Course Title: Software Engineering
Course no: CSC-351 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Discussion on types of software, developing process and maintaining the software.

Goal: This course introduces concept of software development paradigm and implementing these in real world.

Course Contents:

Unit 1: **11 Hrs.**

1.1 Introduction to Software Engineering: Definition of software, software engineering. Comparing between other engineering and software engineering.

1.2 System Engineering: Introduction to System, System properties, system and their environment, system modeling.

1.3 Software Process: Introduction, software process model, process iteration, software specification, software design and implementation, software validation, software evolution.

1.4 Project Management: Introduction, management activities, project planning, project scheduling, risk management.

Unit 2: **12 Hrs.**

2.1 Software Requirements: Introduction, Types of requirements, requirements engineering process: Feasibility study, requirements elicitation and analysis, requirement validation, requirement management.

2.2 Software Prototyping: Introduction, prototyping in the software process, rapid prototyping techniques, user interface prototyping.
2.3 Formal Specification: Introduction, formal specification in software process, interface specification, behavioral specification.

Unit 3: **6 Hrs.**

3.1 Architectural Design: Introduction, system structuring, control models, modular decomposition, domain specific architecture.

3.2 Object Oriented Design: Introduction, Features of object oriented design, object oriented software engineering.

Unit 4: **16 Hrs.**

4.1 Verification & Validation: Introduction, verification and validation planning, software inspection, cleanroom software development.

4.2 Software Testing: Introduction, types of testing, testing work benches.
4.3 Critical system validation: Introduction, formal methods and critical systems, reliability validation, safety assurance, security assessment.
4.4 Software Cost Estimation: Introduction, productivity, estimation techniques.

4.5 Software Reengineering: Introduction, source code translation, reverse engineering.

Laboratory works: Developing the software techniques explained in the course.

Homework

Text Books: Software Engineering, 7th Edition, Ian Sommerville, PEARSON EDUCATON ASIA

Reference: Software Engineering: A Practitioner's Approach, 6th Edition, Roger S. Pressman, McGraw Hill International Edition.

Assignment: Assignment should be given from the above units in throughout the semester.

Computer Usage: No specific

Prerequisite: C, C++, Data Structure, Automata Theory, System Analysis & Design

Category Content: Science Aspect: 60%
Design Aspect: 40%

Course Title: Complier Design and Construction
Course no: CSC-352 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: Analysis of source program. The phases of compiler.

Goal: This course introduces fundamental concept of compiler and its different phases.

Course Contents:

Unit. 1: 6 Hrs.

1.5 Introduction to compiling: Compilers, Analysis of source program, the phases of compiler, compiler-construction tools.
1.6 A Simple One-Pass Compiler: Syntax Definition, Syntax directed translation, Parsing, Translator for simple expression, Symbol Table, Abstract Stack Machines.

Unit 2: 19 Hrs.

2.4 Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, Finite Automata, Regular Expression to an NFA, Design of a lexical analyzer generator 5 hrs.
2.5 Syntax Analysis: The role of parser, Context free grammars, Writing a grammars, Top-down parsing, Bottom-up parsing, Operator-preceding parsing, LR parsing, Ambiguous grammar.
2.6 Syntax Directed Translation: Syntax-directed definition, Syntax tree and its construction, Evaluation of S-attributed definitions, L-attributed, Top-down translation, Recursive evaluators.
2.7 Type Checking: Type systems, Specification of a simple type checker, Type conversions.

Unit 3: 13 Hrs.

3.3 Intermediate Code Generation: Intermediate languages, Declarations, Assignments Statements, Boolean Expressions, Back patching.
3.4 Code Generator: Issues in design of a code generator, the target machine, Run – time storage management, Basic blocks and flow graphs, a simple code generator, Peephole organization, Generating code from dags, Dynamic programming code-generation algorithm, Code-generator generators.
3.5 Code Optimization: The principal sources of optimization, Optimization of basic blocks, loops in flow graphs.

Unit 4: 7 Hrs.

4.6 Writing a Compilers: Planning a compiler, Approaches to compiler development, the compiler development environment, Testing and Maintenance.
4.7 Comparing some compliers: Pascal Complier, C compiler, C++ complier.

