SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme of Teaching and Examination
M.Tech. III Semester

Specialization- Network Information System

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	**T**	**P**		Continuous Evaluation	Sem End Exam	Total	
1	EMT07301	Block Chain	3	1	-	4	30	70	100	3 Hrs.
2	EMT07351	**Elective –II**	3	1	-	4	30	70	100	3 Hrs
3	EMT07303	Preliminary Work on Dissertation	-	-	20	10	75	175	250	3 Hrs
4	EMT07304	Technical Paper Writing and Seminar	-	-	4	2	15	35	50	3 Hrs.
Total Contact hr. per week: 20			**Total Credit**			**20**	**150**	**350**	**500**	

Table – II		
Elective - II		
Sr. No	**Subject Code**	**Subject Name**
1	EMT07351A	Modeling and Simulation
2	EMT07351B	Information Retrieval System
3	EMT07351C	Software Define Network

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Course Title	Block Chain				
Course Code	EMT07301				
Semester	M.Tech – NIS- 3rd Semester				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	This course is intended to study the basics of Block chain technology.				
Course Objectives	• Learner will explore various aspects of Block chain technology like application in various domains. • By implementing learner will have idea about private and public Block chain, and smart contract.				
Course Contents	**UNIT I : Introduction of Cryptography and Block chain:** What is Blockchain, Block chain Technology Mechanisms & Networks, Block chain Origins, Objective of Block chain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain. **UNIT II : BitCoin and Cryptocurrency:** What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency. **UNIT III : Introduction to Ethereum:** What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts. **UNIT IV : Introduction to Hyperledger:** What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. **UNIT V : Blockchain Applications:**				

	Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.
Course Outcomes	• Understand and explore the working of Blockchain technology (Understanding). • Analyze the working of Smart Contracts (Analyze). • Understand and analyze the working of Hyperledger (Analyze). • Apply the learning of solidity and de-centralized apps on Ethereum (Apply).
Text Books	1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). 2. Antonopoulos, Mastering Bitcoin.
Reference Books	1. Antonopoulos and G. Wood, Mastering Ethereum. 2. D. Drescher, Blockchain Basics. Apress, 2017.

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Course Title	**Elective –II - Modeling and Simulation**				
Course Code	EMT07351A				
Semester	M.Tech – NIS- 3rd Semester				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	Basic knowledge about electronic and computers.				
Course Objectives	1. Define the basics of simulation modelling and replicating the practical situations in organizations. 2. Generate random numbers and random variants using different techniques. 3. Develop simulation model using heuristic methods. 4. Analysis of Simulation models using input analyzer, and output analyzer. 5. Explain Verification and Validation of simulation model.				
Course Contents	**UNIT - I** **Introduction to Simulation:** Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study. Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples. **UNIT - II** **General Principles:** Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling. **Random Numbers:** Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test. **UNIT - III** **Random Variate Generation:** Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique **Optimisation Via Simulation:** Meaning, difficulty, Robust Heuristics, Random Search.				

	UNIT - IV **Analysis of Simulation Data Input Modelling:** Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis. **Verification and Validation of Model** : Model Building, Verification, Calibration and Validation of Models. **UNIT - V** **Output Analysis** – Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations. **Simulation Softwares:** Selection of Simulation Software, Simulation packages, Trend in Simulation Software.
Course Outcomes	After completion of this course the students will be able to - 1. Describe the role of important elements of discrete event simulation and modeling paradigm. 2. Conceptualize real world situations related to systems development decisions, originating from source requirements and goals. 3. Develop skills to apply simulation software to construct and execute goal-driven system models. 4. Interpret the model and apply the results to resolve critical issues in a real world environment.
Text Books	1. System Design, Modeling, and Simulation using Ptolemy II, Ptolemy.org, 2014. 2. Simulation modeling and analysis / Averill M. Law, President Averill M. Law & Associates, Inc.
Reference Books	1. Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol, Discrete Event system Simulation, Pearson Education, Asia, 4th Edition, 2007, ISBN: 81-203-2832-9. 2. Geoffrey Gordon, System Simulation, Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-4. 3. Narsingh Deo, Systems Simulation with Digital Computer, PHI Publication (EEE), 3rd Edition, 2004, ISBN : 0-87692-028-8.

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<table>
<tr><td>Course Title</td><td colspan="5">Information Retrieval System</td></tr>
<tr><td>Course Code</td><td colspan="5">EMT07351B</td></tr>
<tr><td>Semester</td><td colspan="5">M.Tech – NIS- 3rd Semester</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">The main objective of this course is to present the scientific support in the field of information search and retrieval.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Students must have the minimal concept of Data Base Management Systems.
2. They must also have the concept of different types of algorithms used for searching data.
3.They must also have the minimal knowledge of Natural language such as saurus, synonyms etc.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT - I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities
UNIT - II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.
UNIT - III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters
UNIT - IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search,</td></tr>
</table>

	Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext **Information Visualization:** Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies. **UNIT - V** **Text Search Algorithms:** Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems **Multimedia Information Retrieval:** Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.
Course Outcomes	1. Describe the objectives of information retrieval systems. 2. Describe models like vector-space, probabilistic and language models to iidentify the similarity of query and document. 3. Implement clustering algorithms like hierarchical agglomerative clustering and k-means algorithm. 4. Understand relevance feedback in vector space model and probabilistic model. 5. Illustrate how N-grams are used for detection and correction of spelling errors.
Text Books	1. David A. Grossman, OphirFrieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition(Distributed by Universal Press), 2004.
Reference Books	1. Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004. 2. SoumenChakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan – Kaufmann Publishers, 2002. 3. Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009.

