Detailed Syllabus

Lecture-wise Breakup

NOTE: All the entries (…) must be in Times New Roman 11.

Course Code	17M11CS121	**Semester** EVEN **(specify Odd/Even)**	**Semester M.Tech CSE (**IInd) DD (VIII) **Session** 2021-2022 **Month from** January 2022 – June 2022
Course Name	**Cloud and Web Services Software Engineering**		
Credits	3-0-0	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Prof. Sandeep Kumar Singh
	Teacher(s) (Alphabetically)	Prof. Sandeep Kumar Singh, Dr.Naveen Kumar (JIIT -128)

COURSE OUTCOMES		**COGNITIVE LEVELS**
C113.1	Demonstrate role of Software engineering in combining cloud and web services computing paradigms for service development.	Understand Level (Level 2)
C113.2	Make use of web & cloud services and **service engineering process** to design, implement, and test, deploy and execute services.	Create Level (Level 6)
C113.3	Categorize various cloud services into compute, storage, database, application, analytics, network, and deployment.	Understand Level (Level 2)
C113.4	Analyze the requirements for developing and migrating applications to Web and Cloud Services.	Analyzing Level (Level 4)
C113.5	Appraise different **design patterns, reference architectures, performance metrics, testing for Cloud and Web Services.**	Evaluate Level (Level 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Distributed Software Engineering	Software Engineering Meets Services and Cloud Computing, Distributed Systems, Models of Interaction, Client and Server Computing, Architectural Patterns for distributed systems, Software as Service.	3
2.	Service-oriented software engineering	Service-Oriented Computing, Service-Oriented Architecture (SOA), Service Engineering and Service Composition	4
3.	Modelling Service Composition	Business Process Modeling Notation (BPMN), block-structured process execution languages, including BPML and BPEL, Modelling tools like Bizagi,BPMN.io etc	5
4.	Introduction Web to Services	Brief of Web Services, Service Oriented Architectures, Core Functionality- SOAP, WSDL,UDDI, Microservices Architecture	4
5.	Designing and Implementing Services	Web Service Development Life Cycle, SOAP, Restful Services, Microservices – Domian Driven Design, Implementation, Deployment and Testing of Services	4
6.	Address SE in Web services	Web Services Design Pattern, Metrics to Measure Web Service Performance.	3
7.	Introduction to Cloud Services	Cloud Services, Cloud Deployment Models, Cloud Technologies and Open Source Software, Challenges - Scaling Computation, Scaling Storage, Multi-Tenancy, Availability, Limitations and Challenges in Cloud-Based Applications Development	3
8.	Cloud Services from Amazon	IAM services-users, groups, policy and roles, Elastic Compute Cloud, Databases on Amazon, Storage on Amazon services,	6
9.	Migrate, Secure and	Migration of Application to Web or Cloud Service, Enabling SSL	4

	Consume Services	authentication and authorization, consuming services using another service or application.	
10.	Address SE in Cloud services	Cloud Services Design Pattern, Metrics to Measure Cloud Service Availability, elasticity, Scalability, Load balancing, Auto scaling. Performance, Cloud Service Automation	6
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25

Attendance = 05
Internal assessment & Assignments in PBL mode = 20
(A Macro Assignment is given which will make the student conversant in design, creation and implementation of an application using Web Services and Cloud Services. This will make them industry ready in applying web and cloud services)

Total **100**

Recommended Reading material:

Text Books

1.	Mahmood Z, Saeed S (eds) (2013) Software Engineering Frameworks for the Cloud Computing Paradigm. Springer-Verlag, London
2.	Cloud Computing: A Hands-On Approach Book by Arshdeep Bahga and Vijay K. Madisetti, December 2013 CreateSpace Independent Publishing Platform7290 Investment Drive # B North Charleston SC United States
3.	Cloud Computing Design Patterns Book by Amin Naserpour, Robert Cope, and Thomas Erl, June 2015, Prentice Hall Press One Lake Street Upper Saddle River, NJ United States
4.	**Software Engineering Book by Ian Sommerville Apil 2015, Pearson**
5.	Amazon Web Services for Mobile Developers: Building Apps with AWS October 2017, Abhishek Mishra, SYBEX Inc. 2021 Challenger Drive Alameda, CA United States
6.	Web Services, Service-Oriented Architectures, and Cloud Computing, Second Edition: The Savvy Manager's GuideJanuary 2013, Douglas K. Barry, Morgan Kaufmann Publishers Inc. 340 Pine Street, Sixth Floor San Francisco CA United States

