UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2018 SCHEME)

SYLLABUS FOR

VIII

SEMESTER

INFORMATION TECHNOLOGY

SCHEME -2018

VIII SEMESTER

INFORMATION TECHNOLOGY (F)

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/ P				
18.801	E-Commerce and E-Security (F)	3	3	1	-	50	3	100	150
18.802	Web Application Development(F)	3	3	1	-	50	3	100	150
18.803	Elective III	3	3	1	-	50	3	100	150
18.804	Elective IV	3	3	1	-	50	3	100	150
18.805	Web Applications Lab (F)	3	-	-	4	50	3	100	150
18.806	Project Work and Viva Voce (F)	5	-	-	9	150	-	100	250
	Total	**20**	**12**	**4**	**13**	**400**	-	**600**	**1000**

18. 803 Elective III

18.803.1	Soft Computing (FR)
18.803.2	Cloud Computing (FR)
18.803.3	Embedded Systems (F)
18.803.4	Knowledge Representation and Reasoning (F)

18.805 Elective IV

18.804.1	Robotics and Computer Vision (FR)
18.804.2	Graph Theory (FR)
18.804.3	Natural Language Processing (F)
18.804.4	Distributed Systems (F)

18.801 E-COMMERCE AND E-SECURITY (F)

TeachingScheme:3(L)-1(T)-0(P) **Credits**:3

Course Objectives:

- *To understand the basic concepts in e-commerce and e-payment*
- *To understandthe threats and counter measures involved in providing electronic security*

Module – I

Ecommerce:Introduction,business models in e-commerce,B2CandB2B models,Supply Chain Management, Electronic Data Interchange.
Ethical issues,legal issues-copy rights and trademarks,warranties.Taxation,international issues, Intellectual Property Rights.

Module – II

E-payment: Payment systems–debitvs.credit,payment instructions,electronic wallet, smartcards.

Payment transaction security – user anonymity, location untraceability, payment transaction untraceability,confidentiality and non-repudiation of payment transaction,dual signature, freshness of transaction messages.
Electronic check security - Payment authorization transfer, proxies.

Module – III

Digitalmoneysecurity: Blind signature,exchanging coins,protection against double spending, protection against forging and stealingcoins.
Framework for electronic payment – Internet Open Trading Protocol.
Websecurity:HTTP messages**,**HTTP headers leaking information, HTTP cache security,SSL tunneling,SHTTP,web client security,anonymous routing.

Module – IV

Protection in general purpose Operating Systems :Designing trusted Operating Systems. Database security.Security in Networks.AdministeringSecurity.Legal,privacy and ethical issues in computer security.

References:

1. EliasM.Awad,ElectronicCommerce:FromVisiontoFulfillment,3rdEdition,Pearson Education2008.
2. JeffreyF.RayportandBernardJ.Jaworski,IntroductiontoEcommerce,2ndEdition, Tata McGraw Hill,2008.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, Security in Computing, 5th Edition, Prentice Hall2015.

4. VesnaHassler,SecurityFundamentalsforE-commerce,ArtechHouse,2000.

Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey,seminar,term-project,softwareexercises,etc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours MaximumTotalMarks:100

Thequestionpapershallconsistof2parts.

Part A (20 marks) -Ten Short answer questions of 2 marks each. All questions are compulsory.Thereshouldbeatleastonequestionfromeachmodule.

PartB(80Marks)-Candidateshavetoanseweronefullquestionoutofthetwofromeach module.Eachquestioncarries20marks.

Course Outcome:

At the end of the course, the student will have a good understanding of the fundamental principles governinge-commerce,e-payment and the security threats and solutions involved.

18.802 WEB APPLICATION DEVELOPMENT (F)

Teaching Scheme: 3(L) - 1(T) - 0(P) **Credits**:3

Course Objectives

- *To understand the basic concepts of JDBC, servlets and JSP.*
- *To understand the design and development of a J2EE application.*

Module – I

Introduction : Web architecture, web application lifecycle, XML and J2EE.

