

# E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University,  
Chennai Accredited by NAAC with 'A' Grade | Accredited by NBA

NAGAPATTINAM – 611002



## B.E. COMPUTER SCIENCE ENGINEERING

**2019 Regulation : Full Time Curriculum and Syllabus**

<b>SEMESTER VI</b>									
Course Code	Course Name	L	T	P	C	Maximum Marks			Category
						CA	ES	Total	
<b>Theory Course</b>									
1902CS601	Compiler Design	3	0	0	3	40	60	100	PC
1902CS602	Web Technology	3	2	0	4	40	60	100	PC
1902CS603	Artificial Intelligence	3	0	0	3	40	60	100	PC
1903CS005/ 1903CS007	PC Elective II – Distributed Systems / Adhoc & Sensor Networks	3	0	0	3	40	60	100	PE
1901HS004	HSS Elective II – Business Model Innovation	3	0	0	3	40	60	100	HSSE
	Open Elective I	3	0	0	3	40	60	100	OE
<b>Laboratory Course</b>									
1902CS651	Compiler Laboratory	0	0	2	1	50	50	100	PC
1902CS652	Web Technology Laboratory	0	0	2	1	50	50	100	PC
1904CS653	Software Prototype development Lab (Mini Project 1)	0	0	2	1	50	50	100	PC
1904CS654	Industrial Visit Presentation	0	0	0	1	100	-	100	EEC
1904GE651	Life Skills: Aptitude II	0	0	2	1	100	-	100	EEC
<b>Total</b>		<b>18</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>590</b>	<b>510</b>	<b>1100</b>	

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1902CS601	COMPILER DESIGN	L	T	P	C
		3	0	0	3
<b>PREREQUISITES:</b>					
1. Theory of computation					
<b>COURSE OBJECTIVES:</b>					
1. To learn the design principles of a Compiler. 2. To understand, design and implement a lexical analyzer 3. To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation 4. To understand optimization of codes, run time environment and design code generation schemes.					
<b>Module I</b>	<b>INTRODUCTION TO COMPILERS</b>	<b>9 Hours</b>			
Programming Language basics-Language processors – Analysis of the source program – Translators Compilation and Interpretation- The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools – Applications of Compiler Technology					
<b>Module II</b>	<b>LEXICAL ANALYSIS</b>	<b>9 Hours</b>			
Lexical Analysis – Role of the lexical analysis – Input Buffering – Specification of tokens- Recognition of tokens – Lexical analyzer generator- LEX- Finite Automata – Regular Expression to an NFA – Conversion of an NFA to a DFA –Optimization of DFA based pattern matchers.					
<b>Module III</b>	<b>SYNTAX ANALYSIS</b>	<b>9 Hours</b>			
Need and Role of the Parser – Context-Free Grammars – Writing a Grammar – Top-Down Parsing- Recursive-Descent Parsing FIRST and FOLLOW – LL(1) Grammars- Non recursive Predictive Parsing- Error Recovery in Predictive Parsing Bottom-Up Parsing – Shift-Reduce Parsing –Introduction to LR parsing – SLR Parser – Canonical LR Parser – LALR- Parser Generators- YACC.					
<b>Module IV</b>	<b>SYNTAX-DIRECTED TRANSLATION &amp; RUN TIME ENVIRONMENT</b>	<b>9 Hours</b>			
Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute-Definitions-Design of predictive translator – Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions. Runtime environments –Storage organizations-stack allocation of space –Access to nonlocal data on the stack- Heap Management- Introduction to Garbage Collection.					
<b>Module V</b>	<b>INTERMEDIATE-CODE GENERATION &amp; CODE GENERATION</b>	<b>9 Hours</b>			
<b>Intermediate-Code Generation</b> :Variants of Syntax Trees – Three-Address Code – Types and Declarations – Translation of Expressions – Type Checking – Control Flow – Backpatching – Switch-Statements –Intermediate Code for Procedures. <b>Code Generation:</b> Issues in the Design of a Code Generator The Target Language – Addresses in the Target Code– Basic Blocks and Flow Graphs – Principal Sources of Optimization- Optimization of Basic Blocks – Loops in flow graphs – A Simple Code Generator –Peephole Optimization.					
<b>TOTAL:</b>					<b>45 HOURS</b>
<b>FURTHER READING / SEMINAR :</b>					
1. Machine-Independent Optimizations 2. Instruction-Level Parallelism					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1:Design token recognizer using modern tools. CO2:Design Top-down and Bottom-up parsing Techniques. CO3:Translate given input to intermediate code CO4:Explain various phases of a compiler. CO5:Identify various types of optimizations on intermediate code and generate assembly code.					

