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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02CINT51	Title of the Course	WEB PROGRAMMING
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To acquire knowledge about various front-end development tools. 2. To study server-side scripting using PHP.

Course Content		
Unit	**Description**	**Weightage* (%)**
1.	**Introduction to Front-end Development Tools** − HTML Forms − Introduction to HTML5 and XHTML − CSS: Introduction, Applications, types, properties and attributes, class − Introduction to JavaScript: Features, Advantages, DOM, − Methods to implement JavaScript, Arrays, Functions, Dialogue Boxes − Events, Methods and Validations in JavaScript	25
2.	**Server Side Scripting Using PHP - I** − Introduction to Open Source − Advantages and Capabilities of Open Source − Introduction to PHP: Features, Adding PHP to HTML − Common PHP script elements – data types, variables, constants, operators, − Flow control and looping − Strings, arrays, associative arrays, functions − Working with Forms – Form validation, Input validation, regular expression functions	25
3.	**Server Side Scripting Using PHP – II** − Introduction to MySQL: Features, Merits and Demerits, − Data Types − MySQL Functions − Database Connectivity − Error handling − Introduction to Sessions and Cookies	25

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| 4. | **Server Side Scripting Using PHP - III**
– Security – Authentication (user logins), Authorization (Permissions)
– Object Oriented Programming with PHP: Classes, Objects, Inheritance, Polymorphism
– File Handling – Introduction, access, uploading, handling
– Introduction to Content Management Systems | 25 |

| Teaching-Learning Methodology | Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices. |

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Knowledge about front-end development tools.
2.	Understanding of server-side scripting using PHP.
3.	Ability to design and develop websites and web-based applications using HTML5, CSS3 and JavaScript.
4.	Ability to develop dynamic database-driven websites using PHP.

Suggested References:	
Sr. No.	References
1.	Ivan Baryons: "Web Enabled Commercial Applications Development using HTML, DHTML, Javascript, PHP"
2.	Steve Suehring Tim Converse Joyce Park:PHP6 and MySQL Bible - Wiley Publication

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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02CINT52	Title of the Course	SOFTWARE ENGINEERING
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To study the fundamental concepts related to software engineering, different phases of software development and various software development process models.
	To learn the basic concepts related to software requirement specification and software project management.
	To acquire basic knowledge about the concepts related to system design, coding and testing.
	To learn development of feasible and reliable software products for solving real life problems.
	To learn the process of improving the quality of software work products.

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction** – General Architecture of Systems with basic components – Open and Close Systems – TPS, MIS, DSS and ES Types of Systems – Software – meaning and applications – Software Engineering – meaning, goal, challenges and approach – Software Process – Software Development Process Models – waterfall, prototyping, iterative, time boxing and spiral – Introduction to Agile Computing	25
2.	**Software Requirement Analysis and Project Management** – Software Development Life Cycle (SDLC) – Software Requirements Specification (SRS) – Need, Process, Problem Analysis, Requirement Specifications, structure and components, Functional Specifications using Use Cases – Software Project Management : Project Planning, various issues addressed in Project Planning – Work Breakdown Structure (WBS)	25

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3.	**Software Design** – Design – meaning, types – Design approaches - function-oriented design (introduction), object-oriented design – Design Concepts for Object-oriented design - information hiding, functional independence, refinement, refactoring and design classes – Object Modeling using UML – Overview, Diagrams – class, sequence, collaboration, use-case, activity, state chart	25
4.	**Coding and Testing** – Coding – meaning, process, programming standards and guidelines, refactoring, verification, metrics – Testing – meaning, importance and process – Testing fundamentals – error, fault, bug, failure, test oracles, test cases and test criteria – Introduction to Black-box (functional) testing and White-box (structural) testing – Comparison of Black-box and White-box testing – Alpha testing and Beta testing – Testing tools	25

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Understanding of the fundamental concepts related to software engineering, different phases of software development and various software development process models.
2.	Basic knowledge of the concepts related to software requirement specification and