Design and development of a J2EE application: J2EE Layers, Application components, J2EE Architecture, Development methodology Task list for building J2EE applications database design defining the application creating the interface, building pages, creating data access objects, validating the code.

Module – II

JDBC: Architecture, JDBC API, Retrieving and updating Data, SQLtoJava Data Types, JDBC Execution Types, Metadata, Scrollable resultsets, transaction support, Batch Statements.

Servlets: Introduction to Servlets, Benefits of Servlets, use as controller in MVC, basic HTTP,

Servlet container, Servlets API, javax.servelet Package, Reading Servlet parameters, service method detail, HTML clients, servlet lifecycle, HTTP response header, session management, dispatching requests, Servlets with JDBC, web applications.

Module –III

Java Server Pages: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Setting attributes, Error Handling and Debugging, Using JavaBeans Components in JSP Pages, Sharing Data between JSP pages Passing Control and Data between Pages – Sharing Session and Application Data – application Models MVC Design.

Module – IV

Enterprise Java Beans : Overview, distributed programming, EJB framework, Session and entity beans, Stateless and stateful session bean, Bean attributes, Parts of a Bean, container managed persistence (CMP) and bean managed lifecycle of EJB java message service (JMS) and message driven beans (MDB), distributed programming services, CORBA and RMI Transaction management, Security, deployment, personal roles for EJB Development, building session beans creating session beans Entity beans.

References:

1. *Joseph J. Bambara and , Paul R. Allen, J2EE UNLEASHED, Pearson Education, 2007.*
2. *Jason Hunter and William Crawford, Java Servlet Programming, 2/e, O'Reilly Media 2001.*
3. *Roman, Rima Patel and Gerald Brose (Ed), Mastering EJB, 3/e, John Wiley & Sons 2004.*

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project, software exercises, etc.

20% - Regularity in the class

University Examination Pattern:

Examination duration: 3 hours *Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each module

Part B (80 Marks) - Candidates have to answer one full question (question may contain sub-divisions), out of the two from each module. Each question carries 20 marks.

Course Outcome:

After successful completion of this course, the student will be able to develop web applications using J2EE, servlets, JSP and EJB.

18.803.1 SOFTCOMPUTING(FR)(ElectiveIII)

TeachingScheme:3(L)-1(T)-0(P) **Credits: 3**

CourseObjective:

- *To provide a clear understanding on artificial neural networks and genetic algorithms.*
- *To solve various crisp and fuzzy set operations.*

Module – I

Introduction to Soft Computing–Artificial Neural Networks–introduction–basic models–linear separability–Hebb network–Supervised learning networks–perceptron–Adaptive LinearNeuron–back propagation network–radial basis function network–Associative Memory Network – auto associative and hetero associative memory networks – Bidirectional Associative Memory – Unsupervised learning networks – Kohonenself organizingfeaturemaps–LearningVectorQuantization–Counter propagation networks.

Module – II

Crisp and Fuzzysets–operations and properties–CrispandFuzzyrelations–operations and properties – membership functions – features – methods of membership value assessment – Defuzzification – lambda cuts for fuzzy sets and fuzzy relations – Defuzzification methods–Fuzzy arithmetic–Extension principle–fuzzy measures–Fuzzy rules–fuzzy reasoning–Fuzzy inference system–Mamdani and Sugeno models–Fuzzy Logic Control Systems–control system design–architecture and operation–applications.

Module – III

Genetic Algorithm–introduction–basic operations and terminologies–generalgenetic algorithm–classification of genetic algorithm–genetic programming–applications.

Module – IV

Hybridsystems–neuro-fuzzy,neuro-genetic and fuzzy-genetic hybrids–Adaptive Neuro- Fuzzy Inference Systems–architecture–hybrid learning algorithm–GeneticAlgorithm based Internet search technique–Soft Computing based hybrid fuzzycontrollers–Soft Computing based rocketing in econtrol.

References:

1. SivanandamS.N,S.N.Deepa,*Principles of SoftComputing*,WileyIndia,2007.
2. RossT.J.,*FuzzyLogic with Engineering Applications*,WileyIndia,Thirdedition,2009.
3. Goldberg D. E., *Genetic Algorithms: Search, Optimization and Machine Learning*, Addison Wesley, N.Y.,1989.