Laboratory works:

1 Writing a complier, optimization techniques, comparing the compilers.
2. Construction of Lexical Analyser.
3. Construction of Parser
4. Development of Code Generator
5. Write a code to show the function of symbol table.
6. Implement the parsing techniques.
7. Show the application of different types of grammar.
8. Implement the lexical analyzer generator.
9. Implement the type conversation.
10. The course instructor is allowed to create a group two students.
    a. Assign them to write a small compiler.

Text Books: Compilers, Principles, Techniques, and Tools, Pearson Education Asia.

Reference:

Homework Assignment: Assignment should be given from the above units in throughout the semester.

Computer Usage: No specific

Prerequisite: C, C++, Data Structure, Automata Theory

Category Content: Science Aspect: 25%
Design Aspect: 75%

Course Title: Web Technologies
Course no: CSC-353 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course introduces the client server web technology.

Goal: To expose the students with client and server side web programming.

Course Contents:

Unit 1. Introduction: **4 Hrs.**

Review of web technology, Review of HTML and JAVA Script

Unit 2. Issues of Web Technology: **6 Hrs.**

Architectural issues of web layer, HTTP & FTP Protocols, Tier Technology: 2-Tier, 3-Tier and n-Tier

Unit 3. The Client Tier: **12 Hrs.**

Representing content, XML, DTD's, Schemas, Stylesheets and Transformation: CSS, XSL/XSLT, SAX, and DOM, Client-side Programming

Unit 4. The Server Tier: **20 Hrs.**

Web Server Concept, Creating Dynamic Content, Using Control Flow to control Dynamic Control Generation, Sessions and State, Error handling, Authentication, Architecting web application, Using tag libraries, Writing tag libraries

Unit 5. Introduction to Advanced Server Side Issues: **3 Hrs.**

Laboratory works: The laboratory should cover all the topics mentioned above.

Text / Reference Books:

Matt J. Crouch, **ASP.NET and VB.NET Web Programming**, Pearson Education Asia, 2002

Rahul Banerjee, **Internetworking Technologies**, Prentice-Hall of India Limited, Fourth Edition, 2000

Course Title: Real Time System
Course no: CSC-354 **Full Marks**: 90+10
Credit hours: 3 **Pass Marks**: 2 + 8

Nature of course: Theory (3 Hrs.)

Course Synopsis: This course introduces the real time technology
.
Goal: The main objective of this course is to address issue in scheduling, resource access control, and communication in the real time system

Unit 1. Introduction **3 Hrs.**

Digital control, High-level controls, Signal processing, Real time applications

Unit 2. Hard versus Soft Real-Time Systems **4 Hrs.**

Jobs and processors, Release times, Deadlines, and timing constraints, Hard and soft timing constraints, Hard real-time systems, Soft real-time systems,

Unit 3. Reference Model of Real-Time Systems **4 Hrs.**

Processor and resources, Temporal parameters of real-time workload, Periodic task model, Precedence constraints and data dependency, Other dependencies, Functional parameters, Resource parameters of jobs and parameters of resources, Scheduling hierarchy

Unit 4. Approaches to Real-Time Scheduling **4 Hrs.**

Clock-driven approach, Weighted round-robin approach, Priority-driven approach, Dynamic versus static system, Effective release times and deadlines, Optimality of the EDF and LST algorithms, Nonoptimality of the EDF and LST algorithms, Challenges in validating timing constraints in priority-driven systems, Off-line versus on-line scheduling,

Unit 5. Clock-Driven Scheduling **5 Hrs.**

Notations and assumptions, Static, Timer-driven scheduler, General structure of cyclic schedules, Cyclic executives, Improving the average response time of aperiodic jobs, Scheduling sporadic jobs, Practical considerations and generalization, Algorithm for constructing static schedules, Pros and cons of clock-driven scheduling

Unit 6. Priority-Driven Scheduling of Periodic Tasks **6 Hrs.**

Static assumption, Fixed-priority versus dynamic-priority algorithms, Maximum schedule utilization, Optimality of the RM and DM algorithms, A schedulability test for fixed-priority tasks with short response times, schedulability test for fixed-priority

tasks with arbitrary response times, Sufficient schedulability conditions for the RM and DM algorithms, Practical factor

Unit 7. Scheduling Aperiodic and Sporadic Jobs in Priority-Driven Systems 6 Hrs.

Assumptions and approaches, Deferrable servers, Sporadic servers, Constant utilization, total bandwidth, and weighted fair-queuing servers, Slack stealing in deadline-driven systems, Slack stealing in fixed-priority systems, Scheduling of sporadic jobs, Real-time performance for jobs, with soft timing constraints, Low-level scheme for integrated scheduling

Unit 8. Resources and Resource Access Control 5 Hrs.