Reference Books

7.	XML, Web Services, and the Data Revolution Book by Frank P. Coyle , March 2002, Addison-Wesley Longman Publishing Co., Inc.75 Arlington Street, Suite 300 Boston, MA,United State
8.	Design Patterns: Elements of Reusable Object-Oriented Software with Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, 2003
9.	Cloud Computing and Software Services Theory and Techniques Syed A hson and Dr. Mohammad Ilyas July 2010, CRC Press, Inc. Subs. of Times Mirror 2000 Corporate Blvd. NW Boca Raton, FL, United State

Detailed Syllabus
Lecture-wise Breakup

Subject Code	17M11CS122	**Semester:** Even **(specify Odd/Even)**	**Semester** II **Session** 2021-2022 **Month from** Jan'22 **to** June'22
Subject Name	Performance Evaluation of Computing Systems		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Dr. Kavita Pandey
	Teacher(s) (Alphabetically)	Dr. Kavita Pandey

COURSE OUTCOMES		**COGNITIVE LEVELS**
C114.1	Demonstrate the ability to describe the correct tools and techniques for computer system performance evaluation	Understand (level 2)
C114.2	Identify the probability distribution in a given stream of data that corresponds to a source of randomness in a system.	Apply (level 3)
C114.3	Design the appropriate model of a discrete, dynamic, stochastic system using the theory of random processes.	Apply (level 3)
C114.4	Inspect the mathematical modeling techniques, Markov chains, queuing theory for analyzing the system.	Analyze (level 4)
C114.5	Select the appropriate experiments and perform a simulation study of the given system.	Evaluate (level 5)

Module No.	**Title of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Overview of Performance Evaluation	Need for Performance Evaluation, Systematic approach to Performance Evaluation, Selection of evaluation techniques and performance metrics	5
2.	Random Variables and Probability distributions	Discrete and continuous random variable, Expectation and variance, Bernoulli random variable, Binomial distribution, Poisson distribution, Geometric distribution, Normal and Exponential distribution, Normal approximation and Poisson approximation to binomial distribution, hazard rate function, , Comparing systems using sample data, Confidence interval	10
3.	Markov Process	Introduction and classification of stochastic processes, Discrete time and Continuous time markov chains, Birth and death processes , Transition probabilities, Steady state solution, Performance measure in terms of time spent and expected reward	6
4.	Queuing models	Basics of Queuing theory, Kendall notation, Little's Law, Analysis of a single queue	8

		with one server and multiple servers, Analysis of finite buffers queuing systems	
5.	Simulation modeling	Introduction to simulation, Types of simulation, Random number generation, a survey of random number generators, seed selection, testing random number generators , random variate generation	6
6.	Measurement techniques and tools	The art of data presentation, Ratio Games	2
7.	Experimental design and analysis	Types of Experimental designs, 2^2 factorial designs, General 2^K factorial designs, 2^{K-p} fractional factorial designs	5
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance (10 Marks), Assignments / Quiz / Mini project (15 Marks)
Total	**100**

Project based Learning: Each student in a group of 2-3, study the research papers related to experimental designs and present their summary in the form of report. To make it application based, students select the recent articles which is applied on various contemporary domains. Understanding the research papers gives them the knowledge about applicability of experimental designs in identifying the important factors, their variations, etc.

Recommended Text books:

1.	Raj Jain, "The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling", Wiley, Reprint Edition, © 2014.
2.	K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd Edition, Reprint Edition, © 2018.