4. RajasekaranS.andG.A.V.Pai,*Neural Networks,FuzzyLogic and Genetic Algorithms,* PHI, 2003.
5. EberhartR.,P.SimpsonandR.Dobbins,*Computational Intelligence-PCTools,*AP Professional, Boston,1996.
6. JangJ.SR.,C.T.SunandE.Mizutani,*Neuro-Fuzzy and SoftComputing,*PHI/Pearson Education2004.

Internal Continuous Assessment *(Maximum Marks-50) 50%*

- Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey,seminar,term-projectetc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours *MaximumTotalMarks:100*

Thequestionpapershallconsistof2parts.

Part A (20 marks) -Ten Short answer questions of 2 marks each. All questions are compulsory.There should be atleast one question from each module.

Part B (80Marks)- Candidates have to answer one full question (question may contain sub-divisions),out of the two from each module. Each question carries 20marks.

Course Outcome:

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

- *Have a clear understanding on artificial neural networks.*
- *Perform crisp and fuzzy set operations.*
- *Identify various Defuzzification methods*
- *Explain various genetic algorithms.*
- *Apply genetic algorithm to solve real world problems.*

18.803.2 CLOUD COMPUTING(FR)(ElectiveIII)

TeachingScheme:3(L)-1(T)-0(P) **Credits:3**

CourseObjective:

- *To understand the design of cloudservices.*
- *To understand the concept of virtualization*
- *To apply different cloud programming models as per need.*
- *To be able to setup a private cloud.*
- *To learn to design the trusted cloud computing system*

Module - I

Technologies for Network-Based System – System Models for Distributed and Cloud Computing–NIST Cloud Computing Reference Architecture.Cloud Models:-Characteristics – CloudServices–Cloud models(IaaS,PaaS,SaaS)–Public vs Private Cloud–Cloud Solutions - Cloud ecosystem–Service management–Computing on demand.

Module – II

Basics of Virtualization-Types of Virtualization-Implementation Levels of Virtualization-Virtualization Structures-Tools and Mechanisms-Virtualization of CPU,Memory,I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

Module – III

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

Module – IV

Security Overview–Cloud Security Challenges and Risks–Software-as-a-ServiceSecurity–Security Governance–Risk Management–Security Monitoring–Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control–Autonomic Security.

References:

1. *KaiHwang,GeoffreyC.FoxandJackG.Dongarra,DistributedandCloudComputing,From Parallel Processing to the Internet of Things, Morgan KaufmannPublishers, 2012.*
2. *JohnW.RittinghouseandJamesF.Ransome,CloudComputing:Implementation, Management,andSecurity,CRCPress,2010.*
3. *TobyVelte,AnthonyVelteandRobertElsenpeter,CloudComputing,APractical Approach, TMH,2009.*
4. *KumarSaurabh,CloudComputing,InsightsintoNew-EraInfrastructure,WileyIndia, 2011.*

5. RonaldL.KrutzandRussellDeanVines,*CloudSecurity,AcomprehensiveGuideto SecureCloudComputing*,Wiley,India,2010.
6. Rajkumar Buyya, Christian Vecchiola and S.TamaraiSelvi, *Mastering Cloud Computing*, TMH,2013.

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey, seminar, term-project etc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours *MaximumTotalMarks:100*

The question paper shall consist of 2parts.

Part A (20 marks) -Ten Short answer questions of 2 marks each. All questions are compulsory.There should be atleast one question from each module.

PartB (80 Marks)- Candidates have to answer one full question (question may contain sub-divisions),out of the two from each module. Each question carries 20marks.