Assumptions on resources and their usage, Effects of resources contention and resource access control, Nonpreemptive critical sections, Basic priority-inheritance protocol, Basic priority-ceiling protocol, Stack-based, priority-ceiling (ceiling-priority) protocol, Use of priority-ceiling protocol in dynamic-priority system, Preemption-ceiling protocol, Controlling accesses to multiple-unit resources, Controlling concurrent accesses to data objects,

Unit 9. Multiprocessor Scheduling, Resource Access Control and Synchronization 5 Hrs.

Model of multiprocessor and distributed systems, Task assignment, Multiprocessor priority-ceiling protocol, Elements of scheduling algorithms for end-end periodic tasks, End-to-end tasks in heterogeneous systems, Predictability and validation of dynamic multiprocessor systems.

Unit 10. Real –Time Communication 6 Hrs.

Model of real-time communication, Priority-based service disciplines for switched networks, Weighted round-robin service disciplines, Medium access-control protocols of broadcast networks, Internet and resource reservation protocols, Real-time protocol, Communication in multi computer systems

Text / Reference Book:

1. Real-Time Systems, Jane W. S. Liu, Pearson Education Asia, 2003

Course Title: Introduction to Artificial Intelligence
Course no: CSC-355 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course introduces the problem solving techniques, problem representation and machine learning.

Goal: The main objective of this course is to provide basic knowledge of Artificial Intelligence, with acquaintance of different search techniques and AI applications.

Course Contents:

Unit 1. Introduction to Artificial Intelligence **4 Hrs.**

Artificial Intelligence and related fields, brief history of AI, applications of Artificial Intelligence, Definition and importance of Knowledge, and Learning.

Unit 2. Problem Solving **6 Hrs.**

Problem Definition, Problem as a state space search, Problem formulation, Problem types, Well-defined problems, Constraint satisfaction problem, Game playing, Production systems.

Unit 3. Search Techniques **9 Hrs.**

Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison, Informed search techniques-hill climbing, best first search, greedy search, A* search, Adversarial search techniques-minimax procedure, alpha beta procedure

Unit 4. Knowledge Representation, Inference and Reasoning **12 Hrs.**

Formal logic-connectives, truth tables, syntax, semantics, tautology, validity, well-formed-formula, propositional logic, predicate logic, FOPL, interpretation, quantification, horn clauses, rules of inference, unification, resolution refutation system (RRS), answer extraction from RRS, rule based deduction system, Statistical Reasoning-Probability and Bayes' theorem and causal networks, reasoning in belief network

Unit 5. Structured Knowledge Representation **4 Hrs.**

Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, Semantic nets, frames, conceptual dependencies and scripts

Unit 6. Machine Learning **4 Hrs.**

Concepts of learning, learning from examples, explanation based learning, learning by analogy, learning by simulating evolution, learning by training neural nets, learning by training perceptrons.

Unit 7. Applications of Artificial Intelligence **6 Hrs.**

Expert Systems, Neural Network, Natural Language Processing, Machine Vision

Laboratory work: Laboratory exercises should be conducted in either LISP or PROLOG. Laboratory exercises must cover the fundamental search techniques, simple question answering, inference and reasoning.

Text / Reference books:

- E. Rich and Knight, *Artificial Intelligence*, McGraw Hill.
- D. W. Patterson, *Artificial Intelligence and Expert Systems*, Prentice Hall.
- P. H. Winston, *Artificial Intelligence*, Addison Wesley.
- Stuart Russel and Peter Norvig, *Artificial Intelligence A Modern Approach*, Pearson
- Ivan Bratko, *PROLOG Programming for Artificial Intelligence*, Addison Wesley.

Course Title: Fundamentals of E-Commerce
Course no: CSC-356 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.)

Course Synopsis: Discussion on types of commerce, doing business in electronics, infrastructure of electronic commerce.

Goal: This course introduces basic concept of commerce and discusses the basic needs of electronic commerce.

Course Contents:

Unit 1: **14 Hrs.**

1.7 Introduction to Electronic Commerce: Introduction of commerce, Electronic commerce framework, electronic commerce and media convergence, the anatomy of e-commerce application.

1.8 The Network for Electronic Commerce: Need of network, market forces influencing the I-way, components of I-way, network access equipment, and global information distribution network.