Recommended Reference books:

1.	Ross, Sheldon M. "A First Course in Probability". Upper Saddle River, N.J.: Pearson Prentice Hall, 10th Edition, ©2019
2.	Obaidat, Boudriga, "*Fundamentals of Performance Evaluation of Computer and Telecommunication Systems* ", 2010, Wiley, ISBN 978-0-471-26983
3.	Ross, Sheldon M. "Introduction to Probability Models". Amsterdam: Academic Press, 12th Edition, ©2019
4.	Fortier, Michel, "Computer Systems Performance Evaluation and Prediction", 2003, Elsevier, ISBN 1-55558-260-5

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS122	Semester Even	Semester 2nd Session 2021 -2022 Month from Jan'22 to June'22
Course Name	Performance Engineering Lab		
Credits	2	Contact Hours	2 hrs

Faculty (Names)	Coordinator(s)	Dr. Parmeet Kaur
	Teacher(s) (Alphabetically)	1. Dr. Kavita Pandey 2. Dr. Parmeet Kaur

COURSE OUTCOMES		COGNITIVE LEVELS
C174.1	Experiment with GProf to calculate the performance and statistics of a program in terms of call counts and timing information of functions.	Apply (level 3)
C174.2	Analyze performance of data mining algorithms on real world data sets using Weka tool.	Analyze (level 4)
C174.3	Compare the performance of different protocols by simulating various wired and wireless network scenarios in NS2 Simulator.	Analyze (level 4)
C174.4	Examine the performance of M/M/1, M/D/1 and D/M/1 Queuing models in NS2.	Analyze (level 4)
C174.5	Model computer systems using Markov Chain Theory with Performance Evaluation Process Algebra (PEPA)	Analyze (level 4)

Module No.	Title of the Module	List of Experiments	CO
1.	GNU Profiler	Use the Gprof (GNU Profiler) to analyze the performance and statistics of a program	1
2.	Data Science Tools	Data analysis using WEKA tool	2
3.	Network Simulation	Introduction to Network simulator (NS2) and its various utilities NAM, XGraph etc. Creation of Wired and Wireless Network Scenarios and simulation of various protocols Wired and Wireless Network Performance Analysis using AWK and Python	3
4.	Queuing Analysis	Simulation of various queues in NS2 and analyzing their performances on various performance metrics such as throughput, average delay and packet loss	4
5	Performance Evaluation Process Algebra	Model computer systems using Markov Chain Theory and Perform Steady State Analysis.	5

Evaluation Criteria

Components	Maximum Marks
Evaluation-1:	10

Lab test-1:	20
Lab test-2:	20
Evaluation-2 :	15
Project:	20
Attendance:	15
Total	100

Project based Learning: Each student in a group of 3-4 will study the research papers related to performance analysis of software systems. The articles should be recent and in relation with the subject contents. Understanding and implementing the research paper(s) enhances the student's working experience towards studied tools and concepts.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	GPROF Tutorial – How to use Linux GNU GCC Profiling Tool
2.	https://www.dcs.ed.ac.uk/pepa/about/
3.	Marc Greis' Tutorial for the UCB/LBNL/VINT Network Simulator "ns"
4.	Introduction to Network Simulator NS2 by Teerawat Issariyakul, Ekram Hossain
5.	An Introduction to the WEKA Data Mining System by Zdravko Markov
6.	https://www.cs.waikato.ac.nz/~ml/weka/
7.	nile.wpi.edu/NS/
8.	The ns Manual, https://www.isi.edu/nsnam/ns/doc/ns_doc.pdf

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS123	**Semester** II	**Semester** ... **Session** 2021-2022 **Month from** June to July, 2022
Course Name	**IoT Systems Development Lab**		
Credits	1	**Contact Hours**	2 Hours