**REFERENCES:**

1. Compilers: Principles, Techniques, and Tools by Alfred V.Aho, MonicaS. Lam, RaviSethi, JeffreyD.Ullman, Pearson Publishers,2008
2. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003.
3. Bennet J.P., Introduction to Compiler Techniques, Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2003
4. Henk Alblas and Albert Nymeyer,, Practice and Principles of Compiler Building with C,PHI, 2001
5. Kenneth C. Loudon, Compiler Construction: Principles and Practice, Thompson Learning, 2003
6. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education,2008.
7. Steven S. Muchnick, “Advanced Compiler Design and Implementation, “Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003.
8. Compilers: Principles, Techniques, and Tools by Alfred V.Aho, MonicaS. Lam, RaviSethi, JeffreyD.Ullman, Pearson Publishers,2008
9. [nptel.ac.in/courses/106104123/](http://nptel.ac.in/courses/106104123/)

1902CS602	WEB TECHNOLOGY	L	T	P	C	
		3	1	0	4	
<b>PREREQUISITES:</b>						
1. Basic knowledge in HTML tags & skill of creating web pages should be known . 2. Fundamentals of Programming and Networking & Knowledge of basic Computer hardware and software is also necessary.						
<b>COURSE OBJECTIVES:</b>						
1.To impart the new concepts in Web Technologies 2.To develop understanding about the different technologies used in the World Wide Web including XML, Perl, Rails and PHP						
<b>Module I</b>	<b>Introduction</b>	<b>9 +3 Hours</b>				
XHTML Evolution of HTML and XHTML- Standard XHTML Document Structure- Basic Text Markup- Images- Hypertext Links-Lists- Tables- Forms- Frames. Cascading Style Sheets Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.						
<b>Module II</b>	<b>XML</b>	<b>9+3 Hours</b>				
Introduction to SGML – features of XML - XML as a subset of SGML – XML Vs HTML – Views of an XML document - Syntax of XML- XML Document Structure – Namespaces- XML Schemas- simple XML documents – Different forms of markup that can occur in XML documents - Document Type declarations – Creating XML DTDs – Displaying XML Data in HTML browser – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications						
<b>Module III</b>	<b>PERL</b>	<b>9 +3 Hours</b>				
Origin and Use of Perl- Scalars and their Operations – Assignment Statements and Simple Input and Output – Control Statements- Fundamentals of Arrays – Hashes REFERENCES- Functions- Pattern Matching – File Input and Output – Simple programs in Perl -Using Perl for CGI Programming.						
<b>Module IV</b>	<b>PHP &amp; MySQL</b>	<b>9 +3 Hours</b>				
Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking - Database Connectivity, Simple programs in PHP and MySQL.						
<b>Module V</b>	<b>RAILS &amp; AJAX</b>	<b>9+3 Hours</b>				
<b>RAILS</b> - Overview of Rails- Document Requests- Processing Forms- Rails Application with Databases – Layouts <b>AJAX</b> - Ajax Overview of Ajax – Basics of Ajax – Rails with Ajax.						
				<b>Total:</b>	<b>45 + 15 Hours</b>	
<b>FURTHER READING :</b>						
1.Robert W Sebesta, Programming with World Wide Web , 4th ed., Pearson Education ,New Delhi, 2009						
2.Deitel &Deitel Internet & World Wide Web How To Program 4th ed., Pearson International Edition Education ,New Delhi, 2009						
<b>COURSE OUTCOMES:</b>						
After completion of the course, Students will be able to						
CO1	Develop web pages using basic HTML					
CO2	Apply XML techniques in web design					
CO3	Implement CGI using Perl					
CO4	Implement PHP & MySQL database connectivity for real world applications					
CO5	Use AJAX with Rails.					
<b>REFERENCES:</b>						
1. Deitel&Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2011						
2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009						
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2009						
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education ,New Delhi, 2009.						
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2010						
6. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009						
7. <a href="https://nptel.ac.in/courses/106105084/">https://nptel.ac.in/courses/106105084/</a>						