1.9 The Internet as a Network Infrastructure: Introduction, the Internet terminology, NSFNET: Architecture and Components, Internet governance: The Internet Society.

Unit 2: **23 Hrs.**

2.8 Network Security & Firewalls: Client-Server network security, security threats in client-server, firewalls and network security, data & message security, encrypted documents and electronic mail.

2.9 Electronic Commerce & World Wide Web: Introduction, architectural framework for electronic commerce, WWW as an architecture, security in the web.

2.10 Consumer Oriented Electronic Commerce: Introduction, consumer oriented application, mercantile process models, mercantile models from the consumer's perspective, mercantile models from the merchant's perspective.

2.11 Electronic Payment Systems: Introduction, types of electronic payment system, digital token based electronic payment systems, smart cards and electronic payment systems, credit cards systems, Threat on electronic payment system.

Unit 3: **8 Hrs.**

3.6 Inter-organizational Commerce & Electronic Data Interchange: Introduction, EDI application in business, EDI: legal, security, and privacy issues, EDI and electronic commerce.

3.7 The Corporate Digital Library: Introduction, dimensions of electronic commerce systems, types of digital documents, Issues behind document infrastructure, corporate data warehouses.

Laboratory works: Developing the small electronic payment system.

Text Books: **Frontiers of Electronic Commerce**, 5th Edition, Kalkotia and Whinston, Pearson Education Asia

Homework Assignment: Assignment should be given from the above units in throughout the semester.

Computer Usage: No specific

Prerequisite: C, C++, Data Structure, System Analysis & Design

Category Content: Science Aspect: 60%
Design Aspect: 40%

Course Title: Society and Ethics in Information Technology
Course no: CSC-357 **Full Marks**: 90+10
Credit hours: 3 **Pass Marks**: 36+4

Nature of course: Theory (3 Hrs.)

Course Synopsis: General introduction to society, ethics and profession and general understanding of professional environment.

Goal: This course provides general understandings of the social and ethical issues related with the practice of a profession taking special reference of IT profession.

Unit 1. Society and Technology **8 Hrs.**

Meaning of society and its characteristics, Theories of social change – Socio-cultural evolution, functional and conflict theory, Concept of technology and technological change, General impact of technology on society, Impact of computer on society, Application, security, crimes and ethical issues related with IT

Unit 2. Profession and Ethics **10 Hrs.**

Meaning and characteristics of a profession, Define ethics and distinguish between moral and non-moral action, Discussion on moral dilemma, Discuss ethical theories – Utilitarianism, universalism, distributive justice and personal liberty, Introduction to professional society – its registration procedure, code of ethics applicable to IT profession and disciplinary action

Unit 3. Law, Policy and Institutions **15 Hrs.**

Sources of law, Overview of law/policies/institutions affecting practice of IT profession, Types of business firms and their characteristics – private, partnership and company, Introduction multinational companies and joint ventures, Define contract, Essentials of a valid contract, Void and voidable contract, Introduction to tort and negligence, Introduction to Labor Act and Trade Union Act, Introduction to Nepalese cyber law and IT policy taking general reference to other countries – US, England, Japan, India and China

Unit 4. Introduction to Intellectual Property Rights **2 Hrs.**

Copy rights, patent, trademarks, industrial design

Unit 5 Case Studies/Group Discussions and Seminars **10 Hrs.**

In each unit, related cases will be discussed and group discussions will be held in the class as well as students will make presentations covering wide areas of society, ethics and profession.

References:

Chitrakar, Roshan and shrestha, Deepanjal (Compilation), A Manual of Social and Professional Issues in Information Technology, **PAI, Kathmandu, 2005**

Johnson, D. G., Computer Ethics**, Pearson Education Asia, 2001 ISBN: 81-7808-306-X**

Laudon, Kenneth C. **and Laudon Jane P.,** Management Information Systems, **Prentice Hall of India, New Delhi, 1999 ISBN: 81-203-1282-1**

Kanter, Jerome, Managing with Information, **Prentice Hall of India, New Delhi, 1998 ISBN: 81-203-1012-8**

Patnaik, Srikanta, First Text Book on Information Technology, **Dhanpat Rai & Co., New Delhi, 2001**

Govindarajan, M., Natarajan, S., and Senthilkumar, V. S., Engineering Ethics, **Prentice Hall of India, New Delhi, 2004 ISBN: 81-203-2578-8**

Homework Assignments: Assignments includes preparation for cases, group discussions and presentations in the class.