Faculty (Names)	**Coordinator(s)**	Dr K.Rajalakshmi
	Teacher(s) (Alphabetically)	Dr. Hema N Dr K.Rajalakshmi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C181.1	Explain Node-RED IDE platform for IoT application development and demonstrate I/O nodes, flows, third party palettes, import/export of flows in Node-RED.	Understand (level 2)
C181.2	Develop user defined functional nodes and deploy it in Node-Red.	Apply (level 3)
C181.3	Analyze various IoT Communication protocols using APIs with Arduino and Raspberry Pi along with sensors and actuators.	Analyze (level 4)
C181.4	Apply and evaluate the characteristics of different IoT devices.	Evaluate (level 5)
C181.5	Design and develop IoT based applications for various challenges and problems related to Sustainable Development, e.g., energy and waste management, water conservation, clean energy, improving public health, sustainable urbanization, smart agriculture etc.	Create (level 6)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Node-Red Installation and Use	Setup and Install Node.js and Node-RED as IDE platform for IoT application development.	CO1
2.		Demonstrate I/O nodes, flows, third party palettes, import/export of flows in Node-RED	CO1
3.		Develop Java Script based IoT applications using functional nodes , flows and dashboard on Node-RED platform	CO2
4.		Developing and implementation of user defined nodes for creating flows in Node-Red.	CO2
5.	Study and use of Arduino and Raspberry Pi, sensors and actuators.	Study and interface of Arduino and Rasberry Pi with different types of sensors and actuators	CO2
6.		Creation of various IoT based applications using Arduino and Rasberry Pi	CO3, CO4
7.	Developing IoT based systems applications using Arduino and Raspberry Pi	Developing smart applications for various challenges and problems related to Sustainable Development, e.g., energy and waste management, water conservation, clean energy, improving public health, sustainable urbanization, smart agriculture etc.	CO5

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 1	20
Lab Test# 2	20
Attendance	15
D2D	30
IoT System Development PBA	10
Report of Project	5
Total	**100**

Project based learning: Students form group of size 2-3 members. Each group will identify several real life issues in various thrust areas like healthcare, industrial, education, smart city, logistics, environment, governance and etc. Once problem has been identified, the group will analyze the problem and synthesizeIoT system based solutions to the identified problem. Each group will apply different IoTbased approaches such as smart sensor and heterogeneous devices. This approach will enhance skills of each student and increase the understanding of IoT systems in distributed applications. Moreover, candidate will gain the enough knowledge to provide the IoT solution to enhance the quality of life in human/organization. After this course, a student will able to undertake any work in this area in the industry or research.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Internet of Things: Architecture and Design Principles, Raj Kamal, McGrawHill.
2	“Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti
3	https://nodered.org/docs/getting-started
4.	https://www.arduino.cc/en/Tutorial/HomePage
5.	https://www.raspberrypi.org/documentation/

Detailed Syllabus

Subject Code	17M22CS115	**Semester Even**	**Semester M.Tech II** **Session 2021- 2022** **Month from Jan to June**
Subject Name	Large Scale Graph Algorithms and Analytics		
Credits	**3**	**Contact Hours**	**3**
Faculty (Names)	**Coordinator(s)**	Dr. Adwitiya Sinha	
	Teacher(s) (Alphabetically)	Dr. Adwitiya Sinha	

S.No.	Description	Cognitive Level (Blooms Taxonomy)
C161.1	Understand the characteristics & significance of large-scale graphs over complex structures	Understanding Level (Level III)
C161.2	Analyze several techniques to yield and process information from large-scale real-world data sources	Analyzing Level (Level II)
C161.3	Apply the concept of random network theory to large graphs	Applying Level (Level IV)
C161.4	Evaluate the heterogeneous behavior in large-scale graphs with hyper-graphs and multi-graphs for recommendation	Evaluating Level (Level V)
C161.5	Design algorithmic frameworks for large-scale complex interconnected structures	Creating Level (Level VI)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1	Introduction to Large-scale Graphs	Basics of Graph, Multi-Graph, Hypergraph & its Duality, Introduction & Application of Large-scale Graph, Characteristics, Challenges	6
2	Data Sources & Categorization	Complex Data Sources (Social Networks, Simulations, Bioinformatics), Categories – Social graphs (Facebook, Twitter, Google+), Endorsement graphs (Web Link Graph, Paper Citation Graph), Location graphs (Map, Power Grid, Telephone Network), Co-occurrence Graphs (Term-Document Bipartite, Click-through Bipartite)	7
3	Basic Large-scale Graph Analysis	Basic Large-scale Graph Analysis (Efficient Search – Graph Traversal and Search Algorithms; Pattern Discovery -Matching Algorithms, Centrality Computing Algorithms, List Ranking Algorithms; Partitioning – Connected Component Algorithms, Graph-Cut Algorithms)	7

