled.
5. Identifying the factors that influence people's behavior in a project environment. This unit enables to select the most appropriate people for the project and to understand the role of continuing training and learning, to improve group working and to select appropriate leadership styles. This unit also involves many case studies that help in understanding the concept of software project management.

Course Content

Unit I

Introduction to Software Project Management

Project Definition – Contract Management – Activities covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning. **10Hrs**

Unit II

Project Evaluation

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. **10Hrs**

Unit III

Activity Planning

Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control. **12Hrs**

Unit IV

Monitoring and Control

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance. **10Hrs**

Unit V

Managing People and Organizing Teams

Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldham – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies. **10Hrs**

Text Book

1. Bob Hughes, Mike Cotterell, and Rajib Mall “Software Project Management”, Fifth Edition, Tata McGraw Hill, 2012.

Reference Books

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

Course Outcomes

After learning all the units of the course, the student is able to

1. Identify the stakeholders of a project, their objectives and ways of measuring the success in meeting those objectives.
2. Find the cost of the project using cost benefit evaluation techniques
3. Identify the factors putting a project at risk, categorize and prioritize action for risk elimination or containment.
4. Analyze the progress of project, measure the risk of slippage and control changes to a projects requirements.
5. Identify some of factors that influence people’s behavior in a project environment and understand the characteristics of the various team structures that can be employed.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	3	3					2			3		1		
CO 2	1	3	2					2			3		1		
CO 3	1	3	2					2			3		1		
CO 4	2	3	2					2			3		1		
CO 5	2	3	2					2			3		1		

Course title: Network Management System			
Course Code:P15IS834	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Explain general concept and architecture behind standard based network management
2. Understand concepts and terminology associated with SNMP, CORBA, WBEM
3. Apply the usage of different network management tools
4. Learn about the various computer network security issues
5. Analyze the various standards used for network management in data center
6. Understand and Analyze the monitoring of energy consumption and performance management in cloud data center

Course Content

Unit I

Operation Management: Operations Center, Management Data, Manager Agent Protocol, Remote Consoles, Simple Network Management Protocol (SNMP), Common Object Repository Broker Architecture(CORBA), Web-Based Enterprise Management (WBEM), Web Services, NetConf, Comparison of the Different Management Protocols, Management Information Structure, Management Information Base, Common Information Model, Issues with Standard Representation, Device Agent Structure, Management Application Structure, Operations Center Function, **Monitoring:** Monitored Information, Generic Model for Monitoring, Pre-DB Data Processing, Management Database. **Fault Management:** Fault Management Architecture, Fault Diagnosis Algorithms, Self-Healing Systems, Avoiding Failures. **12Hr**

Unit II

Configuration Management: Configuration Management Overview, Configuration Setting, Configuration Discovery and Change Control, Configuration Management Applications, Patch Management. **Performance and Accounting Management:** Need for Operation Time Performance Management, Approaches for Performance Management, Performance Monitoring and Reporting, Performance Trouble Shooting, Capacity Planning, Accounting Management. **Security Management:** General Techniques, Security Management for Personal Computers, Security Management for Computer Servers, Security Management for Computer Networks, Operational Issues. **10Hrs**

Unit III

Datacenter Networks And Relevant Standards: Overview, Topologies, Network Expansion, Traffic, Routing, Addressing, Research Challenge, **INTER-DATA-CENTER NETWORKS WITH MINIMUM OPERATIONAL COSTS:** Introduction, Inter-Data-Center Network Virtualization, IDC Network Design with Minimum Electric Bills, Inter-Data-Center Network Design with Minimum, Downtime Penalties, Overcoming Energy versus Resilience Trade-off. **OPENFLOW AND SDN FOR CLOUDS:** Introduction, SDN, Cloud Computing, and Virtualization Challenges, Software-Defined Networking, Overview of Cloud Computing and Open Stack, SDN for Cloud Computing, Combining Open Flow and Open Stack with Open Daylight, Software-Defined Infrastructures, Research Trends and Challenges. **10Hrs**

Unit IV

Energy Consumption Optimization in Cloud Data Centers: Introduction, Energy Consumption in Data Centers: Components and Models, Energy Efficient System-Level Optimization of Data Centers, Conclusions and Open Challenge. **PERFORMANCE MANAGEMENT AND MONITORING:** Introduction, Background Concepts, Related Work, X-Cloud Application Management Platform, Implementation, Experiments and a Case Study, Challenges in Management on Heterogeneous Clouds. **Resource Management And Scheduling:** Introduction, Basic Concepts, Applications, Problem Definition, Resource Management and Scheduling in Clouds, Challenges and Perspectives. **10Hrs**