Course Outcome:

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

- *Have a clear understanding on cloud computing and virtualization techniques.*
- *Address core issues of cloud computing such as security, privacy, and inter-operability.*
- *Design cloud services and setup a private cloud.*
- *Design compute and storage clouds based on applications.*
- *Understand the characteristics and services provided by cloud.*

18.803.3 EMBEDDED SYSTEMS (F) (ElectiveIII)

TeachingScheme:3(L)-1(T)-0(P) **Credits**:3

Course Objectives:

- *To impart knowledge on the hardware and software aspects of an embedded system.*
- *To develop skills on how to design an embedded system, its constraints, programming environment and the fundamentals of real time systems and real time Operating systems.*

Module – I

Introduction-Definition and classification–Microprocessor Vs Microcontrollers-Processors and hardware units in an embedded system –- Software embedded into the system – Embedded system-on-chip - Processor and memory organization. Internal serial communicationdevices-Parallelportdevices-Timerandcountingdevices-I2C,CAN,USB and advanced serial high-speed bus-PCI,PCI-X and advanced buses-Sensors and Actuators, Device drivers -Interrupt servicing mechanism.

Module – II

Programming concepts-Assembly language vs.high level language-C Program Elements-Queues,stacks and lists-Concepts of embedded programming in C++-Ccompilers–Cross compiler Optimization of memory usage.
SoftwareDevelopmentTools:Embedded Program Development-Downloading the HexFile to the NonVolatileMemory–Hardware Simulator.

Module – III

Real time systems: Introduction:BasicModel, Characteristics and applications of realtime systems,Safety and Reliability,Types of RealTime Tasks, Timing Constraints.
Inter-process communication and synchronization: Multiple Processes in an application - Semaphores–Priority inversion problem-Deadlock situations–Signals–Message queues–Mailboxes–Pipes–Sockets.

Module – IV

Realtime OS:Real-time operatingsystems –Features of Real-time operatingsystems, RTOS services-Structures-Resource management–Filesystem organization and implementation
I/O subsystems–Interrupt handling–Task scheduling models-Handling of interrupt latency and deadlines-Performance metrics.

References:

1. *RajKamal,EmbeddedSystems-Architecture,ProgrammingandDesign,2nd Edition,McGraw Hill,2008*
2. *RajibMall,Real-timesystems:TheoryandPractice,PearsonEducation,2009*
3. *ParagHDave,HimanshuBDave,EmbeddedSystems,Pearsoneducation2015.*
4. *LylaBDas,EmbeddedSystemsAnIntegratedApproach,Pearsoneducation2012.*

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey, seminar, term-project, software exercises, etc.

20% - Regularity in the class

University Examination Pattern:

Examination duration:3hours *Maximum Total Marks:100*

The question paper shall consist of 2parts.

Part A (20 marks) -Ten Short answer questions of 2 marks each. All questions are compulsory.There should be atleast one question from each module .

PartB (80Marks)-Candidates have to answer one fullquestion (question may contain sub-divisions),out of the two from each module.Each question carries 20marks.

Course Outcome:

After successful completion of this course, the student will be able to:

- *Understand,design,execute and evaluate programs on embedded systems and real time systems that include both hardware and software*
- *Identify and synthesise of solutions for embedded system problems*

18.803.4 KNOWLEDGEREPRESENTATION AND REASONING (F) (ElectiveIII)

TeachingScheme:3(L)-1(T)-0(P) **Credits**:3

Course Objective

- *Torepresentknowledgesymbolicallyinaformsuitableforautomatedreasoning.*
- *Getting familiar with the knowledge modeling concepts and knowledge representation languages developed for the web*

Module – I

Introduction:Concept of Knowledge, Representation, Reasoning, Knowledge-based systems,NeedofKnowledgerepresentationandReasoning,Roleoflogic.
Language of first order logic : Syntax, Semantics, Pragmatics
Expressing Knowledge: Knowledge Engineering, Vocabulary, Basic Facts, Complex Facts, Terminological Facts, Entailments, Abstract Individuals

Module – II

Describing web resources:RDF–Basicidea-XML-basedsyntax-RDF Schema-Basic ideas-language–axiomatic semantics for RDF and RDFSchema–Direct inference system for RDF and RDFS–Querying in SPARQL.

Module – III

Web Ontology Language:OWLandRDF/RDFS–Sublanguages of OWL-Description of OWL language–Layering of OWL-Examples.