1902CS603	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3
<b>PREREQUISITES</b>					
Computer Knowledge					
<b>COURSE OBJECTIVES:</b>					
1. To learn problem solving methodologies using Artificial Intelligence 2. Understand a wide variety of Machine Learning Algorithms. 3. Understand state-of-the-art deep learning methods and applying them for real world data analysis					
<b>Module I</b>	<b>INTRODUCTION</b>				<b>9Hours</b>
Introduction to AI - Agent - Type of Agent - Constraints Satisfaction Problem - Depth First Search - Best First Search - Hill Climbing - Simulated Annealing - A* Algorithms.					
<b>Module II</b>	<b>KNOWLEDGE &amp; LOGIC</b>				<b>9Hours</b>
Knowledge Representation - Types of Knowledge Representation - Knowledge Base - Proposition Logic - Predicate Logic (FOL) - Syntax and Semantics - Inference in FOL - Resolution and Reputation - Forward and Backward Chain.					
<b>Module III</b>	<b>MACHINE LEARNING</b>				<b>9 Hours</b>
Foundations for ML and Supervised Machine Learning - ML Techniques overview - Validation Techniques (Cross-Validations) - Feature Selection - Classifications - Naïve Bayes Classifier, K-Nearest Neighbors - Artificial Neural Network - Unsupervised Learning Algorithms.					
<b>Module IV</b>	<b>DEEP LEARNING</b>				<b>9 Hours</b>
Introduction to DL - Linear Models - Normalization- Dimensionally Reduction - Optimization and Generalization - Spatial Networks - Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience - Case Study..					
<b>Module V</b>	<b>INTRODUCTION TO ROBOTICS</b>				<b>9 Hours</b>
Fundamentals of Robotics, Robotics History - Basic blocks of Robots - Types of Robotics- Robotic Technology - Robot Kinematics -Implementation scope in Structure & Programming - Robotic Applications.					
				<b>Total:</b>	<b>45 Hours</b>
<b>FURTHER READING:</b>					
IOT Applications using Machine Learning and Deep Learning					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1:Understand the basics of AI CO2:know about the Knowledge and Logics in AI CO3:Apply common Machine Learning algorithms in practice and implementing their own. CO4:Understand the basic of Deep Learning. CO5:Understand the basics and function towards Robotics.					
<b>References:</b>					
1. “Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill 2. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI 3. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz and Shai Ben-David, Cambridge University Press,2014 4. Deep Learning, John D. Kelleher, MIT Press,2019					

1903CS005	DISTRIBUTED SYSTEMS (PC Elective II)	L	T	P	C
		3	0	0	3
<b>PREREQUISITES:</b>					
1. Operating Systems 2. Computer Networks					
<b>COURSE OBJECTIVES:</b>					
1. To know the various distributed computing system strategies. 2. To understand the levels of message passing and call semantics. 3. To learn the architecture of Remote Procedure Call. 4. To be aware of the transaction models and deadlocks. 5. To understand the purpose and categories of clock synchronization.					
<b>Module I</b>	<b>BASIC CONCEPTS</b>	<b>9 Hours</b>			
Characterization of Distributed Systems – Trends – Resource Sharing – Challenges – System Models– Architectural and Fundamental Models – Types of Networks. Case study: www					
<b>Module II</b>	<b>INTERPROCESS COMMUNICATION AND DISTRIBUTED OBJECTS</b>	<b>9 Hours</b>			
Interposes Communication – The API for the Internet Protocols – External Data Representation and Marshalling –Client –Server Communication – Group Communication – Distributed Objects and Remote Invocation– Communication Between Distributed Objects – Remote Procedure Call – Case study: EJB, Java RMI.					
<b>Module III</b>	<b>DISTRIBUTED TRANSACTIONS AND CONCURRENCY CONTROL</b>	<b>9 Hours</b>			
Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions – Distributed Deadlocks - Transaction Recovery.					
<b>Module IV</b>	<b>SYNCHRONIZATION AND RESOURCE MANAGEMENT</b>	<b>9 Hours</b>			
Time and Global States-Introduction-Clocks, Events and Process States-Synchronizing physical clocks- Logical time and logical clocks-Global States-Distributed Debugging-Coordination and Agreement- Introduction-Distributed mutual exclusion-Elections Algorithm- Multicast Communication.					
<b>Module V</b>	<b>DISTRIBUTED FILE SYSTEM AND NAME SERVICES</b>	<b>9 Hours</b>			
Distributed File Systems-Introduction-File service architecture-Network File System- Name Services – introduction -Name Services and the Domain Name System-Directory Services. Case study: CODA					
				<b>TOTAL:</b>	<b>45 HOURS</b>
<b>FURTHER READING / SEMINAR:</b>					
1.Google system Architecture 2.Amazon System Architecture					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1	Acquire knowledge in the basic concepts of distributed system.				
CO2	Explain interprocess communication and distributed objects.				
CO3	Exemplify the distributed transactions and concurrency control.				
CO4	Explain resource management in distributed systems.				
CO5	Explain distributed file system and name services.				
<b>REFERENCES:</b>					
1. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, Principles and Paradigms, Pearson Education, 2014.					
2. Mughesh Singhal, Niranjana G Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw Hill Edition, 2011.					
3. M. L. Liu, Distributed Computing Principles and Applications, Pearson Education, 2011.					
4.George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Pearson Education, 2010					
5.Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2012					
6. <a href="https://onlinecourses.nptel.ac.in/noc17_cs42">https://onlinecourses.nptel.ac.in/noc17_cs42</a>					

