Semester - VI

Course	Type	Course Code	Course Name	Credit
Core Course -13	Theory	CMS-A-CC-6-13-TH	Software Engineering	4
Core Course -14	Theory	CMS-A-CC-6-14-TH	Theory of Computation	4
	Practical	CMS-A-CC-6-14-P	Project Work	4

Semester - VI (DSE)
Discipline Specific Elective Course - DSE-A(3&4)& DSE-B (3&4)
(Candidates have to opt one course from DSE-A & one course from DSE-B)

Course	Type	Course Code	Course Name	Credit
DSE-A-3	Theory	CMS-A-DSE-A-3-TH	Embedded Systems	4
	Practical	CMS-A-DSE-A-3-P	Embedded Systems Lab	2
DSE-A-4	Theory	CMS-A-DSE-A-4-TH	Multimedia and its Application	4
	Practical	CMS-A-DSE-A-4-P	Multimedia and its Application Lab	2
DSE-B-3	Theory	CMS-A-DSE-B-3-TH	Introduction to Computational Intelligence	4
	Practical	CMS-A-DSE-B-3-P	Computational Intelligence Lab	2
DSE-B-4	Theory	CMS-A-DSE-B-4-TH	Advance Java	4
	Practical	CMS-A-DSE-B-4-P	Advance Java Lab	2

CMS-A-CC-6-13-TH: Software Engineering.

Core Course-13: Theory, Credit:04, Contact hours 60.

Introduction Defining system, open and closed system, modeling of system through computer hardware, communication systems, external agents and software systems; Importance of Engineering Methodology towards computerization of a system.	**03 hours**
Software Life Cycle Classical and Iterative Waterfall Model; Spiral Model; Prototype Model; Evolutionary model and its importance towards application for different system representations, Comparative Studies.	**07 hours**
Software Requirement and Specification Analysis Requirements Principles and its analysis principles; Specification Principles and its representations Software Design Analysis – Different level of DFD Design, Physical and Logical DFD, Use and Conversions between them, Decision Tables and Trees, Structured analysis, Coupling and Cohesion of different modules Software Cost Estimation Modeling –COCOMO.	**23 hours**
Software Testing Software Verification and Validation; Testing objectives, Testing Principles, Testability; Error and Faults; Unit Testing, White Box and Blank Box Testing, Test Case Design: Test Vector, Test Stub.	**17 hours**
Software Quality Assurances Concepts of Quality, Quality Control, Quality Assurance, IEEE Standard for Statistical Software Quality Assurances (SSQA) criterions.	**10 hours**

Text/ Reference Books

1. Software Engineering: A Practitioner's Approach by R.S. Pressman, McGraw-Hill.
2. An Integrated Approach to Software Engineering by P. Jalote, Narosa Publishing House.
3. Software Engineering by K.K. Aggarwal and Y. Singh, New Age International Publishers.
4. Software Engineering by I. Sommerville, Addison Wesle.
5. Software Engineering for Students by D. Bell, Addison-Wesley.
6. Fundamentals of Software Engineering by R. Mall, PHI.

CMS-A-CC-6-14-TH: Theory of Computation.
Core Course-14: Theory, Credit:04, Contact hours: 60.

Finite Automata Definition of a Finite Automaton, Model, Representation, Classification – with respect to output function Mealy and Moore Machines, with respect to State Transition – Deterministic and Non-Deterministic Machine, Examples, conversion algorithms Mealy to Moore and Moore to Mealy, Finite and Infinite state machines, Finite Automaton, Deterministic and Non-Deterministic Finite automaton, Non-Deterministic to equivalent Deterministic Automaton-Optimized and Non-optimized technique ideas and algorithms, Acceptability of String by a Finite Automaton.	**15 hours**
Formal Languages and Grammar Introduction to Formal Grammar and Language, Chomsky's Classification of Grammar – Type-0, Type-1 or Context Sensitive, Type-2 or Context Free and Type-3 or Regular Grammar, Illustration of each of these classes with example, Sentential form, Sentences – Languages or strings, Derivations, Ambiguous Grammar and Language, Designing of Grammar for a language, Find the Language for given Grammar, Definition and basic idea about Push Down Automaton.	**15 hours**
Regular Expression: Basic Idea and Definition, Regular Expression basic Identities, Arden's Theorem – Statement (without Proof) and application for reduction of equivalent regular expressions, Regular expression to Finite Automata conversion, State Transition System to Regular Expression conversion algorithm by Arden's Algebraic Method, FA to Regular Grammar and Regular Grammar to FA conversion algorithms and applications.	**15 hours**
Turing Machine Concepts of Turing Machine, Formal Definitions, Classifications – Deterministic and Non-Deterministic Turing Machines, Simple Design of Turing Machines: Odd / even count and concepts of Universal Turing Machines, Difference and Similarities between Turing Machine and a General Purpose Computer, Definition and significant of Halting Problem in Turing Machine.	**15 hours**

Text/ Reference Books:

1. Introduction to Automata Theory, Languages, and Computation by John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, 3rd Edition, Pearson.
2. Theory of Computer Science (Automata, Languages & Computation) by K L P Misra&

N Chandrasekharan, 3rd Edition, PHI.

