NATIONAL UNIVERSITY



Syllabus

MAS in Computer Science Effective from Session: 2020 – 2021

DEPARTMENT OF COMPUTER SCIENCE

Natural Science Group

First Semester

Course Code	Course Title	Marks	Credits
4211	Research Methodology for Computer Science	100	4
4212	Internet of Things (IoT) and Robotics	100	4
4213	Wireless Communication	100	4
4214	Advanced Digital Image Processing	100	4
	Total	400	16

Second Semester (Any two theory course)

Course Code	Course Title	Marks	Credits
4221	Distributed Database Management System	100	4
4222	Data & Web Mining	100	4
4223	Web Application Engineering	100	4
4224	Digital Governance and E-Commerce	100	4
	Thesis		
	Total	200	8

Third/Final Semester (Any two theory course) Third Semester

Course Code	Course Title		Marks	Credits
4231	Information Security		100	4
4232	Graph Theory		100	4
4233	Management Information System		100	4
<mark>4238</mark>	Thesis		200	8
4239	Viva		50	2
		Total	450	18
L		Total	Credit 42	

Total Credit 42

First Semester:

Course Code : 4211	Marks: 100	Exam Duration: 4 hrs.	Class Hours: 120 hrs.
Course Title :	Research Methodology for Computer Science		

Course	The course aims at offering students a deep understanding of the research					
Objectives	methodology and art of research report writing.					
Course	Definition and explanation of research. Types and Paradiams of Research. History					
Contonta	and Dilosophy of Desearch (asp. Dilosophical evolution, pathways to major discoveries					
Contents	and Finosophy of Research (esp. Finosophical evolution, pathways to major discoveries					
	& inventions), Research Process decision, planning, conducting, Classification of					
	Research Methods; Reflective Thinking, Scientific Thinking.					
	Research problem formulation : Literature review- need, objective, principles, sources,					
	functions & its documentation, problem formulation esp. sources, considerations &					
	steps, Criteria of a good research problem, Defining and evaluating the research					
	problem, Variables esp. types & conversion of concepts to variables. Research design					
	esp. Causality, algorithmic, quantitative, and qualitative designs, Various types of					
	designs, Characteristics of a good research design, problems and issues in research					
	design; Hypotheses: Construction, testing, types, errors; Design of experiments					
	especially, classification of design and type of errors.					
	Problem-solving: Understanding the problem- unknowns, data & conditions, conditions					
	- satisfiability, sufficiency, redundancy & contradiction, separation of parts of the					
	problem and conditions, notations; devising a plan- connection between data and					
	unknown, similar/related problems, reuse of previous solutions, rephrasing/transforming					
	the problem, solving a partial or related problem, transforming data and unknowns;					
	carrying out the plan- esp. correctness of each step in multiple ways; evaluation of					
	solution and method- checking the correctness of the solution, different derivations, the					
	utility of the solution.					
	Theoretical methods of research: Algorithmic methods including probabilistic, soft					
	computing, and numerical methods: Modeling and Simulation: Engineering Design &					
	Optimization (techniques): Statistical research methods: Central tendency, Dispersions.					
	Skewness, Moments, Kurtosis, esp. Distributions, Time series, Overview of Non-					
	parametric tests & Multivariate analysis: Emerging techniques in discrete mathematics.					
	algorithms, probability-statistics, internet technology, and software engineering, and					
	their application to research in computer science and information technology.					
	Foundation of Hypothesis: Meaning of assumption, postulate, and hypothesis, nature of					
	hypothesis function and importance of hypothesis Characteristics of good hypothesis					
	formulating hypothesis.					
	Data & Reports: Infrastructural setups for research: Methods of data collection esp					
	validity and reliability. Sampling: Data processing and Visualization especially					
	Classification: Ethical issues especially bias Misuse of statistical methods Common					
	fallacies in reasoning. Research Funding & Intellectual Property Research reports.					
	Research Proposal & Report writing esp. Study objectives study design problems and					
	limitations: Prototype micro-project report implementing a major part of all the above					
References	indications, i rotoripe intere project report implementing a major part of an the above.					
ACICI CHUES	1 Islam M.N. (2014). An introduction to research methods 2^{rd} edition					
	1. Islam, WI.W. (2014), An inconcerton to research methods. 5 edition, Mullick and brothers. Dhaka					
	Providence (2004) Descent Mathedale are Dranatice Hall Ledi-					
	2. K. Paneerseivan (2004), Kesearch Methodology, Prenctice-Hall India					
	3. Yogesh Kumar Singh (2006), Fundamental of Research Methodology and					
	Statistics, New Age International Publishers.					
	4. C.R.Kothari (2004), Research Methodology Methods and Techniques					
	(Second Revised Edition), New Age International Publishers.					