Unit-V

Cloud Security: Introduction, Technical Background, Existing Solutions, Transforming to the New IDPS Cloud Security Solutions, Flow IPS: Design and Implementation, Flow IPSvs Snort/IptablesIPS, Network Reconfiguration, Performance Comparison, Open Issues and Future Work. **Scientific Applications On Clouds:** Introduction, Background Information, Related Work, IWIR Workflow Model , Amazon SWF Background, Rain Cloud Workflow, IWIR-to-SWF Conversion, Experiments, Open Challenges, Conclusion **10Hrs**

Text Books

1. Principles of Computer Systems and Network Management -Edition: 1st , ISBN: 9780387890081, 0387890084, Verma Dinesh Chandra Verma, Springer-Verlag New York Inc
2. Cloud Services, Networking, and Management-ISBN: 1118845943, Nelson L.S da Fonseca and RaoufBoutaba, Wiley-IEEE Press; 1 edition (31 March 2015)

Reference Books

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, 2nd Edition, EMC Education Services EMC Education Services, JOHN WILEY & SONS INC
2. Network-Embedded Management and Applications: Understanding Programmable Networking Infrastructure-Ralf Wolter, Alexander Clemm, Springer New York,2012

Course Outcome

After learning all the units of the course, the student is able to

1. Analyze the general standards and architecture behind the standard based on network management
2. Demonstrate how to configure and analyze the performance and security aspects of various network.
3. Analyze and Evaluate the various standard used for network management in data centers
4. Discover energy consumption and performance management in cloud data centers
5. Understand the importance of network management in cloud security management.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	2	3	3	2	2	3	2	2	2	2		2	
CO 2	3	3	2	2	2	2	1	3	1	2	2	2	3	3	2
CO 3	3	3	1	2	2	2	2	3	2	2	2	2	2	2	
CO 4	3	2	2	2	3	2	2	3	2	2	2	2		3	
CO 5	3	3	2	2	3	2	1	3	2	2	2	2		3	

Open Elective - 2

Course title: Software Engineering			
Course Code:P15IS841	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course learning objectives

This course aims to

1. Study a body of knowledge relating to Software Engineering, Software reengineering, and maintenance.
2. Understand the principles of large scale software systems, and the processes that are used to build them.
3. Use tools and techniques for producing application software solutions from informal and semi-formal problem specifications;
4. Acquire and develop many valuable skills such as the ability to use computer aided software
5. Evaluate requirements for a software system
6. Apply the process of analysis and design using object oriented approach.
7. Communicate to others the progress of the system development and the contents of the design by means of reports and presentations.
8. Recognize current trends in the area of software engineering
9. Identify the processes, techniques and deliverables that are associated with requirement engineering including system requirement and system modeling
10. Identify the importance of testing in assuring the quality of software with an understanding of managing risks during the progress of the project.

Course contents

Unit I

Overview and Requirements

Introduction: FAQ's about software engineering, Professional and ethical responsibility; software process models, process iteration, software specification, software design and implementation, software validation, software evaluation; Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; the software requirements document; requirements engineering processes: feasibility studies, requirements elicitation and analysis, requirement validation and management; system models: context models, behavioral model, data models, object models, CASE workbenches; software prototyping: prototyping in the software process, rapid prototyping techniques, user interface prototyping. **12Hrs**

Unit II

Software Design

Architectural Design: system structuring, control models, modular decomposition, domain-specific architectures; object oriented design: Objects and Object Classes, An Object-Oriented design process; Design evolution. **10Hrs**

Unit III

Critical System, Verification and Validation

Dependability: critical systems, availability and reliability, safety, security; critical system specification, verification and validation: Verification and Validation: Planning; Software inspections; Automated static analysis, clean room software development; software testing: defect testing, integration testing, object oriented testing, testing workbenches. **10Hrs**

Unit IV**Management**

Managing People: limits to thinking, group working, choosing and keeping people, the people capability maturity model; software cost estimation: productivity, estimation techniques, algorithmic cost modeling, project duration and staffing; quality management: quality assurance and standards, quality planning, quality control. **10 Hrs**