3. Introduction to Theory of Computation by MichealSipser, 3rd Edition, Cengage Learning.

4. Switching and Finite Automata Theory by ZviKohavi, Niraj.K.Jha, 3rd Edition, TMH.

5. Formal Language and Automata, P. Linz, Narosa

CMS-A-CC-6-14-P: Project Work
Core Course-14, Practical, Credit:04, Contact hours: 60.

Candidates have to do their project in any relevant topic, under the supervision

of teachers.

Discipline Specific Elective Course A: DSE-A

CMS-A-DSE-A--3-TH: Embedded Systems
DSE-A: Choice-3: Theory, Credit:04, Contact hours: 60.

Introduction to 8051 Overview of Microcontroller, Memory, I/O interface Intel Microcontroller 8051: Architecture, Peripheral Interface Controller (PIC).	**15 hours**
Assembly Language Programming Instruction set, Addressing Modes, Jump, Loop and Call instructions, I/O Manipulation, Serial communication, Arithmetic and logical instructions.	**10 hours**
Introduction to Embedded System Programming Data types and time delays, I/O programming, Logic operations, Data conversions, Data serialization, Interrupt programming, LCD and Keyboard interfacing, ADC, DAC, sensors interfacing, interfacing 8255, I/O interfacing for 8051, interfacing 8255, 8257, 8259/ 8279, ADC, DAC, Motor control using 8051 C.	**15 hours**
Programmable logic devices and Hardware description Language PAL, PLA, PLD, ASIC, FPGA (Qualitative study).	**10 hours**
Hardware Description Language (VHDL): Basic Terminology, Entity Declaration, Architecture body, Configuration and package declaration, Package body, Model analysis and Simulation. Basic Language elements, Behavioral Model, Dataflow Model, Structural Model, Subprogram and overloading, Applications.	**15 hours**

CMS-A-DSE-A--3-P: Embedded Systems Lab.
DSE-A: Choice-3, Practical, Credit: 02, Contact hours: 40 hours

Practical: Sample practical problems can be included related to theory.
1. Assembly Language Programming related to Microcontroller 8051.
2. Programming Using Embedded C for 8051.
3. VHDL programs for construction and simulation of various digital circuits.

Text/ Reference Books:
  1. An Embedded software primer,David E.Simon, Pearson Education.
  2. The 8051 Microcontroller, Kenneth J. Ayala, Thomson.
  3. Embedded Systems, Raj Kamal, TMH.
  4. Microcontroller, Raj Kamal, Pearson Education.
  5. A VHDL Primer, J. Bhasker, Prentice Hall
  6. FPGA Prototyping by VHDL Examples: Xilinx Spartan-3 Version, Pong P. Chu, Wiley-Interscience.

CMS-A-DSE-A--4-TH: Multimedia and its Applications
DSE-A: Choice-4, Theory, Credit:04, Contact hours: 60.

Multimedia Introduction to multimedia, Components, uses of multimedia.	**04 hours**
Making Multimedia Stages of a multimedia project, requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.	**06 hours**
Text Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.	**04 hours**
Images Still Images – Bitmaps, Vector Drawing, 3D Drawing & rendering, Natural Light & Colors, Computerized Colors, Color Palettes, Image File Formats.	**06 hours**
Sound Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.	**06 hours**
Video How Video Works, Analog Video, Digital Video, Video File Formats, Video Shooting and Editing.	**06 hours**
Animation Principle of Animations. Animation Techniques, Animation File Formats.	**08 hours**
Multimedia System An overview of multimedia system and media streams, Source representation and compression techniques text, speech and audio, still image and video, Graphics and animation.	**10 hours**
Multi-modal Communication Video conferencing, networking support, Trans-coding.	**10 hours**

CMS-A-DSE-A--4-P: Multimedia and its Applications Lab.
DSE-A: Choice-4: Practical, Credit:02, Contact hour: 40.

Sample practical problems can be included related to theory.

Text/ Reference Books:

  1. Multimedia: Making it work by Tay Vaughan, TMH.
  2. Multimedia: Computing, Communications Applications by R Steinmetz and K Naharstedt,
     Pearson.
  3. Multimedia Handbook by Keyes, TMH.
  4. Multimedia System Design by K. Andleigh and K. Thakkar, PHI.

Discipline Specific Elective Course B: DSE-B.
Introduction to Computational Intelligence/ Advanced Java.

CMS-A-DSE-B--3-TH:Introduction to Computational Intelligence
DSE-B: Choice-3, Theory, Credit:04, Contact hours: 60.