Module – IV

Logic and Inference:Monotonic Rules–Syntax,Semantics,Description Logic Programs– Semantic Web Rules Language,Rule ML
Ontology Engineering: Constructing ontologies manually -Reusing existing ontologies – Ontology mapping**.**

References:

1. *RonaldJBrachman,HectorJLevesque,KnowledgeRepresentationandReasoning, Morgan Kaufman Publishers,2004.*
2. *GrigorisAntoniouandFrankvanHarmelen,ASemanticWebPrimer,TheMITPress, 2008.*
3. *PascalHitzler,MarkusKrotzsch,SebastianRudolph,Foundations of Semantic Web Technologies,Chapman&Hall/CRC,2009.*

Internal Continuous Assessment *(Maximum Marks-50) 50%*

- Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey,seminar,term-project,softwareexercises,etc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours MaximumTotalMarks:100

Thequestionpapershallconsistof2parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory.Thereshouldbeatleastonequestionfromeachmodule.

PartB(80Marks)-Candidateshavetoansweronefullquestionoutofthetwofromeach module.Eachquestioncarries20marks.

Course Outcome:

After successful completion of this course,the student will be able to design ,describe and utilize web ontologies, define logic semantics and inferences and use ontology engineering approaches in semantic applications.

18.804.1 ROBOTICS AND COMPUTER VISION(FR)(ElectiveIV)

TeachingScheme:3(L)-1(T)-0(P) **Credits:3**

CourseObjective:*To familiarize the concepts in image analysis, high-level vision and robotics.*

Module - I

History, Present Status and Future Trends of Robotics: robotics and programmable automation,historical background,lawsofrobotics,robotdefinitions,robotics systems and robot anatomy, human systems and robotics, specifications of robots, present application status,machine intelligence,computer and robotics—future trends,flexible automation versus robotics technology,safety measures in robotics.

Module - II

Robot Kinematics and Dynamics : Introduction, forward and reverse kinematics(transformation) of three degrees of freedom robot arm, forward and reversetransformation of a four degrees of freedom manipulator in 3-D, homogeneoustransformations, kinematic equations using homogeneous transformations, inverse kinematics of robot, robot arm dynamics.

Module - III

Vision as an information processing task,A geometrical framework for vision.2Dand3D images interpretation,Segmentation,Binary and grey morphology operations,Thresholding, Filtering,Edge and corner detection,Features detection.Contours,Tracking edges and corners, object detection and tracking, Image data compression, Real time Image processing.

Module - IV

Robotics,Vision and Control:Position-Based Visual Servoing,Image Based Visual Servoing-Camera and Image Motion-Controlling Feature Motion-Depth-Performance Issues,Using Other Image Features-Line Features,Circle Features.

References:

1. *DebS.R.andS.Deb,RoboticsTechnologyandFlexibleAutomation,TataMcGrawHill Education Pvt. Ltd,2010.*
2. *PeterCorke,Robotics,VisionandControl:FundamentalAlgorithmsinMATLAB, SpringerScience&BusinessMedia,2011*
3. *LindaShapiroandGeorgeShockman,ComputerVision,PrenticeHall,2001*
4. *RichardSzeliski,Ed.,ComputerVision:AlgorithmsandApplications,Springer,2010.*

5. *Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press,2012.*
6. *Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for ComputerVision,ThirdEdition,AcademicPress,2012.*

Internal Continuous Assessment *(Maximum Marks-50) 50%*

- Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey, seminar, term-project etc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours *MaximumTotalMarks:100*

Thequestionpapershallconsistof2parts.

Part A (20 marks) -Ten Short answer questions of2 marks each. All questions are compulsory.Thereshouldbeatleastonequestionfromeachmodule.

PartB(80Marks)-Candidateshavetoanseweronefullquestion(questionmaycontainsub-divisions),outofthetwofromeachmodule.Eachquestioncarries20marks.