Course Title: Automation and Robotics
Course no: CSC-358 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: this course has the idea of automation and robotics.

Goal: To provide students with information on how to apply robots and manufacturing automated systems with the basic principles underlying the design, analysis and synthesis of robotic systems.

Course Contents:

Unit 1. Introduction **6 Hrs.**

Robot definition, Major Components, Human arm characteristics, Geometric motion configuration, Robot Classification, Direct and Indirect Drives, Characteristics of Robot Performance, Historical development of Robot, Degrees of freedom, Asimov's laws of robotics, dynamic stabilization of robots.

Unit 2. Power Sources and Sensors **8 Hrs.**

Hydraulic, pneumatic and electric drives, determination of HP of motor and gearing ratio, variable speed arrangements, path determination, micro machines in robotics, machine vision, ranging, laser, acoustic, magnetic, fiber optic and tactile sensors.

Unit 3. Manipulators, Actuators, and Grippers **8 Hrs.**

Manipulators, Classification, Construction of manipulators, manipulator dynamics and force control, electronic and pneumatic manipulator control, End effectors, Loads and Forces, Grippers, design considerations, Robot motion Control, Position Sensing

Unit 4. Kinematic Analysis **10 Hrs.**

Manipulator Kinematics, Manipulator Geometry and Degrees of Freedom, Workspace and Joint Space, Coordinate Transformation, Rotation Matrices and Transformation, Homogeneous Transformation, Translation Matrices, Orientation Specification, Rotation Matrices.

Unit 5. Process Control **9 Hrs.**

Process Control and Types, On-Off Control Systems, Proportional Control Systems, Proportional Plus Integral (PI) Control Systems, Three Mode Control (PID) Control Systems, Process Control Tuning.

Unit 6. Other Issues **4 Hrs.**

Robot Safety, Safety Hazards, Safety Measures, Economic Analysis and Installation, Robot Manufacturing Systems, selection of a robot.

References:

1. Jain K.C. and Aggarwal B.E., *Robotics – Principles and Practice*, Khanna Publishers
2. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., *Industrial Robotics*, McGraw Hill.
3. Ghosh, *Control in Robotics and Automation: Sensor Based Integration*, Allied Publishers.
4. Schuler, C.A. and McNamee, W.L. *Modern Industrial Electronics*, Macmillan/McGraw-Hill
5. Klafter R.D., Chimielewski T.A., Negin M., *Robotic Engineering – An integrated approach*, Prentice Hall of India.

Course Title: Digital System Design
Course no: CSC-359 **Full Marks**: 70+10+20
Credit hours: 3 P**ass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course introduces the concepts of VLSI design and testing

Goal: The course objective is to provide ample knowledge on digital design process with the VLSI design procedures and to enhance the knowledge of hardware design applying subsystem design with VHDL and FPGA.

Course Contents:

Unit 1. Introduction **5 Hrs.**

Digital Systems and Integration, Electronic Design Automation, IC Manufacturing, Logic Families, IC Design Techniques, IC characteristics: fan-out, power dissipation, propagation delay, and noise margin of TTL and CMOS integrated circuit logic devices

Unit 2. Logic Manipulation **5 Hrs.**

DeMorgan's Theorem, Canonical Forms, Minterm and Maxterm, implicant, prime implicant, K-Maps, Quine-McCluskey Method.

Unit 3. Application Specific Devices **8 Hrs.**

PROMs and EPROMs, Programmable Array Logic (PAL), Programmed Logic Array (PLA), Gate Arrays, Programmable Gate Array, Full Custom Design.

Unit 4. State Machine and Design **7 Hrs.**

Mealy and Moore machines, state transition tables and diagrams, algorithmic state machine charts, Synchronous State Machine Design, Design of Input Forming Logic and Output Forming Logic of state machine.

Unit 4. VLSI Design **8 Hrs.**

Transistor and Layouts, Fabrication Process, Design Rules, Layout design and tools, Logic Gates, Combinational logic Networks and Design, Sequential Systems and Design, Subsystem Design, Various Floorplanning Methods, Off-Chip Connections.

Unit 5. Testing **6 Hrs.**

Testing and Verification, Testing logic circuits, Combinational gate testing, Combinational network testing, Sequential Testing, Test vector generation, fault, fault model and fault detection, SA0, SA1, Design for Testability.