Introduction Introduction to Artificial Intelligence, Brief History and Application, Structures and Strategies for state space search- Data driven and goal driven search, Heuristic search, Depth First and Breadth First search, Iterative deepening, A* algorithm, Game playing (Minimax), Rule-based system, Semantic Nets, Frames, Scripts, Conceptual Dependency, Introduction to PROLOG.	**20 hours**
Neural Network Basics of Artificial Neural Network, Characteristics and Comparison with biological neural network, Basic model of Artificial Neural Network: Single layer Perceptron model, Learning, Feed Forward Neural Network, Error, Back Propagation and weight updation, Perceptron, Bayesian Networks, Neural computational model- Hopfield Nets. .	**20 hours**
Rough sets Basic difference between Rough sets and Fuzzy sets	**02 hours**
Fuzzy Logic and Application Fuzzy sets, application – basic operations, Properties, Fuzzy Relations, Fuzzy inference, Notion of Fuzziness, Operations on Fuzzy sets, Fuzzy Numbers, Brief overview of crisp sets, Crisp relations, Fuzzy relations, Max*-composition of fuzzy relation, Max*-transitive closure, Probability measures of fuzzy events, Fuzzy expected value, Approximate reasoning, Different methods of role aggregation and defuzzification.	**18 hours**

CMS-A-DSE-B-3-P:Computational Intelligence Laboratory
DSE-B: Choice 3, Practical, Credit: 02, Contact hours: 40.

Computational intelligence lab using Prolog / LISP

Text/ Reference Books:

  1. Pattern Recognition and Machine Learning, Christopher M. Bishop.
  2. Artificial Intelligence, E, Rich and K. Knight, Tata McGraw Hill.
  3. A Brief Introduction to Neural Network, David Kriesel.
  4. Fuzzy Set Theory – and its Applications, H.J. Zimmermann.
  5. Rough Set Data Analysis : A road to Non-invasive Knowledge Discovery, Methods,
  Ivo Duntsch & Gunther Gediga.

6. An Introduction to Neural Computing: Theory and Practice, P.D. Wassermann, Van Nostrand Reinhold, New York, 1989.

7. Artificial Neural Networks, B. Yegnarayana, Prentice Hall of India.

CMS-A-DSE-B--4-TH: Advanced Java
DSE-B: Choice-4, Theory, Credit:04, Contact hours: 60.

Basics of Servlet Servlet: What and Why? Servlet API, Servlet interface, Generic Servlet, Http Servlet, Servlet life cycle, Servlet request methods, Servlet collaboration, Servlet config.	**10 hours**
Session Management What is a session? Why is it required? Creating a session? Session information passing mechanisms between client and server - Cookies, Rewriting; Destroying a session. .	**04 hours**
Basics of JSP Life cycle of JSP; JSP API;JSP tags, directives, scripting elements, implicit objects, exception handling, action elements; MVC.	**10 hours**
Design Pattern Singleton; DAO; DTO; MVC; Front controller; Factory method; Collection framework.	**10 hours**
Javascript Introduction to Javascript; Ways to use Javascript; Working with events; Client-side validation.	**10 hours**
JQuery Introduction to JQuery; Validation using JQuery; JQuery forms; JQuery examples; Key services of the application server.	**06 hours**
Spring Framework Spring Core (Basic Concepts); Spring AOP; Spring JDBC; Spring MVC; Spring Boot and Spring Data; Spring ORM.	**10 hours**

Text/ Reference Books:

1. Object-Oriented Software Development Using Java. Xiaoping Jia. Addison Wesley,
2. Head First Object-Oriented Analysis and Design. Brett D. McLaughlin, Gary Pollice, and Dave West. O'Reilly.
3. Head First Design Patterns. Eric Freeman and Elizabeth Freeman. O'Reilly
4. Head First Servlets & JSP, O'Reilly.
5. Murach's Java Servlets and JSP, Murach.
6. Core Servlets and Javaserver Pages: Core Technologies, Marty Hall and Larry Brown, Prentice Hall.
7. Enterprise JavaBeans 3.0, Richard Monson-Haefel and Bill Burke, O'Reilly.
8. Java Design Pattern Essentials, Tony Bevis, Ability First Limited
9. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Addison-Wesley Professional

10. Getting started with Spring Framework – Ashish Sarin, J Sharma, Createspace

11. Spring in Action - Craig Walls, Manning Publications

CMS-A-DSE-B-4-P: Advanced Java Laboratory
DSE-B: Choice 4, Practical, Credit:02, Contact hours: 40.

Advanced Java Laboratory based on the following:

(i)   Write programs in Java using Servlets:
      a. To invoke servlets from HTML forms.
      b. To invoke servlets from Applet Programs using cookies.
(ii)   Programs with session tracking.
(iii)   Create dynamic web pages, using Servlets and JSP.
(iv)   Programs using JDBC with create, insert table data.
(v)   Implementing MVC with Request Dispatcher.
(vi)   Writing a web service.

Text/ Reference Books

1. Core Servlets and Javaserver Pages: Core Technologies, Marty Hall and Larry Brown, Prentice Hall.

2. JavaScript: The Definitive Guide, David Flanagan, O'Reilly.

3. Enterprise JavaBeans 3.0, Richard Monson-Haefel and Bill Burke, O'Reilly.

4. JavaScript and JQuery: Interactive Front-End Web Development, Jon Duckett, Wiley.

5. Professional JavaScript for Web Developers, Nicholas C. Zakas, Wrox.

6. Java Design Pattern Essentials, Tony Bevis, Ability First Limited.

7. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Addison-Wesley Professional.