Course Outcome:

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

- *Identify the role of inverse kinematics in position controlled robots*
- *Learn the basics of robotics to perform routinetasks.*
- *Understands the controls used in robotics.*
- *Implement various image processing algorithms.*
- *Identify the components used in computervision.*

18.804.2 GRAPH THEORY (FR) (ElectiveIV)

TeachingScheme:3(L)-1(T)-0(P) **Credit:3**

CourseObjective:

- *To introduce the major concept areas of graphtheory.*
- *To develop an awareness regarding the application of theorems used in graph theory.*
- *To provide practical,hands on experience in realworld applications of graphtheory.*

Pre-requisites: 18.303-Discrete Structures

Module – I

What is graph–Application of graphs–finite and infinitegraphs–Incidence and Degree–Isolated vertex, pendent vertex,Nullgraph. Paths and circuits–Isomorphism,subgraphs, walks,paths and circuits,Connected graphs,disconnectgraphs,Euler graphs Hamiltonian paths and circuits–Travelling salesman problem.Trees–properties,pendent vertex, Distance and centres-Rooted and binary tree,counting trees,spanning trees.

Module – II

Combinatorial versus geometric graphs, Planar graphs, Different representation of planar graphs,geometricdual,combinatorialdual,vector spaces of graph,ban 2vectorsofagraph, orthogonal vectors and spaces Directedgraphs–types of digraphs,Digraphs and binary relation,Eulergraphs,trees with directededges.

Module – III

Graphs theoretic algorithms and computer programming - Algorithm for computer representation of a graph,algorithm for connectedness and components,spanningtree, directed circuits,shortest path,searching the graphs,Isomorphism.

Module – IV

Graphs in switching and cording theory–contact networks,Analysis of contact Networks, synthesis of contact networks,sequential switching networks,unit cube and its graph, graphs in codin gtheory.

References:

1. Hararay,*Graph theory*,Narosa Publishers,1969.
2. NarasinghDeo,*Graph theory*,Pearson publications,2004.
3. FouldsL.R.,*Graphs Theory Applications*,Narosa,Springer-Verlag,1992.

4. John Clarkand Derek Allan Hotton,*AFirstLookatGraphTheory*,Allied.

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey,seminar,term-projectetc.

20% - Regularity in the class

University Examination Pattern:

Examination duration:3hours *Maximum Total Marks:100*

The question paper shall consist of 2 parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be atleast one question from each module.

PartB(80Marks)-Candidates have to answer one fullquestion(questionmaycontainsub-divisions),outofthetwofromeachmodule.Eachquestioncarries20marks.

Course Outcome:

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

- *Demonstrate knowledge of fundamental concepts in graph theory, including properties and characterization of bipartite graphs and trees, Euclidian and Hamiltoniangraphs.*
- *Understand and apply some of the classica ltheorems of graph theory.*
- *Represent reallife situations with mathematical graphs.*
- *Develop algorithms for connectedness and components, spanning tree, directed circuits,shortest path,searching the graphs,Isomorphism.*
- *Solve real world problems by applying graph theoretic results and algorithms.*

18.804.3 NATURAL LANGUAGE PROCESSING(FR)(ElectiveIV)

TeachingScheme:3(L)-1(T)-0(P) **Credits:3**

Course Objective:

- *To impart conceptual and application level aspects of Natural Language Processing.*

Module – I

Natural LanguageProcessing,Ambiguity and uncertainty inlanguage.TheTuring test, Chomsky hierarchy,regular languages,andtheirlimitations.Finitestateautomata.Practical regular expressions for finding and counting language phenomena.N-gramLanguage Models and Information Theory: n-gram models. Entropy, relative entropy, cross entropy, mutual linformation,perplexity. Statistical estimation and smoothing for language models.

Module – II

Statistical Machine Translation (MT), Statistical Alignment Models and Expectation Maximization(EM)and its use in statistical MT alignment models;complete statisticalMT system decoding and A*Search.

Module – III

Information Extraction(IE) and Named Entity Recognition(NER).Information sources,rule- based methods,evaluation(recall,precision).Introduction to supervised machine learning methods.NaiveBayes(NB)classifiersforentityclassification,MaximumEntropyClassifiers

Module–IV

Syntax and Parsing for Context-Free Grammars (CFGs): Parsing, treebanks, attachment ambiguities .Context-free grammars.Top down and bottom-upparsing,emptyconstituents, leftrecursion, and repeated work,ProbabilisticCFGs.