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	software project management.
3.	Fundamental knowledge about the concepts related to system design, coding and testing.
4.	Understanding of the development of feasible and reliable software products for solving real life problems.
5.	Understanding of the process of improving the quality of software work products.
6.	Ability to apply engineering design to produce economical software solutions that satisfy needs of end users

Suggested References:	
Sr. No.	References
1.	Jalote Pankaj : Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, 2005 (ISBN 978-81-7319-702-4).
2.	Roger S. Pressman : Software Engineering, A Practice Approach, 6th Edition, Mc-Graw Hill International Edition, 2005 (ISBN 007-124083-7).
3.	Rajib Mall : Fundamentals of Software Engineering, 2nd Edition, Prentice-Hall of India, 2006 (ISBN-81-203-2445-5).
4.	James A Senn : Analysis and Design of Information Systems McGraw Hill Intl. Stdt. Edn, 1985
5.	Ian Sommerville : Software Engineering, 6th edition, Pearson Education, 2001, (ISBN 81 7808-497-X).
6.	Waman S Jawadekar, Software Engineering Principles and Practice, 1st Edition,Tata McGraw Hill, 2004.
7.	Sajja, P.S. "Essence of Systems Analysis and Design: A Workbook Approach", Springer International Publishing, Singapore, 2017

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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02CINT53	Title of the Course	ARTIFICIAL INTELLIGENCE
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To learn the basic concepts related to Artificial Intelligence and Knowledge Based Systems. To understand the concept of fuzzy Logic and its applications. To acquire knowledge about connectionist models and genetic algorithms.

Course Content		
Unit	Description	Weightage* (%)
1.	**Artificial Intelligence (AI) and Knowledge Based Systems (KBS)** – Natural and Artificial Intelligence – Testing Intelligence with Turing Test, and Chinese Room Experiment, Application Areas of Artificial Intelligence, Data pyramid – Production systems and AI Based Searches like Hill Climbing and Heuristic Search – KBS Structure, Components of KBS, Categories of KBS, Knowledge-Based Shell, Advantages, Limitations and Applications of KBS – Knowledge Acquisition, Knowledge Update – Factual and Procedural Knowledge Representations – Knowledge Based Systems Development Model	25
2.	**Fuzzy Logic** – Fuzzy Logic and Fuzzy Sets, Membership Functions, – Fuzzification and Defuzzification – Operations on Fuzzy Sets – Fuzzy Functions and Linguistic Variables – Fuzzy Relations, Propositions and Connectives – Fuzzy Inference – Fuzzy Rules, Fuzzy Control System and Fuzzy Rule Based Systems	25
3.	**Connectionist Models** – Introduction to ANN, Biological Neuron and Artificial Neuron	25

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	– Hopfield model of ANN, Parallel relaxation – Linearly Separable Problems, Single perceptron – Non Linearly Separable problems, Fixed increment perceptron learning – Multi Layer Perceptron, Applications of ANN and Cases	
4.	**Genetic Algorithms** – Introduction to Genetic Algorithm (GA), – Fundamental Concepts of GA : Gene, Population, Fitness Functions, Generations – Encoding Strategies, Genetic Operators, Fitness Functions – Typical Genetic Algorithm Cycle – Function Optimization, Designing Special Operators and Edge Recombination, Travelling Salesman Problem – Schema, Genetic programming	25

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Understanding of the basic concepts related to Artificial Intelligence and Knowledge Based Systems.
2.	Understanding of the concept of fuzzy Logic and its applications.
3.	Knowledge about connectionist models and genetic algorithms.

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	Suggested References:

Sr. No.	References
1.	Rich and Knight, Artificial Intelligence, Tata McGraw Hill Publishing Co. Ltd., 21st Indian Reprint, 2001
2.	Akerkar RA and Sajja P S, Knowledge-Based Systems, Jones & Bartlett Publishers, Sudbury, MA, USA, 2009
3.	Vijyalaxmi Pai and Rajasekaran, Neural Network, Fuzzy Logic and Genetic Algorithms, Prentice Hall of India, 2003
4.	J S R Jang, C T Sun and E Mizutani, Neuro-Fuzzy Soft Computing, Prentice Hall of India Ltd., 1997
5.	Peter Jackson, Introduction to Applied Expert systems, Pearson Education Ltd., Second Indian Reprint, 2001
6.	David W Rolston: Principles of AI & ES Development, McGraw Hill, 1988.
7.	David E.Goldberg, Genetic Algorithms in Search, Optimization & Machine Learning, Pearson Education, 2002

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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02CINT54	Title of the Course	VISUAL PROGRAMMING
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To learn basics of the .NET Technology and its applications. 2. To study the fundamentals of C#.NET and its applications. 3. To learn the object-oriented programming concepts and the advanced features of C#.NET. 4. To understand database programming and report creation facility.