1903CS007	AD HOC AND SENSOR NETWORK (PC Elective II)	L	T	P	C
		3	0	0	3
<b>PREREQUISITES:</b>					
1.Computer Networks					
<b>COURSE OBJECTIVES:</b> The student should be made to:					
1. Understand the design issues in ad hoc and sensor networks&Learn the different types of MAC protocols.					
2. Be familiar with different types of adhoc routing protocols.and Be expose to the TCP issues in adhoc networks.					
3. Learn the architecture and protocols of wireless sensor networks.					
<b>Module I</b>	<b>INTRODUCTION</b>				<b>7 Hours</b>
Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel-Wireless local loop – IEEE 802.16 standard –HIPER ACCESS Mobile Ad Hoc Networks(MANETs) and Wireless Sensor Networks (WSNs) :Concepts and Architectures, Applications and Design Challenges .					
<b>Module II</b>	<b>MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS</b>				<b>11Hours</b>
Issues in designing a MAC Protocol- Goals and Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11.					
<b>Module III</b>	<b>ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS</b>				<b>11 Hours</b>
Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing,reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.					
<b>Module IV</b>	<b>WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS</b>				<b>8 Hours</b>
Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies –MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.					
<b>Module V</b>	<b>WSN ROUTING, LOCALIZATION &amp; QOS</b>				<b>8 Hours</b>
Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.					
				<b>Total:</b>	<b>45 Hours</b>
<b>FURTHER READING :</b>					
1. Energy Management					
2. Security In Adhoc Networks					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1	Explain the fundamentals of adhoc and sensor networks.				
CO2	Compare the routing protocols of adhoc networks.				
CO3	Illustrate the security issues in adhoc networks and explain solutions for it.				
CO4	Explain the principles of energy management in adhoc networks.				
CO5	Summarize the methods for data dissemination and gathering.				
<b>REFERENCES:</b>					
1. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “,Prentice Hall Professional Technical Reference, 2008.					
2. Carlos De Moraes Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks:Theory and Applications”, World Scientific Publishing Company, 2006.					
3. Feng Zhao and LeonidesGuibas, “Wireless Sensor Networks”, Elsevier Publication -2004.					
4. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”,Wiley, 2012					
5. <a href="https://onlinecourses.nptel.ac.in/noc17_cs07">https://onlinecourses.nptel.ac.in/noc17_cs07</a>					