References:

1. *Daniel Jurafsky and James H. Martin, Speech and Language Processing: An IntroductiontoNaturalLanguageProcessing,ComputationalLinguisticsandSpeech Recognition,2/e,PrenticeHall,2008.*
2. *Christopher D. Manning and HinrichSchuetze, Foundations of Statistical Natural LanguageProcessing,MITPress,2003.*

Internal Continuous Assessment *(Maximum Marks-50) 50%*

- Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey,seminar,term-projectetc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours *MaximumTotalMarks:100*

Thequestionpapershallconsistof2parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory.There should be atleastonequestionfromeachmodule.

PartB(80Marks)-Candidates have to answer one fullquestion(questionmaycontainsub-divisions),outofthetwofromeachmodule.Eachquestioncarries20marks.

Course Outcome:

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

- *UnderstandthebasicsofNaturalLanguageProcessingandtherebyfigureout ambiguityanduncertaintythatexistinlanguages.*
- *ApplytheconceptofN-grammodelstosolveproblems.*
- *BecomeawareofthesignificanceofInformationExtractionandNamedEntity RecognitioninNaturalLanguageProcessing.*
- *Evaluateinformationretrievalmethodsusingtheconceptsofprecisionandrecall.*
- *BethoroughlyknowledgeableregardingsyntaxandparsingforContextFree Grammars.*

18.804.4 DISTRIBUTED SYSTEMS(F)(ElectiveIV)

TeachingScheme:3(L)-1(T)-0(P) **Credit:3**

CourseObjective:

This course enables the students to

- *Describe important characteristicsofdistributedsystemsandthesalientarchitectural features of such systems.*
- *Describe the features and applications of important standard protocols whichare used in distributedsystems.*
- *Characterize different implementation paradigms for distributed systems.*

Module – I

Characteristics of DistributedSystem:Examples of distributed systems–resourcesharing andweb–WorldWideWeb–Issues in the design of distributed system.System models: Architectural models and fundamental models.

Module – II

Interprocess Communication:theAPI for Internetprotocol–external data representation andmarshalling–client server communication-group communication-Casestudy:inter process communicationinUnix.Distributed objects and remote invocation:communication between distributedobjects–remote procedure call–Events andnotification.

Module – III

Operating system support: Operating system layer – protection – processes and threads-Communicationandinvocation–Operatingsystemarchitecture.Distributedfilesystem:File service architecture–Sun networkfile systems.

Module – IV

Transactions and concurrency control: Transactions, nested transactions-locks-optimistic concurrency control. Replication : System model and group Communication**.**

References:

1. *GeorgeCoulouris,JeanDollimoreandTimKindberg,DistributedSystems:Concepts andDesign,5th Edition,PearsonEducation,2011.*
2. *AndrewSTanenbaumandMaartenVanSteen,DistributedSystems:Principlesand Paradigms,2nd Edition,PearsonEducation,2006.*

Internal Continuous Assessment *(Maximum Marks-50) 50%*

- Tests (minimum 2)

30%-Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey, seminar, term-project etc.

20% - Regularity in the class

University Examination Pattern:

Examinationduration:3hours *MaximumTotalMarks:100*

Thequestionpapershallconsistof2parts.

Part A (20 marks) - Ten Short answer questions of 4 marks each. All questions are compulsory.Thereshouldbeatleastonequestionfromeachmodule.

PartB(80Marks)-Candidateshavetoansweronefullquestion(questionmaycontainsub-divisions),outofthetwofromeachmodule.Eachquestioncarries20marks.

Course Outcome:

After the successful completion of the course students will have:

- *Asoundunderstandingoftheprinciplesandconceptsinvolvedindesigning distributedsystems.*
- *Theabilitytoimplementadistributedapplication*
- *Anunderstandingofthedesignissuesrelatingtopublish-subscribe,peer-to-peer networks*
- *TheabilitytoanalyseDistributedSystemArchitecture.*

18.805 WEB APPLICATIONS LAB (F)

TeachingScheme:0(L)-0(T)-4(P) **Credits**:3

Course Objective:

This course intends to provide hands-on experience to students in designing and implementing web applications.