Course Code : 4212		Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Internet of Things (IoT) and		d Robotics	

Course Objectives	The purpose of this course is to impart knowledge on the Internet of Things (IoT), which relates to the study of sensors, actuators, and controllers, among other Things, IoT applications and examples overview (building automation, transportation, healthcare, industry, etc.) with a focus on wearable electronics.
Course Contents	 Internet of Things (IoT) Architecture: Foundation of IoT: An Overview, Cloud Computing for IoT, Open Service Platforms for IoT, Human Interface, M2M to IoT; IoT Challenges and Issues: Tackling Jamming Attacks in IoT, Bioinspired Techniques for Data Security in IoT, A Chaos-Based Multi-level Dynamic Framework for Image Encryption, security issues in IoT, Building Secure IoT Systems; Government regulation on IoT; The IoT World of Applications: Mobile Computing and IoT, Single Activity Recognition System, Deep Learning and IoT, Machine Learning in IoT, IoT for Crowd Sensing and Crowd Sourcing, IoT Applications: IoT in Healthcare, IoT in Agriculture, IoT in Smart Cities, Smart Infrastructures, Smart home, IoT in Transportation, Smart Grid, Industrial Automation, IoT in Robotics. Preparing IoT Projects: Creating the sensor project - Preparing Raspberry Pi - Clayster libraries - Hardware- Interfacting with the hardware - Interfacing the hardware Internal representation of sensor values - Persisting data - External representation of sensor values - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states - Creating a camera - Hardware - Accessing the serial port on Raspberry Pi - Interfacing the hardware - Creating persistent default settings - Adding configurable properties - Persisting the settings - Working with the current settings - Initializing the camera.
References	 Internet of Things (IoT) Concepts and Applications (2020), editor Mansaf Alam, Kashish Ara, and Shakil Samiya Khan, Springer Nature Switzerland. Ovidiu Vermesan, Peter Friess (2014), Internet of Things – From Research and Innovation to Market Deployment', River Publishers. N. Ida (2014), Sensors, Actuators and Their Interfaces, SciTech Publishers. Boris Adryan, Dominik Obermaier, Paul Fremantle (2017), The Technical Foundations of IoT, Artech House publisher, UK. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle (2014), M2M to Internet of Things, Academic Press.

Course Code : 4213		Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Wirele	ss Communication		

Course	The aim of offering this course is to explain the various terminology, principles,
Objectives	devices, schemes, concepts, algorithms, and different methodologies used in
-	Wireless Communication Networks and the terms related to 4 th Industrial
	Revelution. To enable students to compare and contrast multiple division
	techniques, mobile communication systems, and existing wireless networks
	including 5G.
Course	Overview: Introduction to Mobile Wireless Communications, RF Engineering
Contents	Fundamentals, Generic Digital Radio, Global System for Mobile
	Communications (GSM), GPRS and EDGE, CDMA Fundamentals, Universal
	Mobile telecommunication System (UMTS), CDMA2000, Wireless Sensor
	Network.
	Introduction to OFDM and Fourth Generation Wireless (LTE),
	4th Industrial Revolution: History, Design principles and goals, Components,
	Primary drivers, Biggest trends- Smart factory, Predictive maintenance, Smart
	sensors, Agriculture and Food Industries, Challenges;
	Evolving from 4G to 5G;
	Introduction and Key Specifications of 5G Technologies: Opportunities and
	Challenges in Millimeter Wave MIMO Communication, Channel Models,
	Hybrid Signal Processing for Millimeter Wave MIMO, Digital and Analog
	Beamforming, Hybrid RF/ BB Precoder and Combiner Design for millimeter
	Wave MIMO, Coexistence of LTE and 5G, cognitive radio for 5G.
	Application of 5G: Impact of 5G on society, Business, Industry, 4 th Industrial
	Revolution etc.;
References	1. Martin Sauter (2017), From GSM to LTE-Advanced Pro and 5G: An
	Introduction to Mobile Networks and Mobile Broadband, Third Edition
	2. Jonathan Rodriguez (2015), Fundamentals of 5G Mobile Networks,
	ISBN: 978-1-118-86752-5
	3. Biljana Badic, Christian Drewes, Ingolf Karls, Markus Mueck (2016),
	Rolling Out 5G: Use Cases, Applications, and Technology Solutions,
	Apress publication.