1901HS004	Business Model Innovation (HSS Elective II)	L	T	P	C
		3	0	0	3
<b>PREREQUISITE:</b>					
The course assumes no prior skill or background in design, art, engineering, or prototyping. It is open to all undergraduates and graduate students with an interest in learning design thinking, and is especially recommended for those students planning social-venture and other kinds of design interventions					
<b>COURSE OBJECTIVES:</b>					
<ol style="list-style-type: none"> <li>1. Understand the Business Model Canvas</li> <li>2. Master the different types of Innovation</li> <li>3. Design Innovative Business Models</li> <li>4. Differentiate from Competition</li> <li>5. Understand purchasing psychology</li> <li>6. Define innovative revenue models</li> </ol>					
<b>Module I</b>	<b>Introduction to Business Models</b>				<b>9 Hours</b>
Introduction to Business Model Generation, Business Model Canvas, Examples: Uber Innovation Model, Facebook, Customers, Value Proposition, Sales & Delivery Channels, Customer Relationships, Revenue Streams, Resources, Activities, Partners					
<b>Module II</b>	<b>Introduction to Designing Innovative Business Models, Product and Design Innovation</b>				<b>9 Hours</b>
Disrupting Markets, Examples; AirBnb model, Better Product, Success stories of Tinder and Uber – Case studies, Visual Design, Tesla Innovation Model					
<b>Module III</b>	<b>Customer Innovation: Customer niches, Sales &amp; Delivery Channels, Marketing</b>				<b>9 Hours</b>
Disrupting Customer Relationships, Acquire first time customer, Disrupting Customer segments, Focus on underserved market niche, Disrupt delivery Channels, Digital Sales channel					
<b>Module IV</b>	<b>Resource Driven Innovation</b>				<b>6 Hours</b>
New product development strategies, Innovative production techniques, Automation of small and medium companies					
<b>Module V</b>	<b>Revenue Model Innovation &amp; Purchasing Psychology</b>				<b>12 Hours</b>
Disrupting revenue models, Subscription models, Freemium and Micro payments, advertising, affiliates and franchising, Why People Buy – Necessity, Loss Aversion, Fear, Convenience, Belonging & Vanity, Scarcity					
<b>TOTAL: 45 HOURS</b>					
<b>COURSE OUTCOMES:</b>					
<ol style="list-style-type: none"> <li>1. Describe Key Concepts and basics of Design Thinking Principles</li> <li>2. Elaborate the Design Thinking Approach through IDEO's method &amp; Customer Journey Maps</li> <li>3. Conduct user interviews and synthesize learnings to uncover insights and identify opportunities for innovation</li> <li>4. Develop Design Driven Innovative Solutions to RealWorld Problems</li> </ol>					
<b>FURTHER READING:</b>					
<ol style="list-style-type: none"> <li>1. HBR's 10 Must Reads on Business Model Innovation (with featured article "Reinventing Your Business Model" by Mark W. Johnson, Clayton M. Christensen, and Henning Kagernmann) (English, Paperback, Review Harvard Business)</li> <li>2. The Business Model Book (Adam J. Bock, Gerard George)</li> <li>3. The Field guide to Human Centered Design by IDEO.org</li> </ol>					
<b>REFERENCES:</b>					
1.The Business Model Innovation Factory: How to Stay Relevant When The World is Changing Hardcover – April 24, 2012, Saul Kaplan					
2.Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation Book by Tim Brown, 2009					
3. The business model navigator is a book that comes out from the research of Oliver Gassmann, Karolin Frankenberger, and Michaela Csik.					
4. Business Model Generation: A Handbook for Visionaries, Game...by Alexander Osterwalder					
5. The Design of Everyday ThingsBook by Don Norman, 1988					



6. Testing Business Ideas: A Field Guide for Rapid Experimentation (Strategyzer) 1st Edition by David J. Bland (Author), Alexander Osterwalder
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7. <a href="https://nptel.ac.in/courses/109104109/">https://nptel.ac.in/courses/109104109/</a>
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1903CS022	ARTIFICIAL INTELLIGENCE (Open Elective-I)	L	T	P	C	
		3	0	0	3	
<b>Course Objectives:</b>						
1. To learn problem solving methodologies using Artificial Intelligence 2. To introduce the concepts of machine learning and its implementation 3. To introduce AI programming languages like Prolog						
<b>Module I</b>	<b>PROBLEM SOLVING</b>	<b>9 Hours</b>				
Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction						
<b>Module II</b>	<b>LOGICAL REASONING</b>	<b>9 Hours</b>				
Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic - forward chaining – backward chaining – unification – resolution						
<b>Module III</b>	<b>PLANNING</b>	<b>9 Hours</b>				
Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world						
<b>Module IV</b>	<b>UNCERTAIN KNOWLEDGE AND REASONING</b>	<b>9 Hours</b>				
Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models						
<b>Module V</b>	<b>LEARNING</b>	<b>9 Hours</b>				
Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning.						
					<b>Total:</b>	<b>45 Hours</b>
<b>Further Reading:</b>						
Bot Applications, Deep Learning						
<b>Course Outcomes:</b>						
After completion of the course, Student will be able to						
CO1	Identify problems those are amenable to solution by AI methods					
CO2	Identify appropriate AI methods to solve a given problem					
CO3	Formalize the AI problem using proper framework/language					
CO4	Implement machine learning algorithms to solve AI problems					
CO5	Implement the AI methodologies using AI programming Languages					
<b>References:</b>						
1. “Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill						
2. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI						
3. Introduction to Prolog Programming By Carl Townsend.						
4. “PROLOG Programming For Artificial Intelligence” -By Ivan Bratko( Addison-Wesley)						
5. <a href="https://nptel.ac.in/courses/106/102/106102220/">https://nptel.ac.in/courses/106/102/106102220/</a>						