4	Advanced Large-scale Graph Analysis	Advanced Large-scale Graph Analysis (Graph indexing and ranking – Link Analysis Algorithms, Web Crawling, Page Ranking Personalized Page Rank, Page Rank Axioms, HITS; Data Based Approaches – Clustering and Classification Algorithms	7
5	Computation for Massive Data Sets	Large scale Graph Clustering: Spectral Clustering, Modularity-based Clustering, Random Walks, Social Balance Theory	5
6	Large Graph Representation, Analysis & Implementation	Adjacency Matrix Representation, Adjacency List Representation, Graph Implementation Strategies & Softwares (PowerBI, Python, NetworkX, Pajek, MapReduce, GraphLab, Orange)	5
7	Advanced Research Topics	Power Law Distribution in Social Networks, Models of Power Law Random Graphs, Game-Theoretic Approach to Modeling Network Creation, Rank Aggregation and Voting Theory, Recommendation Systems	5
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	Attendance (15 Marks), Assignment/Quiz/Mini-project (10 Marks)
Total	**100**

Project based learning: Each student in a group of 3-4 will extract data from real-world domains using data streaming, web crawling, application programming interfaces (APIs), or from standard repositories that are globally recognized. For conducting application-based research, the students are encouraged to analyze social/political/financial/disease related data and generate underlying networked structure based on activity and topology. Analysing the real-world data for providing link prediction, community detection, security enhancements, commercial decision making, cost-benefit analysis, etc. using network science algorithms, tools, and analytics.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Deo, Narsingh. *Graph theory with applications to engineering and computer science*. Courier Dover Publications, 2017.
2.	Gross, Jonathan L., and Jay Yellen, eds. *Handbook of graph theory*. CRC press, 2003.
3.	Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications, L. N. de Castro (2006), CRC Press.
4.	Bondy, John Adrian, and Uppaluri Siva Ramachandra Murty. *Graph theory with applications*. Vol. 290. London: Macmillan, 1976.
5.	West, Douglas Brent. *Introduction to graph theory*. Vol. 2. Upper Saddle River: Prentice hall, 2001.
6.	Bollobás, Béla. *Modern graph theory*. Vol. 184. Springer Science & Business Media, 2013.

Detailed Syllabus
Lecture-wise Breakup

Course Code	18M12CS115	**Semester (Even)**	**Semester II Session** 2021 -2022 **Month from Jan to June, 2022**
Course Name	Internet of Things		
Credits	**3**	**Contact Hours**	**3 Lectures**

Faculty (Names)	**Coordinator(s)**	Dr. K. Rajalakshmi
	Teacher(s) (Alphabetically)	Dr. K. Rajalakshmi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C150.1	Identification of purpose, requirements and description of various components and specifications of IoT devices, applications and protocols.	Understand (level 2)
C150.2	Develop the Process Model, Domain Model, Information Model and Service Model specifications using IoT communication protocols.	Apply (level 3)
C150.3	Analyze the characteristics and functioning of various IoT specific communication protocols used in different layers of IoT devices.	Analyze (level 4)
C150.4	Evaluate various IoT protocols and components for building IoT applications for real world problems and sustainable solutions.	Evaluate (level 5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Internet of Things	Introduction to Internet of Things, Layers in IoT, IoT Communication Protocols at different layers, Design steps for IoT, IoT Enabling Technologies, IoT Levels.	5
2.	IoT platforms design methodology	IoT Design methodology, Purpose and requirement specifications, Process, Domain, Information Model specifications, Service specifications and application development.	5
3.	IEEE 802.15.4	The Physical Layer, MAC Layer, MAC Layer Frame Format and their uses.	3
4.	ZigBee	ZigBee Architecture, Association, ZigBee Network Layer, APS Layer, ZDO, Security, ZCL etc.	3
5.	Internet Connecting Principles	Introduction to Arduino and Raspberry Pi, Connectivity with other components, internet connectivity, IP addressing in IoT, Media Access Control, and Application Layer Protocols: MQTT, CoAP, XMPP.	9
6.	Design Principles for Web Connectivity	Web Communication Protocols for Connected Devices, Message communication Protocols, Web connectivity : SOAP, REST, HTTP RESTFUL, Web Sockets	4
7.	Data Acquiring , Organizing, Processing and Analytics	Data Acquiring and Storage, Organizing the data, Transactions, Business Processes, Integration and Enterprises Systems, Analytics, Knowledge Acquiring, Managing and Storing process	4
8.	Data Collection, Storage and Computing using	Cloud computing paradigms for Data Collection, Storage and Computing, Cloud Service Models, IoT Cloud-based Services.	6