Unit V**Evolution**

software change: program evolution dynamics, software maintenance, architectural evolution; software Re-engineering: source code translation, reverse engineering, program structure improvement, program modularization, data re-engineering. **10 Hrs**

Text book:

1. Software Engineering– Ian Somerville, 8th Edition, Pearson Education, 2007.

Reference books :

1. Software Engineering: A Practitioners Approach - Roger S. Pressman, 7th Edition, McGraw-Hill, 2007.
2. Software Engineering Theory and Practice -Shari Lawrence Pfleeger, Joanne M. Atlee, 3rd Edition, Pearson Education, 2006.
3. Software Engineering Principles and Practice –Waman S Jawadekar, Tata McGraw Hill, 2004
4. Software Engineering – Pankaj Jalote, Tata McGraw Hill.

Course Outcomes**After learning all the units of the course, the student is able to**

1. Demonstrate an understanding of the principles and techniques of Software Engineering
2. Analyze the various steps involved in the design process and the different design approaches which include function-oriented design and object-oriented design
3. Understand the activities in project management, requirement engineering process and to identify the different types of system models
4. Apply the knowledge of design engineering in software development
5. Provide an understanding of the principles of software engineering in a broader system context and the notions of software engineering process and management.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	2			1	1						1	1	1
CO 2	2		2			1							1		1
CO 3	2	1									2				1
CO 4	2		2										1		1
CO 5	1	1						1			1		1		1

Course title: Basic of Research Development			
Course Code:P15IS842	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Choose the most appropriate research types and designs to address a particular research problem.
2. Analyze data collection methods.
3. Describe various sampling methods used in research.
4. Understand various statistical data collection methods in research.
5. Outline the report writing steps in research.

Course Content

Unit I

Introduction: Meaning of Research, Objectives of research, Types of Research, research approaches, significance of research, research Methods versus Methodology, Research and Scientific Method, research process, criteria of good research Defining the Research Problem, Research Design, meaning of research design, need for research design, features of a good design, important concepts relating to research design, Different Research Designs, principles of experimental designs, important experimental designs. **11 Hrs**

Unit II

Collection of Data: Introduction, experiments and surveys, collection of primary data, collection of secondary data, Selection of Appropriate Method for Data Collection, case study Method. **9 Hrs**

Unit III

Design of sample surveys: Introduction, sample design, sampling and non-sampling errors, sample survey Vs Census survey, types of sampling designs. Measurement and scaling: quantitative and qualitative data, classifications of measurement scales, goodness of measurement scales, sources of error in measurement, scaling, scale classification bases, scaling techniques, multidimensional scaling, deciding the scale. **10 Hrs**

Unit IV

Data preparation process, some problems in preparation process, missing values and outliers, Types of Analysis, Statistics in Research, Measures of: Central Tendency, Dispersion, skewness, kurtosis relationship. Testing of Hypotheses: what is a hypothesis? Basic concepts concerning testing of hypothesis, testing the hypothesis, Analysis of variance. **12Hrs**

Unit V

Interpretation and report writing: meaning of interpretation, techniques of interpretation, precautions in interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, types of reports, oral presentation, mechanics of writing a research report, Precautions for Writing Research Reports. **10 Hrs**

Text Books:

1. Kothari C.R., "Research Methodology Methods and techniques", New Age International, 2014, Third edition ISBN: 9788122436235

Reference books:

1. Krishna swami, K.N., Sivakumar, A. I. and Mathirajan, M., "Management Research Methodology", Pearson Education India, 2009 Edition, ISBN: 9788177585636

2. Levin, R.I. and Rubin, D.S., “Statistics for Management”, 7th Edition, Pearson Education: New Delhi, ISBN-13: 9788177585841

Course Outcomes

After learning all the units of the course, the student is able to,

1. Identify best research type and design for defining research problem.
2. Apply appropriate data collection methods for a given engineering and management problem scenario.
3. Compare quantitative, qualitative methods and measurement scales.
4. Identify and apply statistical methods for data collection in real time problems.
5. Organize the research output in the form of report as per the technical and ethical standards.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	2	1	1	1	1	1	1	1		1	2	2	2
CO 2	2	2	1	1	1	1	1	1	1	1		1	1	2	2
CO 3	2	2	2	3	1	1	1	1	1	1		1	1	1	3
CO 4	2	2	1	2	3	1	1	1	1	1		1	2	1	3
CO 5	2	2	2	2	3	3	2	3	2	2		2	2	2	3

Course title: Operation Research			
Course Code: P13IS843	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Elementary mathematics: Linear Algebra –Matrix and its properties.