Unit 6. Hardware Description Languages 6 Hrs.

VHDL and its use in programmable logic devices (PLDs) like FPGA

Text / Reference books:

1. Wolf, Wayne, *Modern VLSI Design-Systems on Silicon* , Third Edition, Pearson
2. Comer, David J. *Digital Logic State Machine Design,* Third Edition, Oxford University Press
3. Ashenden, Peter J., *The Student's Guide to VHDL,* Morgan Kaufman

Course Title: Web Centric Computing
Course no: Csc-361 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course introduces the web data communication.

Goal: To provide the knowledge of Web Centric Computing Using Perl programming.

Course Contents:

Unit 1. Introduction **6 Hrs.**

Net programming, Introduction to Perl, Parsing rules, Variables and data, Statements and control structures, Subroutines, packages, and modules, Working with files, Data manipulation.

Unit 2. Complex Data Structure **4 Hrs.**

Accessing packed data structures, References, Complex Structures, Objects, Using tie.

Unit 3. Networking **5 Hrs.**

Obtaining network information, The socket module, Socket communication, Using IO Socket, Graham Barr's libnet bundle, Gisle Aas' LWP Bundle, Application of sytem.

Unit 4. Database Systems **4 Hrs.**

Text databases, DBM databases, Database file locking, Using the DBI and Win32 ODBC toolkits, SQL refresher.

Unit 5. Interprocessor Communication and Execution Enhancements **6 Hrs.**

Processes, Signals, Pipes, Executing additional processes, Other function calls, System V IPC, Perl on the command line, Perl environment variables, Perl in Perl, Threads, Security.

Unit 6. User Interface Tools **4 Hrs.**

Processing commands line arguments, Perl's reporting mechanism, Working with a terminal, Using Tk.

Unit 7. Developing World Wide Web **6 Hrs.**

HTML, Uniform resource locator, Web operation overview, The environment, The common gateway interface, Smarter web programming, The CGI module, Parsing HTML, Parsing XML, Debugging and testing CGI applications, Security.

Unit 8. Controlling, Extending and Embedding Perl 5 Hrs.

Warning, The strict Pragma, Other Perl Pragmas, Perl Internals, Perl's Internal Structures, Extending Perl, Embedding Perl, Cooperating with other languages.

Unit 9. Debugging, Tuning, Compiling, Documenting, and Distributing 5 Hrs.

Debugging techniques, Using a debugger, Traps for programmers of other languages, Optimization, Using dump, Using the compiler, Comparing script and executable speeds, Using the supplied documentation, Writing POD documentation, Converting POD to other formats, Function support, Perl makefiles.

Laboratory works: Exercises covering all features of above.

Text / Reference book:

1. The Complete Reference: Perl, Martin C. Brown, Tata McGraw-Hill Publishing Company Limited, 2001.

Course Title: Net Centric Computing
Course no: Csc-360 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8
Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course explores the concepts of developing web technology.

Goal: To provide the knowledge of Web Centric Computing Using Active Server programming.

Course Contents:

Unit 1. Introduction **4 Hrs.**

Behind the scenes: Introduction, benefit and application of ASP; Introduction to IIS: Features, properties and application of IIS and MMC, Virtual directory properties; ASP requirements: Need for ASP, Scripting capabilities, Recognizing individuals, Database access, State maintenance, ASP extensibility.

Unit 2. Intrinsic ASP Objects **6 Hrs.**

The response object: ASP objects, Sending text with the response object and embedded quotes, Using variables, Other response; The request object; The application and server objects: Threads, Application variables and use, The server object, Limitation of application variables; The session object.

Unit 3. Writing Server-Side Code **8 Hrs.**

Coding using VBScript and JScript, The scripting dictionary object, File access with ASP, Debugging ASP and error-handling.

Unit 4. Using Components **5 Hrs.**

The browser capabilities component: Difference between browser, Components properties/methods, working and capabilities; Other ASP components; Sending and receiving E-mail with ASP.

Unit 5. Accessing Databases with ASP and ADO **7 Hrs.**

Introduction to relational databases and SQL, Introduction to ADO, Accessing data with ADO, Controlling transactions in ASP.

Unit 6. ASP Applications **7 Hrs.**

Introduction to ASP applications, State maintenance in ASP applications, Controlling access and monitoring, Planning application, Develop a sample project using ASP.

Unit 7. Advanced ASP **8 Hrs.**

Client-side scripting, Building own components, Automating active server pages, Efficiency and scalability.