1903CS024	WEB TECHNOLOGY			L	T	P	C	
				3	0	0	3	
<b>PREREQUISITE:</b> Basic Computer Knowledge, Networks, Database Management Systems.								
<b>COURSE OBJECTIVES:</b>								
1. To impart the new concepts in Web Technologies 2. To develop understanding about the different technologies used in the World Wide Web including XML, Perl and PHP								
<b>Module I</b>	<b>INTRODUCTION</b>						<b>9 Hours</b>	
XHTML Evolution of HTML and XHTML- Standard XHTML Document Structure- Basic Text Markup- Images-Hypertext Links-Lists- Tables- Forms- Frames. Cascading Style Sheets Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.								
<b>Module II</b>	<b>XML</b>						<b>9 Hours</b>	
Introduction to SGML – features of XML - XML as a subset of SGML – XML Vs HTML – Views of an XML document - Syntax of XML- XML Document Structure – Namespaces- XML Schemas- simple XML documents – Different forms of markup that can occur in XML documents - Document Type declarations – Creating XML DTDs – Displaying XML Data in HTML browser								
<b>Module III</b>	<b>PERL</b>						<b>9 Hours</b>	
Origin and Use of Perl- Scalars and their Operations – Assignment Statements and Simple Input and Output – Control Statements- Fundamentals of Arrays – Hashes - Functions- Pattern Matching– Simple programs in Perl -Using Perl for CGI Programming.								
<b>Module IV</b>	<b>PHP</b>						<b>9 Hours</b>	
Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking								
<b>Module V</b>	<b>MySQL</b>						<b>9 Hours</b>	
Basics, query design & functions, database operations, procedures, simple programs in php and mysql.								
						<b>Total:</b>	<b>45 Hours</b>	
<b>COURSE OUTCOMES:</b>								
After completion of the course, Students will be able to								
CO1:Develop web pages using basic HTML								
CO2:Apply XML techniques in web design								
CO3:Implement CGI using Perl								
CO4:Understand the functionality and utility of PHP along with usage of syntax, variables and Data types.								
CO5:Implement PHP & MySQL database connectivity for real world applications								
<b>References:</b>								
1. Deitel&Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2016								
2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2013								
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2012								
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education ,New Delhi, 2012								
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2015								
6. Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2014								
7. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2015								

1902CS651	COMPILER LABORATORY	L	T	P	C
		3	0	0	3
<b>PREREQUISITES:</b> C programming language.					
<b>COURSE OBJECTIVES:</b>					
1. Be exposed to compiler writing tools. Learn to implement the different Phases of compiler					
2.Be familiar with control flow and data flow analysis					
3.Learn simple optimization techniques					
<b>LIST OF EXPERIMENTS</b>					
1. Implementation of Symbol Table					
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments,operators etc.)					
3. Implementation of Lexical Analyzer using Lex Tool					
4. Generate YACC specification for a few syntactic categories. a) Program to recognize a valid arithmetic expression that uses operator +, - , * and /. b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits. d)Implementation of Calculator using LEX and YACC					
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.					
6. Implement type checking					
7. Implement control flow analysis and Data flow Analysis					
8. Implement any one storage allocation strategies(Heap,Stack,Static)					
9. Construction of DAG					
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.					
<b>Total:</b>					<b>45Hours</b>
<b>LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:</b>					
Standalone desktops with C / C++ compiler and Compiler writing tools 30 Nos. (or) Server with C / C++ compiler and Compiler writing tools supporting 30 terminals or more. LEX and YACC					
<b>Additional Experiments:</b>					
1. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1:Implement the different Phases of compiler using tools					
CO2:Analyze the control flow and data flow of a typical program					
CO3:Optimize a given program					
CO4:Generate an assembly language program equivalent to a source language program					
<b>REFERENCES:</b>					
1. Y. S. Abu-Mostafa, M. Magdon-Ismael, and H.-T. Lin, “Learning from Data”, AMLBook Publishers, 2012.					
2. P. Flach, “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press, 2012.					
3. K. P. Murphy, “Machine Learning: A probabilistic perspective”, MIT Press, 2012.					
4. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.					
5. D. Barber, “Bayesian Reasoning and Machine Learning”, Cambridge University Press, 2012.					
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, “Foundations of Machine Learning”, MIT Press, 2012.					
7. T. M. Mitchell, “Machine Learning”, McGraw Hill, 1997.					
8. S. Russel and P. Norvig, “Artificial Intelligence: A Modern Approach”, Third Edition, Prentice Hall, 2009.					