Course Learning Outcomes (CLO):

This course aims to

1. Learn quantitative methods and techniques for model formulation and applications that are used in solving business decision problems.
2. Analyze and Solve linear programming problems using graphical method and simplex method in different forms.
3. Have Knowledge of sensitivity analysis, duality of a LPP.
4. Apply different methods to solve transportation and assignment problems for optimum solutions.
5. Identify the Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) in planning, scheduling and control of projects and Analyze the competitive situations by game theoretic approach.

Course Content

Unit I

Introduction and Overview of the OR Modeling Approach : The origin of OR, the nature of OR, the impact of OR, defining the problem and gathering data, Formulating a mathematical model, deriving solutions from the model, testing the model, preparing to apply the model, implementation. Introduction to Linear Programming: Formulation of linear programming problem (LPP), examples. **10Hrs**

Unit II

Graphical solution, the LP Model, Special cases of Graphical method, assumptions of Linear Programming (LP), additional example Solving LPP - the Simplex Method: The essence of the simplex method, setting up the simplex method, algebra of the simplex method, the simplex method in tabular form, special cases in the simplex method, tie breaking in the simplex method. **10Hrs**

Unit III

Adopting to other model forms (Two Phase method, Big-M method) Post optimality analysis. Theory of the Simplex Method Foundation of the simplex method, the revised simplex method (Without Problems). Duality Theory and Sensitivity Analysis: The essence of duality theory, economic interpretation of duality, primal dual relationship, Adapting to other primal forms, the role of duality in sensitive analysis, the dual simplex method. **10Hrs**

Unit IV

Transportation Problems: The transportation problem, Initial basic feasible solution by North West corner rule ,Vogell 's approximation method , Least cost method. Optimal solution by Stepping stone method, u-v method . Unbalanced Transportation problems and Non degeneracy in a Transportation problems. The assignment problem, a special algorithm for the assignment problem Unbalanced Assignment problems, Maximization problems. **12Hrs**

Unit V

Metaheuristics: The nature of Metaheuristics, Tabu Search, Simulated Annealing, Generating Algorithms. Game Theory: The formulation of two persons, zero sum games, solving simple games- a prototype example, games with mixed strategies, graphical solution procedure, solving by linear programming extensions. **10Hrs**

Text Books:

1. Frederick S.Hillier& Gerald J. Lieberman, Introduction to Operations Research: Concepts and cases, 8th Edition, Tata McGraw Hill, 2006.
2. Hamdy A Taha, Operations Research - An Introduction, 8th Edition, Pearson Education, 2007.

Reference Books:

1. Wayne L. Winston, Operations Research Applications and Algorithms, 4th Edition, Cengage Learning, 2003.
2. Richard Bronson and Govindasami Naadimuthu, Theory and Problems of Operations Research, Schaum's Outline, Tata McGraw Hill, 2nd Edition, 1997.

Course Outcomes

After completion of this course, students will be able to:

1. Learn quantitative methods and techniques for model formulation and applications that are used in solving business decision problems.
2. Analyze and Solve linear programming problems using graphical method and simplex method in different forms Identify different methods of solving a LPP.
3. Identify the role of duality and sensitivity analysis in OR study.
4. Apply different methods to solve transportation and assignment problems for minimum cost with optimality test.
5. Identify the Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) in planning, scheduling and control of projects and Analyse the competitive situations by game theoretic approach.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	1	1									3	2	
CO 2	3	1	2	2									1		
CO 3	3	1	1	1									2		
CO 4	3	3	3	2									1		
CO 5	3	3	1	2									1		

Course title: Entrepreneurship Intellectual Property Rights			
Course Code:P15IS844	Semester: VIII	L-T-P-H : 4 : 0 : 0 : 4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Explain the role of Entrepreneurs in the economic development of the nation.
2. Understand the different Industry Policy Resolution.
3. Understand the rules, policies and working criteria by visiting small scale industries.
4. Know the Procedure for obtaining Patent: Application. Specifications, sealing, advertisement, etc
5. Know the procedure Infringement: Institution of suit, procedure for suit Proof for establishment of Infringement, Defense by defendant Reliefs, Injunction, Damages, and profits.
6. Understand Trade Marks: Statutory Authorities Procedure of registration of Trade Mark, Rights and Licensing.