Course Code : 4214		Marks: 100	Credits : 4 Class Hours	
Course Title :	Advanced Digital Image Pro		ocessing	

Course Objectives	The aim of offering this course is to study the image fundamentals and mathematical transforms necessary for image processing, image enhancement techniques, image restoration procedures, and the image compression procedures.
Course Contents	Digital Image Fundamentals: Visual Perception and Light, Image Representation and Modeling, Sampling and Quantization, Basic Relationships between Pixels.
	Image Enhancement: Image Transformation, Histogram Processing, Labeling, Different Types of Filters, Smoothing Frequency domain Filters, Sharpening Frequency domain Filters, Homomorphic filtering.
	Color Image Processing: Color Perception, Color Coordinate system, Chromaticity Diagram, Color Transformation, Filtering Color Images, Color- tone Adjustment, Color-based Segmentation.
	Image Analysis and Segmentation: Line and Edge Detection, Edge linking and Boundary Detection, Region-based Segmentation, Segmentation by Morphological Watersheds, Motion-based Segmentation.
	Morphological Image Processing: Dilation and Erosion, Opening and Closing, Some Morphological algorithms.
	Image Restoration: A model of the Image Restoration Process, Noise Models, Periodic Noise Reduction, Linear Position-Invariant Degradation, Minimum mean square error filtering.
	Image Compression: Image Compression Models, Error Free Compression, Lossy Compression, Image Compression Standards.
	Wavelets and Multi Resolution Processing: Multi-resolution Expansions, Wavelet Transforms in One-Dimensions and Two-Dimensions, Wavelet Packet.
	Pattern Recognition: Statistical, Structural, Neural Network, PCA, Knowledge-based and Hybrid techniques, Optical Character Recognition, Object Recognition.
	Applications: Robotic Vision, Medical Image Processing, Satellite Image Processing, etc.
References	 Rafael C. Gonzalez and Richard E. Woods (2009), Digital Image Processing, Pearson Education, Inc., 3rd Edition. Castleman (2007), Digital Image Processing, Pearson Education India. S. Annadurai (2007), Fundamentals of Digital Image Processing, Pearson Education India

Second Semester:

Course Code	: 4221	Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Distrib	uted Database Mana	gement System	
Course	The aim of	offering this course is	to achieve deep unde	erstanding of the theory
Objectives	of Distribut	ed Database Manager	nent System. Group	work and presentation
	will be requ	ired.		
Course	Review of 1	Databases		
Contents	Features of	Distributed Versus Ce	ntralized Databases	
	Principles	of Distributed Datab	ases: Levels of Dist	ribution Transparency,
	Distributed	Database Access	Primitives, Referen	nce Architecture for
	Distributed	Databases, Types of I	Data Fragmentation,	Integrity Constraints in
	Distributed	Databases.		
	Transactio	n Management: Trar	sforming Global Q	Queries into Fragment
	Queries, I	Distributed Grouping	and Aggregate	Function Evaluation,
	Parametric	Queries -Optimization	n of Access Strateg	ies, A Framework for
	Query Optin	mization, Join Queries,	General Queries, Di	stributed Atomicity.
	Distributed	atributed Deedlooke	ol: Foundations of D	Istributed Concurrency
	Control, DI	Mothods for Distribute	d Concurrency Control	ol
	Peliability	Basic Concepts	Non-blocking Colla	ui. mmitment Protocols
	Reliability	and Concurrency Con	trol Determining a (Consistent View of the
	Network D	etection and Resolution	on of Inconsistency	Checkpoints And Cold
	Restart.		in or meonsistency,	eneekpoints rind cold
	Distributed	l Database Administr	rations: Catalog Man	agement in Distributed
	Databases,	Authorization and Prot	ection	
	Distributed	l object database m	anagement systems	s: Fundamental object
	concepts a	and Models, Object	Distribution Desig	gn, Horizontal Class
	Partitioning	, Vertical Class Partit	ioning, Path Partition	ning, Class Partitioning
	Algorithms	, Query Execution, Tra	nsaction Models and	Object Structures
	Parallel D	atabase Systems: Da	tabase Server Appr	oach, Parallel System
	Architectur	es – Objectives – Func	tional Aspects – Para	llel Data Processing,
	Load Balan	cing Strategy.		
References	1. M.Tame	er Ozsu, Patrick Valdu	riez, (2011), Distrib	uted database systems,
	3nd Edition	n, Springer		TT'11
	2. Stefano	Ceri, (2017), Distribu	ted Databases, McGr	aw-Hill.