Laboratory works: Exercises covering all features of above.

Text / Reference Book: Active Server Pages 3, a Russell Jones, BPB Publications, New Delhi, 2003.

Course Title: Embedded System Programming
Course no: CSC-362 Full Marks: 70+10+20
Credit hours: 3 Pass Marks: 28+4+8

Nature of course: Theory (3 Hours) + Lab (3 Hrs.)

Course Synopsis: This course explores the system integration and its issues.

Goal: To allow the student to study the design and development process for dedicated computer systems in relation to the environment in which they operate.

Unit 1. Introduction: 8 Hrs.

Overview of dedicated and automated systems and their specific requirements (robust design, environmental issues, temporal constraints, technological constraints, software systems); the product design cycle.

Unit 2. System Specification and Integration: 12 Hrs.

Development of a system specification, including case studies, Evaluation and justification of the available levels of system integration (custom chipdesign through to turnkey-systems) and technological choice.

Unit 3. Software Issues: 11 Hrs.

Development environment: compilers, linkers, debuggers, emulators, real time operating systems and kernels, Designing and implementing code for dedicated systems

Unit 4. Hardware Issues: 14 Hrs.

Choice of processor: I/O, memory, speed, integration, development facilities, economics; DSP devices, Interfacing to commonly used peripheral devices, Backplane Bus standards, Transducers: sensors for measuring physical phenomena, output devices such as power actuators and motors, Data transformation, signal conditioning and data conversion. The impact of EMC regulations on design practice.

Laboratory works: The laboratory exercises should cover all the features mentioned above.

Text / Reference books:

1 S Heath, **Embedded System Design**, Butterworth-Heinemann 1997, ISBN0-75063-237-2
2 David E. Simon, **An Embedded Software Primer**, Pearson Education, 2001

Course Title: Image Processing
Course no: CSC-363 **Full Marks**: 70+10+20
Credit hours: 3 **Pass Marks**: 28+4+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis: This course deals with image components.

Goal: To be familiar with processing of the images, recognition of the pattern and their applications.

Unit 1. Introduction to Digital Image Processing: 4 Hrs.

Digital image representation, Digital image processing: Problems and applications, Elements of visual perception, Sampling and quantization, relationships between pixels

Unit 2. Two-dimensional Systems: 5 Hrs.

Fourier transform and Fast Fourier Transform, Other image transforms and their properties: Cosine transform, Sine transform, Hadamard transform, Haar transform

Unit 3. Image Enhancement and Restoration: 8 Hrs.

Point operations, contrast stretching, clipping and thresholding, digital negative, intensity level slicing, bit extraction, Histogram modeling: Equalization modification, specification, Spatial operations: Averaging, directional smoothing, median, filtering spatial low pass, high pass and band pass filtering, magnification by replication and interpolation

Unit 4. Image Coding and Compression: 4 Hrs.

Pixel coding: run length, bit plan, Predictive and inter-frame coding

Unit 5. Introduction to Pattern Recognition and Images: 3 Hrs.

Unit 6. Recognition and Classification: 5 Hrs.

Recognition classification, Feature extraction, Models, Division of sample space

Unit 7. Grey Level Features Edges and Lines: 6 Hrs.

Similarity and correlation, Template matching, Edge detection using templates, Edge detection using gradient models, model fitting, Line detection, problems with feature detectors

Unit 8. Segmentation: 3 Hrs.

Segmentation by thresholding, Regions for edges, line and curve detection

Unit 9. Frequency Approach and Transform Domain: 3 Hrs.

Unit 10. Advanced Topics: 4 Hrs.

Neural networks and their application to pattern recognition, Hopfield nets, Hamming nets, perceptron

Laboratory works: Developing programs of above features.

Text / Reference books:

1. K. Castlemann, "*Digital Image Processing*", Prentice Hall of India Ltd., 1996.
2. A. K. Jain, "*Fundamental of Digital Image Processing*", Prentice Hall of India Pvt. Ltd., 1995.
3. R. C. Gonzalez and P. Wintz, "*Digital Image Processing*", Addison-Wesley Publishing, 1987.
4. Sing_Tze Bow, M. Dekker, "*Pattern Recognition and Image Processing*", 1992
5. M. James, "*Pattern Recognition*", BSP professional books, 1987.
6. P. Monique and M. Dekker, "*Fundamentals of Pattern Recognition*", 1989.