Exercises:

1. Implementinganddeployingwebapplicationsusing Servlets,HTMLandJSPs.
2. TestingtheapplicationonanApplicationServer.
3. DebuggingWebapplicationslocallyandremotely.
4. Developingapplicationsinateamenvironment.
5. RetrievalofdatafromdatabaseusingSQLandexchangeofinformationinXML format.

Internal Continuous Assessment *(Maximum Marks-50) 40%*

- Test

40%-Regularlabworkandpropermaintenanceoflabrecords 20%-

Regularityintheclass

University Examination Pattern:

Examinationduration:3hours MaximumTotalMarks:150

Questionsbasedonthelistofexercisesprescribed.

Marksshouldbeawardedasfollows:

20% -Algorithm/Design

20%-Implementing/Conductingtheworkassigned 30%-

Output/Resultsandinference

30% - Viva voce

Candidateshallsubmitthecertifiedfairrecordforendorsementbytheexternal examiner.

Course Outcome:

Attheendofthecourse,thestudentswouldhaveacquiredthenecessaryhands-onskills todesign,implementanddeploywebapplications.

18.806 PROJECT WORK AND VIVA VOCE (F)

TeachingScheme:0(L)-0(T)-9(P) **Credits**:5

Course Objective:

- *To provide motivation for the students to solve real world problems using mathematics and engineeringprinciples.*
- *To motivate students to participate in groupdiscussions and thereby exchange ideas.*
- *To serve as platform to identify research issues in existing systems.*

PROJECT WORK:

The project should be based on the core subjects of the discipline. The work can be carried out in the department under the supervision of a faculty member or with the help of an external organization. In the latter case, the motivation of the organizations should be purely academic and they should provide an external guide whose qualifications should be on par with that of a faculty member. An internal guide will be consistently interacting with the external guide and monitoring the progress of the project. There should be a mid- semester and end-semester evaluation of the project. The student has to submit a thesis in the prescribed format, duly certified by the internal guide and external guide(ifany).

For the award of the session marks, the project report and the powerpoint presentation of the project work shall be assessed by a panel consisting of the Head of the Department, project coordinator, project guide, and a senior faculty member. The Head of the Department shall be the chairman of the panel. The students may be assessed individually and ingroups.

VIVA VOCE:

In the viva voce, the student's performance will be evaluated based on the project work, the seminar presented and the knowledge of the courses in the whole curriculum. The distribution of the marks will be in the ratio 2:1:2, respectively.

At the time of viva-voce examination, the project work has to be evaluated in addition to assessing the students' knowledge in the field of Computer Science and Engineering and other related and advanced topics. He/she is expected to present his/her academic records including project report, seminar report, etc. at the time of viva-voce examination. Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.

Internal Continuous Assessment *(Maximum Marks-150)*

MarksbyCommittee:50% *Marks byGuide: 50%*

25% - Presentation/viva, clarity in presentation, awareness to the work/topic etc.

50%-Current relevance of the work, implementation/experimentation of the work, involvement in the worketc.

25%-Evaluation of the report

University ExaminationPattern:

Viva-Voce *MaximumTotalMarks:100*

Marks should be awarded as follows:

40%-General topic scovered in the curriculum and other related and advanced topics.

40%-Projectwork.

20% - Seminar topic

Course Outcome:

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

- *Apply knowledge of mathematics, science and engineering principles to solve complex real world problems bringing out economically and socially feasible solutions upholding ethicalvalues.*
- *Participate in peer group discussions and integrate ideas.*
- *Apply the knowledge base about advanced topic pertaining to area of study to design and implement solutions to challenging problems.*
- *Test and analyze the developed system for further improvement.*
- *Identify new research problems from issues raised during implementation.*
- *Communicate problems and solutions to society through reports.*
- *Managetime and resources effectively.*