Course Contents

Unit I

The Foundations of Entrepreneurship: What's Feeding the Entrepreneurial Fire? The Cultural Diversity of Entrepreneurship. The Power of "Small" Business, the 10 Deadly Mistakes of Entrepreneurship. Putting Failure into Perspective, How to Avoid the Pitfalls. Creativity, Innovation, and Entrepreneurship, Creativity—A Necessity for Survival. Creative Thinking, Barriers to, Creativity How to Enhance Creativity, The Creative Process. Techniques for Improving the Creative Process Protecting Your Ideas. **10 Hrs**

Unit II

The Basics of a Marketing Communications Plan, The Operational Elements of a Marketing Communications Plan, Selecting Advertising Media Preparing an Advertising Budget, Advertise Big on a Small Budget. Pricing Strategies and Tactics, Pricing Strategies and Methods for Retailers Pricing. Concepts for Manufacturers, Pricing Strategies and Methods for Service Firms The Impact of Credit on Pricing Managing Cash Flow, Cash Management, Cash and Profits Are Not the Same. The Cash Budget,

Preparing a Cash Budget, the "Big Three" of Cash Management. Avoiding the Cash Crunch Creating a Successful Financial Plan: Basic Financial Statements Creating Projected Financial Statements. Ratio Analysis Interpreting Business Ratios Break-Even Analysis. **12 Hrs**

Unit III

Basic Principles of IP laws: An Introduction, Concept of Property, and Need, Protection, Criteria. Constitutional aspects of IP, Evolution of Patent system in UK, US and India. Basis for Invention, patentability and Non-Patents: Meaning of Patent, objectives, Regulations, Law in India. Procedure for obtaining Patent: Application. Specifications, sealing, advertisement, etc. Grant of Patents, Compulsory License. Provisional and complete specifications: kinds of specifications. **10 Hrs**

Unit IV

Rights conferred on a patentee: Patent rights Exceptions and limitations, Duties of Patentee. Transfer of Patent Rights: Assignment, Kinds of Assignments License and kinds of License, Transfer of patent by law Infringement of Patents: Construction of Claims, Patents held to be infringed or not. Action for Infringement: Institution of suit, procedure for suit Proof for establishment of Infringement, Defense by defendant Reliefs, Injunction, Damages, profits, drafting, data base searching for patents. Copy Rights: Introduction, Meaning and Characteristics. Author and Ownership of copy right: License, terms, contract. **10 Hrs**

Unit V

Infringement of Copyright: Acts, general principles, Direct and indirect evidence of copying, Acts not constituting the Infringement. Infringement in literary, music and dramatic. Remedies against Infringement of copyright, case study. Trade Marks: Statutory Authorities Procedure of registration of Trade Mark, Rights and Licensing. Infringement of trademark and action against Infringement. Industrial Design: Procedure for registration of a design Piracy of a registered design. Case studies. Revisions. **10 Hrs**

Text Books:

1. Thomas W. Zimmerer and Norman M. Scarborough: Essentials of Entrepreneurship and Small Business Management (IV Edition), Prentice Hall, 2004.
2. Dr. B. L. Wadehra: Intellectual Property Law Handbook, Universal Law Publishing Co. Ltd., 2002.

Reference Books:

1. P. C. Tripathi, P. N. Reddy: Principles of Management Tata McGraw Hill, 4th Edition, 2010.
2. Poornima M Charantimath : Entrepreneurship Development - Small Business Enterprises , 1st Edition, Pearson Education – 2006
3. Dr. T Ramakrishna: Basic principles and acquisition of Intellectual Property Rights, NSLIU - 2005.

Course Outcomes

After completion of this course, students will be able to:

1. Identify the importance of entrepreneurship.
2. Identify and select the right marketing communication plan and financial plan.
3. Exemplify the basic principles of IP laws like patents.
4. Recognize the characteristics and Infringement of Copyright.
5. Explain the importance of Trade Marks, Industrial Design and its infringement.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1									2	2	2				
CO 2							2	2	2		2	2			
CO 3						3		3	2		2				
CO 4						2	3	2	2		2				
CO 5						2		2	3		2				