1902CS652	WEB TECHNOLOGY LABORATORY	L	T	P	C
		0	0	2	1
<b>PREREQUISITES:</b>					
1. Basic knowledge in HTML tags & skill of creating web pages should be known .					
2. Fundamentals of Programming and Networking & Knowledge of basic Computer hardware and software is also necessary.					
<b>COURSE OBJECTIVES:</b>					
1. Learn to develop webpages using HTML and CSS					
2. Be familiar with advanced programming such as PHP/Perl					
3. Know to use AJAX in implementing Rails					
<b>List of Experiments:</b>					
1. Basic Programs using HTML					
2. Programs using cascading style sheets					
3. Programs to create dynamic web pages					
4. Programs using HTML & XML as data store					
5. Programs using Perl					
6. Programs to demonstrate PHP & MySQL database connectivity					
7. Programs using Perl & CGI					
8. Programs using AJAX					
9. Programs using Rails					
10. Case Study : Create a web application for the given problem statement					
				<b>Total:</b>	<b>45 Hours</b>
<b>Additional Experiments:</b>					
1. Programs for Rails with AJAX					
2. Programs to implement JSON					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1	Develop web pages using basic HTML				
CO2	Apply XML techniques in web design				
CO3	Implement CGI using Perl				
CO4	Implement PHP & MySQL database connectivity for real world applications				
CO5	Use AJAX with Rails.				
<b>REFERENCES:</b>					
1. Deitel&Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2011					
2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009					
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2009					
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education New Delhi, 2009.					
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2010					
6. Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2008					
7. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009					
8. <a href="https://nptel.ac.in/courses/106105084/">https://nptel.ac.in/courses/106105084/</a>					

1904CS653	SOFTWARE PROTOTYPE DEVELOPMENT LAB (MINI PROJECT 1)	L	T	P	C
		0	0	2	1
<b>COURSE OBJECTIVES:</b>					
1.To highlight the importance of Software Development and design and its limitations					
2.To show how we apply the process of software development.					
3.To provide the necessary knowledge and skills in using Software Development Tools.					
Software prototyping is the activity of creating prototypes of software applications, i.e., incomplete versions of the software program being developed.					
The <b>purpose</b> of a prototype is to allow users of the software to evaluate developers' proposals for the design of the eventual product by actually trying them out, rather than having to interpret and evaluate the design based on descriptions. Software prototyping provides an understanding of the software's functions and potential threats or issues.[1] Prototyping can also be used by end users to describe and prove requirements that have not been considered, and that can be a key factor in the commercial relationship between developers and their clients.					
The <b>process</b> of prototyping involves the following steps					
<ol style="list-style-type: none"> <li>1. Identify basic requirements Determine basic requirements including the input and output information desired. Details, such as security, can typically be ignored.</li> <li>2. Develop initial prototype The initial prototype is developed that includes only user interfaces. (See Horizontal Prototype, below)</li> <li>3. Review The customers, including end-users, examine the prototype and provide feedback on potential additions or changes.</li> <li>4. Revise and enhance the prototype Using the feedback both the specifications and the prototype can be improved. Negotiation about what is within the scope of the contract/product may be necessary. If changes are introduced then a repeat of steps #3 and #4 may be needed.</li> </ol>					
<p><b>Tools</b> : Efficiently using prototyping requires to have the proper tools and a staff trained to use those tools. Tools used in prototyping can vary from individual tools, such as 4th generation programming languages used for rapid prototyping to complex integrated CASE tools. 4th generation visual programming languages like Visual Basic and ColdFusion are frequently used since they are cheap, well known and relatively easy and fast to use. CASE tools, supporting requirements analysis, like the Requirements Engineering Environment are often developed or selected by the military or large organizations. Object oriented tools are also being developed like LYMB from the GE Research and Development Center. Users may prototype elements of an application themselves in a spreadsheet.</p> <p>As web-based applications continue to grow in popularity, so too, have the tools for prototyping such applications. Frameworks such as Bootstrap, Foundation, and Angular JS provide the tools necessary to quickly structure a proof of concept. These frameworks typically consist of a set of controls, interactions, and design guidelines that enable developers to quickly prototype web applications.</p> <p>Tools such as InVision, Adobe Experience Design, Origami, Sketch, Axure, Web Flow, Framer, Atomic, Principle, Just in Mind, BalSamiq Mockups, are also can be used for prototyping.</p>					
<b>TOTAL: 45 Hours</b>					
<b>COURSE OUTCOMES:</b>					
After completion of the course, Student will be able to					
CO1	Apply the knowledge to collect the requirements				
CO2	Design projects using Software Components				
CO3	Recognize the role and function of each Development model in software System.				
CO4	Apply appropriate design patterns.				
<b>REFERENCES:</b>					
1. <a href="https://www.knowgravity.com">https://www.knowgravity.com</a>					
2. <a href="http://www.win.tue.nl/">http://www.win.tue.nl/</a>					
3. <a href="https://www.microconsult.de">https://www.microconsult.de</a>					