	Cloud Computing		
9.	IoT Applications for Sustainable developments.	Energy Savings in IoT, Green IoT Applications developments for sustainability.	3
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 07, Quizzes /Assignments /Mini-Project = 18)
Total	**100**

Project based learning: Students form group of size 2-3 members. Each group will identify several real life issues in various thrust areas like healthcare, industrial, education, smart city, logistics, environment, governance and etc. Once problem has been identified, the group will analyze the problem and synthesizeIoT system based solutions to the identified problem. Each group will apply different IoTbased approaches such as smart sensor and heterogeneous devices. This approach will enhance skills of each student and increase the understanding of IoT systems in distributed applications. Moreover, candidate will gain the enough knowledge to provide the IoT solution to enhance the quality of life in human/organization. After this course, a student will able to undertake any work in this area in the industry or research.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Internet of Things: A Hands-On Approach, ArshadeepBagha and Vijay Madisetti.
2.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, and Patrick Grossetete
3.	The Internet of Things: Key Applications and Protocols, Oliver Hersent, David Boswarthick, Omar Elloumi, Wiley.
4.	Internet of Things: Architecture and Design Principles, Raj Kamal, McGrawHill
5.	6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
6.	Building the internet of things with ipv6 and mipv6, The Evolving World of M2M Communications, Daniel Minoli John Wiley & Sons

Detailed Syllabus
Lab-wise Breakup

NOTE: All the entries (…) must be in Times New Roman 11.

Course Code	17M15CS121	**Semester – M. Tech CSE**	**Semester II Session Even** 2022 **Month from: Jan-June, 2022**
Course Name	**Cloud and Web Services Lab**		
Credits	1	**Contact Hours**	2 Hrs/Week

Faculty (Names)	**Coordinator(s)**	Prakash Kumar
	Teacher(s) (Alphabetically)	Prakash Kumar /Sandeep Kumar Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
C179.1	Demonstrate the architecture and layers of Cloud Service Models, Deployment models etc.	Understand (level 2)
C179.2	Understand the working of CloudSim and run different scheduling alogorithms.	Apply (level 3)
C179.3	Analyze various Scheduling algorithms and compare their performances on Virtual Machines.	Analyze (level 4)
C179.4	Apply and evaluate the performance of various Cloud based Web Services	Evaluate (level 5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	CloudSim installations and Use	Study of CloudSim, set up CloudSim environment, Virtual Machine (VM) creation, Running VMs on CloudSim.	CO1
2.		Allocate different Cloudlets to VMs and Data Centers using different Cloud based scheduling algorithms.	CO2
3.	Analyze various Scheduling algorithms in different scenarios on CloudSim	Create different Data Centers, VM allocation and provisioning on Data Centers, and analysis of outcomes.	CO3
4.		Assigning cloudlets and analysing the scheduling parameters for various scenarios. Creating and Running applications in Cloud Environments.	CO3
5.	Implement and Analyse Cloud Based Web Services	Apply and evaluate the performance of various Cloud based Web Services	CO4

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 1	20
Lab Test# 2	20
D2D work	60 (D2D: 40 marks, PBL: 20 marks)
Total	**100**