Course Content		
Unit	Description	Weightage* (%)
1.	**The .NET Technology** – Introduction to .NET Framework – Architecture of .NET framework – BCL (Base Class Library), CLR (Common Language Runtime), etc. – .NET Languages – introduction, Types of applications supported by .NET Technology – Managed code, compilation to intermediate language, Just-In-Time compilation, garbage collection, assemblies and the GAC	25
2.	**Language basics** – C#.NET – Introduction and features – General structure of C#.NET program – C#.NET – basic data types, variable, constant, type conversion - Boxing and Unboxing – C#.NET – statements (conditional and looping) – Console Applications, Windows Applications - Windows Forms and Life Cycle – User interface controls - Basic Controls, Dialog controls, Menu control	25
3.	**Advance features** – OOPS concepts, Class and Object – Class types and interface – Working with Strings, Arrays, Lists and Collections – Exception handling	25

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4.	**Database Programming and Reports** – Database programming – concepts – The ADO.NET architecture (connected and disconnected mode) – ADO.NET Data providers, Dataset, DataAdapter, DataReader – Data Controls – Generating reports	25

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand of the basics of .NET Technology and its applications.
2.	Understand of the fundamentals of C#.NET.
3.	Ability to use the object-oriented programming concepts and the advanced features of C#.NET.
4.	Gain knowledge of database programming and report creation facility.
5.	Develop applications using C#.NET.

Suggested References:	
Sr. No.	References
1.	Black Book: .NET 4.5 Programming (6-in-1) covers .NET 4.5 Framework, Visual Studio 2012, C# 2012, ASP.NET 4.5, VB 2012, and F# 3.0, Dreamtech Press, 2013.

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2.	Bill Evjen, Scott Hanselman, Devin Rader: Professional ASP.NET 4 in C# and VB, Wiley India Pvt. Ltd., 2010
3.	Matthew MacDonald: Beginning ASP.NET 4.5 in C#, Apress, 2013
4.	Black Book: C# 2010 Programming covers .NET 4.0, Dreamtech Press, 2010
5.	Joseph Albabari, Ben Albabari: C# 4.0 in a Nutshell, O'Reilly.

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Master of Science (Information Technology)
Semester-II

Course Code	**PS02CINT55**	Title of the Course	**Practicals**
Total Credits of the Course	**5**	Hours per Week	**10**

Course Objectives:	1. To provide knowledge about various front-end development tools.
	2. To provide hands on training in server-side scripting using PHP.
	3. To familiarize student with .NET Technology and its applications.
	4. To provide hands on training for of C#.NET and its applications.
	5. To gain familiarity with the object-oriented programming concepts and the advanced features of C#.NET.

Course Content		
	Description	Weightage* (%)
	Part-1 : Practical based on PS02CINT51	50
	Part-2 : Practical based on PS02CINT54	50

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching as well as online / ICT-based teaching practices

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Knowledge about front-end and back-end development tools.

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2.	to develop application using server-side scripting using PHP.
3.	gain knowledge of design and development of web applications using PHP and C#.NET.
4.	to develop application using C#.NET.