1904GE651	LIFE SKILLS : APTITUDE – II			L	T	P	C	
				0	0	2	1	
<b>COURSE OBJECTIVE(S):</b>								
1. To brush up problem solving skill and to improve intellectual skill of the students 2. To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors 3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 4. To enhance analytical ability of students 5. To augment logical and critical thinking of Student								
<b>MODULE I</b>	<b>Profit and Loss Simple Interest, Compound Interest</b>						<b>6 hours</b>	
Problems on Profit and Loss percentage- Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price - Definitions Simple Interest - Problems on interest and amount - Problems when rate of interest and time period are numerically equal - Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.								
<b>MODULE II</b>	<b>Blood relations, Clocks, Calendars</b>						<b>6 hours</b>	
Defining the various relations among the members of a family - Solving Blood Relation puzzles - Solving the problems on Blood Relations using symbols and notations -Finding the angle when the time is given - Finding the time when the angle is known - Relation between Angle, Minutes and Hours - Exceptional cases in clocks - Definition of a Leap Year - Finding the number of Odd days - Framing the year code for centuries - Finding the day of any random calendar date .								
<b>MODULE III</b>	<b>Time and Distance, Time and Work</b>						<b>6 hours</b>	
Relation between speed, distance and time - Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed - Problems on trains - Problems on boats and streams - Problems on circular tracks - Problems on races - Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method - Problems on alternate days - Problems on Pipes and Cisterns.								
<b>MODULE IV</b>	<b>Data Interpretation and Data Sufficiency</b>						<b>6 hours</b>	
Problems on tabular form - Problems on Line Graphs - Problems on Bar Graphs - Problems on Pie Charts - Different models in Data Sufficiency - Problems on data redundancy								
<b>MODULE V</b>	<b>Analytical Reasoning</b>						<b>6 hours</b>	
Problems on Linear arrangement - Problems on Circular arrangement - Problems on Double line-up - Problems on Selections - Problems on Comparisons								
<b>TOTAL: 30 HOURS</b>								
<b>COURSE OUTCOMES:</b> On the successful completion of the course, students will be able to								
CO1	Implement business transactions using profit and loss & Interest Calculation.							
CO2	Workout family relationships concepts, ability to visualize clocks & calendar and understand the logic behind a Sequence.							
CO3	Calculate concepts of speed, time and distance, understand timely completion using time and work.							
CO4	Learners should be able to understand various charts and interpreted data least time.							
CO5	Workout puzzles, ability to arrange things in an orderly fashion.							
<b>REFERENCES:</b>								
1.Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7 <sup>th</sup> edition, McGraw Hills publication, 2016.								
2.Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4 <sup>th</sup> edition, McGraw Hills publication, 2017.								
3.R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.								
4.R S Agarwal, 'Quantitative Aptitude for Competitive Examinations', revised edition, S.Chand publication, 2017.								
5.Rajesh Verma, "Fast Track Objective Arithmetic", 3 <sup>rd</sup> edition, Arihant publication, 2018.								
6.B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2 <sup>nd</sup> edition, Arihant publication, 2014.								