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Course Title	**Software Define Network**				
Course Code	EMT07351A				
Semester	M.Tech – NIS- 3rd Semester				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	NA				
Course Objectives	1. History and volution of SDN, OF Switch, Control and Data Plane Separation 2. Routing Control Platform and 4D 3. Controllers (Open Daylight Controller (ODL), Open Network Operating System (ONOS) 4. Flow Visor and NVP 5. Data Plane 6. SDN Security and Use Cases 7. Verification and Troubleshooting				
Course Contents	**Unit- I SDN Introduction** - Challenges and opportunities. VLANs, Overlay networking, active network, SDN. Other related technologies - FORCES, RCP, Ethane, P4. SDN application areas - network virtualization, performance, scalability and multi-tenancy. Service and network management. **Unit- II SDN Architecture** Network Operating System (NOS). SDN Architecture. Plane Separation, Simple Device and Centralized Control, Network Automation and Virtualization, Openness SDN Controllers, SDN Applications, APIs Planes - data, management and control. Interfaces - Northbound and Southbound. **Unit- III SDN Protocols** SDN Protocol specifications: Border Gateway Protocol (BGP); Cisco Application Centric Infrastructure (ACI); OpenFlow. OpenFlow versions. Components of an OpenFlow Switch. Flow and group tables. Rule matching. Action handling. Table misses. Counters, metering and metadata. **Unit-IV SDN Switch and Controllers** Languages and functions available for programming SDNs, northbound API. Mininet. Software vs. Hardware SDN switch implementations - Open Switch, WhiteBox, ONL. Controller implementations - POX, NOX, Beacon, Floodlight. Special Purpose controllers - Flowvisor, RouteFlow.				

	Unit- V OpenFlow: Switch-Controller Interaction, Flow Table, Packet Matching, Actions and Packet Forwarding, Extensions and Limitations Network Function **Virtualization**: SDN vs. NFV, OPNFV, Inline Network Functions, Service Creation and Chaining, NFV Orchestration. **Emerging SDN Models**: Protocol Models, Controller Models, Application Models, SDN in Datacenters: Multitenancy, Failure Recovery, SDN in Internet eXchange Points (IXPs) (4 lectures) Data Center Networking in the context of SDN (5 lectures)
Course Outcomes	1. Examine the challenges and opportunities associated with adopting SDN compared to traditional approaches to networking. 2. Analyse the functions and components of the SDN architecture. 3. Discuss the major requirements of the design of an SDN protocol. 4. Design and create an SDN network consisting of SDN switches and a centralised controller. 5. Analyse the performance of the SDN network by using verification and troubleshooting techniques.
Text Books	1.P. GORANSSON, C. BLACK, T. CULVER (2016), Software Defined Networks: A Comprehensive Approach.
Reference Books	1.Morgan Kaufmann. K. GRAY, T.D. NADEAU (2016), Network Function Virtualization, Morgan Kaufmann

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Course Title	Preliminary Work on Dissertation				
Course Code	EMT07303				
Semester	M.Tech – NIS -3rd Semester				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	-				
Course Objectives	1. Demonstrate of well-defined selected project problem. 2. Encourage preparing one International Journal and attends two International Conferences related to their Final project. 3. Present effectively each part of the dissertation in terms of motivation, literature, methodology, experimentation and final conclusions				
Course Contents	**A preliminary work must be completed as per the following:-** 1. Well-defined Engineering Research – based Problem must be selected. 2. Motivation to select such problem. 3. Literature Survey: Part 1 (What other researchers have done so far?) . 4. Literature Survey: Part 2 (What are the Voids found?). 5. Problem Formulation (As per the voids detected). 6. Solution Methodology with respect to the : a. Flowchart and Algorithm. b. What methods have been applied? c. Why they have been applied? d. How they have been applied? e. Mathematical formulations to justify the work. f. Case based studies (if any). g. Results and Discussions (must be thorough). 7. So far Observations and further planning's. 8. Any help to the Society through the selected research based problem.				
Course Outcomes	1.Knowledge of the most advanced research in the candidate's specialisation area (Track) of Information Security, respectively 2. In-depth understanding of academic theory and the preparation of high-quality research pertinent to the field of study 3. Ability to select appropriate research methods and techniques suitable for the candidate's research field.				

	4. In-depth understanding the current state of the art in the individual research area, and the ability to appropriately employ methods and existing research results in the development of new knowledge, theories and presentation of research in the individual research area.
Text Books	
Reference Books	

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Course Title	Technical Paper Writing and Seminar				
Course Code	EMT07304				
Semester	M.Tech –NIS-3rd Semester				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	--				
Course Objectives	1. To build effective presentation skills 2. To develop writing reports and proposals				
Course Contents	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness. Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions useful phrases, how to ensure paper is as good as it could possibly be the first- time submission				
Course Outcomes	At the end of the course, the student will be able to: 1. Understand that how to improve your writing skills and level of readability 2. Learn about what to write in each section 3. Understand the skills needed when writing a Title 4. Ensure the good quality of paper at very first-time submission				
Text Books	1.Goldbort R (2006) Writing for Science, Yale University Press (available on				

	Google Books) 2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University
Reference Books	3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook 4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011