Course Title :	Data & Web Mining
Course	The aim of offering this course is to achieve a deep understanding of the
Objectives	theory of Data & Web Mining. Group work and presentation will be
	required.
Course	Introduction to data mining; data warehouse and OLAP technology; data
Contents	processing; data mining primitives, language, and system architecture;
	concept descriptions; data preprocessing and post-processing; association
	rules; classification and prediction; cluster analysis; decision trees:
	classification and regression free; support vector machine; visualization of
	multidimensional data. Data mining knowledge representation;
	knowledge Interestingness measures Perrosenting input data and output
	knowledge Attribute-oriented analysis Attribute relevance Class
	comparison Statistical measures.
	Data mining algorithms: Association rules Motivation and
	terminology: Basic idea: item sets. Generating item sets and rules
	efficiently, Correlation analysis, Experiments with Weka - mining
	association rules;
	Data mining algorithms: Classification, Basic learning/mining tasks,
	Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules;
	Mining real data: Preprocessing data from a real medical domain (310
	patients with Hepatitis C), Applying various data mining techniques to
	create a comprehensive and accurate model of the data. Clustering: Basic
	issues in clustering, First conceptual clustering system: Cluster/2;
	Partitioning methods: k-means, expectation maximization (EM),
	Hierarchical methods: distance-based agglomerative and divisible
	means EM Cobyed: Advanced techniques: Data Mining software and
	applications:
	Text mining: extracting attributes (keywords) structural approaches
	(parsing, soft parsing). Bayesian approach to classifying text. Web
	mining: classifying web pages, extracting knowledge from the web. Web
	mining type, Web Mining Recommendation Model, Data Mining software
	and applications.
References	1. Jiawei Han and Micheline Kamber (2011), Data Mining: Concepts
	and Techniques, published by Academic press.

Marks : 100

Credits : 4

Class Hours : 60

Course Code : 4222

 K. P. Soman, Shyam Diwakar and V. Ajay (2006), Data Mining: Theory and Practice, Prentice Hall of India Pvt Limited.

Course Code : 422	23	Marks: 100	Credits : 4	Class Hours : 60
Course Title :	Web A	pplication Engineerin	ng	

Course Objectives	The aim of offering this course is to make the students familiar with web application development software tools and environments currently available on the market. Teach the concepts, principles and methods of web engineering. Build web applications that are secured, scalable, flexible to modify and easy to manage.
Course	Introduction to Web and Web application;
Contents	Web Essential: Client, Server and Protocols, HTTP request and Response Message, Web Application, CGI, Web server mode, logging. HTML/XHTML, CSS, w3c standard, XML, XML Schema, XML Tag, XML Structure, XML Namespace, XML processing, SAX, Document Object Model, XML Query, XSLT, Document transformation using XSLT, Server Side Programming;
	Relation database overview: SQL, Database Design, Data Access Model, Object Relational Mapping, Design Pattern, Presentation Layer Design, Business Layer Design, JSP and Servlet or PHP, JDBC, MVC model, Web tier, Command Design Pattern, Service Locator Pattern, Data Access Object Pattern, Persistent communication;
	Web Application Security: Policy, Network-level Security: SSL, Application-level Security. SQL-injection, Form modification, cross site scripting;
	Privacy: P3P, Policies, Procedures Access Control, Authorization and Laws. E- commerce Payment Systems.
	Web Application infrastructure: Case Study PHP or J2EE.
References	 Dave W. Mercer, Allan Kent, Steven D Nowicki, <i>Beginning</i> <i>PHP5</i>, Wiley (Wrox). Robert Sheldon, Geoff Moes, Beginning MySQL, Wiley (Wrox). PHP an MySQL Web development, Luke Welling, Laura Thomson

Course Code : 422	24	Marks: 100	Credits : 4	Class Hours : 60
Course Title :	Digital	Governance and E-G	Commerce	