Project Based Learning: A group of maximum 2 students are formed. Each group chooses a Cloud and Web Services based project. The project shall be designed and/or modeled based on any Cloud and Web Services based Platform like AWS, Google cloud, Eucalyptus, CloudSim, SOAP, RESTful Services, UDDI, WSDL or any Cloud or Web Services based tools. The project shall function and run as per the objective of the project. Live demonstration of the project shall be shown during their presentation. The project evaluation shall be done based on the quality, innovation, relevance and creativity involved.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Rajkumar Buyya, Rajiv Ranjan and Rodrigo N. Calheiros, Modeling and Simulation of Scalable Cloud Computing Environments and the CloudSim Toolkit: Challenges and Opportunities, Proceedings of the 7th High Performance Computing and Simulation Conference (HPCS 2009, ISBN: 978-1-4244-4907-1, IEEE Press, New York, USA), Leipzig, Germany, June 21 - 24, 2009.
2	Rodrigo N. Calheiros, Rajiv Ranjan, Anton Beloglazov, Cesar A. F. De Rose, and Rajkumar Buyya, CloudSim: A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms, Software: Practice and Experience, Volume 41, Number 1, Pages: 23-50, ISSN: 0038-0644, Wiley Press, New York, USA, January 2011.
3	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'REILLY publication.
4.	K. Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing- From Parallel Processing to the Internet of Things", Morgan Kauffman Publishers, Elsevier.
5.	
6.	
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Detailed Syllabus

Lecture-wise Breakup

Course Code	18M12CS113	**Semester** 2nd Sem **(Even)**	**Semester** MTech II Sem **Session** 2021-22 **Month from** Feb to June
Course Name	Cryptography and Computer Security		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr. Jaspal Kaur Saini
	Teacher(s) (Alphabetically)	Dr. Jaspal Kaur Saini

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Understand principles & theories of cryptography and computer security; Classify symmetric encryption techniques	Understand Level (Level 1)
CO2	Apply the knowledge of number theory in public key cryptographic techniques	Apply Level (Level 2)
CO3	Analyze security mechanisms using rigorous approaches, including theoretical for intrusion detection systems	Analyze Level (Level 3)
CO4	Evaluate Authentication Techniques and Hash Algorithms	Evaluate Level (Level 4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to principles and theories of cryptography and computer security, Network security protocols at different layers with respect to TCP/IP security protocol stack, namely, FTPS, HTTPS, DNSSEC, SSL, SSH,SMIME,	4
2.	IPSec	IPSEC (IP Security – IP Authentication Header, Payload Encapsulation) and PPTP	4
3.	Vulnerabilities & Solutions	Techniques and approaches to discover network and system vulnerabilities. Unwanted traffic, Firewalls, VPNs, Intrusion Detection, filters, Protocol weakness exploits, malware vulnerabilities, Spams, Defensive solutions: Packet filtering, Attack Classification and Vulnerability Analysis, Detection, Containment and Response/Recovery	5
4.	Security Tools	Tools for improving system security, Security, Secure Socket Layer and Secure Electronic Transaction.	2
5.	Network Attacks & Classification	Implementation of supervised & unsupervised defensive solutions based on packet filtering, attack classification & vulnerability analysis, detection and mitigation.	3
6.	Cryptography Basics	Mathematics of Cryptography: Modular Arithmetic, Congruence and Matrices, Plain Text, Cipher Text, Encryption Algorithm, Decryption Algorithm Requirements	4

		for Cryptography, Cryptanalysis and attacks	
7.	Symmetric Ciphers	Mathematics of Symmetric-Key Cryptography: Algebraic Structures, Conventional Symmetric Encryption Algorithms Symmetric vs Asymmetric Block and Stream ciphers, DES: DES Structure & DES Security, Double and Triple DES	8
8.	Asymmetric Ciphers	Cryptographic Modes Public Key Cryptography Principles & Applications Algorithms RSA, Diffe-Hellman Key Exchange, DSS Elliptic-curve, Stream Cipher: RC4 and RC5.	8
9.	Data Integrity	One way Hash Functions Message Digest MD5,SHA1 Digital Signatures Public Key Infrastructure (PKI) Digital Certificates Certificate Authorities	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments + Attendance)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Cryptography & Network Security, Forouzan, Tata McGraw Hill
2.	Botnets: The Killer Web App, Craig A. Schiller, Jim Binkley, David Harley, Gadi Evron Tony Bradley, Carsten Willems, Michael Cross, Syngress
3.	Cryptography and Network Security *Principles and Practice*, Sixth Edition, William Stallings, Pearson
4.	Understanding Cryptography, Christof Paar, Jen Pelzl, Springer
5.	USENIX Security Symposium
6.	ACM Transactions on Information and system security
7.	IEEE Press Computer Security and Privacy