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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02EINT51	Title of the Course	ADVANCED JAVA
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To acquire fundamental knowledge about Java Servlets and Java Server Pages (JSP). 2. To learn how to work with the Spring framework. 3. To study fundamentals of Hibernate and Enterprise Java Beans (EJB)

Course Content		
Unit	Description	Weightage* (%)
1.	**Java Servlet and Java Sever Page(JSP)** – Introduction to Java Servlet, Life cycle of Servlet – Introduction to JSP, Architecture of JSP – Developing simple JSP page – JSP directives, JSP scripting elements, JSP action elements – JSP implicit objects	25
2.	**The Spring Framework** – Introduction to the spring framework and architecture – Beans (definition, scope, lifecycle) – Aspect-Oriented Spring – Spring MVC, Security – JDBC Framework	25
3.	**Hibernate** – Understanding object relational persistence – Hibernate mapping – Managing entity identity – Mapping class inheritance	25
4.	**Enterprise Java Beans (EJB)** – Introduction to Java EE architecture – EJB Overview – Entity Beans, Session Beans, Message Driven Beans	25

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Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Fundamental knowledge of Java Servlets and Java Server Pages (JSP).
2.	Ability to work with the Spring framework.
3.	Basic knowledge of Hibernate and Enterprise Java Beans (EJB).
4.	Ability to develop applications using advanced Java features.

Suggested References:	
Sr. No.	References
1.	Bayross Ivan, Shah Sharanam, Bayross Cynthia and Shah Vaishali: Java Server Programming, 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., 2008
2.	Craig Walls : Spring in Action, Dreamtech Press, 4th edition
3.	Bauer Chritian and King Gavin : Java Persistence with Hibernate, Dreamtech Press, 2010
4.	Panda, Rahman and Lane : EJB 3 in Action, Dreamtech Press, 2010
5.	Bond, Law, Longshaw, Haywood and Roxburgh : Teach yourself J2EE, 2nd Edition, Pearson Education, 2007
6.	Web sources

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Master of Science (Information Technology)
M.Sc. (Information Technology) Semester-II

Course Code	PS02EINT52	Title of the Course	DATA SCIENCE
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To acquire basic knowledge of data science and data analytics. 2. To study fundamentals of big data and big data analytics. 3. To learn development of data science applications using Python and R.

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction to Data Science Data Analytics** – Data Science Definition – Need and features – Importance of Data Science in Modern Business – Current Trends in Data Science – Analytical Techniques	25
2.	**Introduction to Big Data** – Types of Digital Data: Unstructured, Semi-structured and – Structured – Working with Unstructured Data – Evolution and Definition of Big Data – Characteristics and Need of Big Data	25
3.	**Introduction to Big Data Analytics** – Meaning and Characteristics of Big Data Analytics – Need of Big Data Analytics – Classification of Analytics – Importance of Big Data Analytics	25
4.	**Data Analytics using Python and R** – Introduction to NumPy, SciPy – Introduction to pandas – Introduction to Matplotlib – Introduction to R – Introduction to R Studio – Developing data science applications using Python and R	25

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Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online/ICT-based teaching practices.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	receive basic knowledge of data science and data analytics.
2.	understand of the fundamentals of big data and big data analytics.
3.	understand development of data science applications using Python and R.

Suggested References:	
Sr. No.	References
1.	Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning and More, Using Python Tools
2.	Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley
3.	VigneshPrajapati, Big Data Analytics with R and Hadoop – Packrt
4.	Mark Lutz, "Learning Python", 4th Edition, O'Reilly, 2009
5.	Wes McKinney, "Python for Data Analysis", O'Reilly, 2013
6.	Robert I. Kabacoff, "R in Action: Data Analysis and Graphics with R", Manning, 2011

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7.	Minelli, Chambers, Dhiray, Big Data Big Analytics, Wiley
8,	Bart Baesens, Analytics in a Big Data World , Wiley
9,	Thomas Erl, Wajid Khattak, and Paul Buhler, Big data Fundamentals: Concepts, Drives, and Techniques, , Pearson India Education Services Pvt. Ltd., 2016
10.	Roger D. Peng and Elizabeth Matsui, The Art of Data Science: A Guide for Anyone Who Works with Data, LeanPub, 2016
11.	Brian Caffo, Roger D. Peng and Jeffrey Leek, Executive Data Science A Guide to Training and Managing the Best Data Scientists, LeanPub, 2016
12.	Alex Holmes Hadoop in Practice – Dreamtech
13.	Documentation of relevant software packages

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