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Course	The aim of offering this course is to achieve a deep understanding of the					
Objectives	theory and application of digital Governance and E-commerce. Group work,					
Ū.	presentation, and Industry attachment will be required.					
Course	Digital Governance					
Contents	Introduction and Overview: From Formal Bureaucracy to Digital					
	Democracy. The Transition from Electronic Government to Digital					
	Governance, Policies: Transforming Democracy and Bureaucracy:					
	From Representative to Digital Democracy: Using the Internet to Increase					
	Citizen Participation in Governance Managing Citizen-Centric Digital					
	Governance Virtual Learning Using the Internet for Education Training and					
	Ouglity Improvement:					
	Administration: implementing Online Digital Governance					
	Accountability and Equality of Access: Balancing Political Responsiveness					
	with Administrative Effectiveness Advancing Digital Covernance and					
	Parformance Management Applying Digital Tachnologies to Improve Public					
	Sorvices:					
	Clabalization and Interactive Citizanshin: Clabal Inventory of Digital					
	Governmence Practices Clobalization Information Technology and Public					
	Administration Toward Digital Covernance and Participatory Citizanshin:					
	Integrating Technology and Public Administration					
	Integrating rechnology and rubic Administration.					
	E-Commerce					
	Introduction to e-commerce: E-commerce business models and concepts:					
	Technology infrastructure for e-commerce: the internet, web, and mobile					
	platform: E-commerce websites, mobile sites, and apps: E-commerce security					
	and payment systems: Business concents and social issues: E-commerce					
	marketing and advertising concepts Social mobile and local marketing.					
	Ethical social and political issues in e-commerce: E-commerce in action :					
	Online retail and services Online content and media Social networks					
	auctions and portals: B2b e-commerce: supply chain management and					
	collaborative commerce.					
References	1 Milakovich Michael E (2012) Digital governance: New technologies for					
	improving public service and participation Routledge					
	2 Chaffey Dave David Edmundson-Bird and Tanva Hemphill (2019)					
	Digital business and e-commerce management Pearson IIK					
	3 Kenneth C Laudon Guido Tabellini (2019) F-commerce Rusiness					
	<i>technology society</i> 15 th edition					

Third Semester:	:			
Course Code : 4231		Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Inform	ation Security		

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Course Objectives Course Contents	The aim of offering this course is to deliver knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks. And to develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies. Information security frameworks and overview; Information security policies: security policies, confidentiality policies, integrity policies; Cryptography and crypto analysis; Symmetric Key, Public key, Cryptography, Digital Signature; cipher techniques; steganography; Authorization, authentication and accouting: biometric security; key management; security design principles; identity management; access control mechanisms; assurance and trust; malicious logics; intrusion detection; Network security; system security; user security; program security; vulnerability explanation, password creating, surfer overflwon, phishing attack, SQL injection, command injection, CSS/XSS, database security; virtual machine security; security using smart card; system security evaluations; vulnerability analysis; auditing; Securing local area networks: Threat on wireless LAN, countermeasures against threat, ESS-ID exposure, ANY connection, Vulnerability on MAC Address Authentication, Encryption with WEP, PSK mode, EAP, implementing virtual private networks; Computer
References	 Matt Bishop, Introduction to Computer Security, published by CDorling Kindersley (India) Pvt. Ltd, licenses of Pearson Education in South Asia, ISBN: 978-81-7758- 425-7, 2006. Michael E. Whitman and Herbert J. Mattord, Principles of Information Security, published by Cengage Learning, 4th Edition, 2011. Andy Taylor, David Alexander, Amanda Finch, David Sutton and Andy Taylor, Information Security Management Principles, BCS publishers, 2nd Edition, 2013.

Course Code : 4232		Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Graph	Theory		

Course	The aim of offering this course is to develop the mathematical sophistication			
Objectives	needed to understand what properties to search for in graphs (simple networks), and prove results about them using the knowledge about graphs' structure.			
Course Contents	Fundamental concepts: varieties of graphs, path, cycles and components, degrees and distances, clique.			
	Trees: Properties, spanning trees, forests, centroids, generation of trees and cycles, wheel.			
	Connectivity: Vertex and edge connectivity, blocks, eccentricity, Menge's Theorem. Planarity of graph.			
	Traversability: Eulerian graphs, kuratowski's theorem, embedding graphs on surfaces, genus, thickness, and crossing number.			
	Graph Coloring: Vertex coloring, edge coloring, chromatic number, five color theorem, four color conjecture, critical graph.			
	Homomorphism Digraph: Different connectedness, oriented graphs- tournaments, network flows and related algorithms. Groups, polynomials and graph enumeration, matching and factorization, perfect graphs, Ramsey number and Ramsey theorem, forbidden graph theory, miscellaneous applications.			
References	 Dougles B Wesf (001), Introduction to Graph Theory, 2nd edition Prentice Hall. R. J. Wilson (2010), Introduction to Graph Theory, 5th edition, Pearson. Frank Harary (2018), Graph Theory, Addson Wisely. 			

Course Code : 4233		Marks : 100	Credits : 4	Class Hours : 60
Course Title :	Inform	ation System Manage	ement	

C	The shirt of the second is to make he to the information of the second
Course	The objective of this course is to make better-informed users, customers, and/or
Objectives	professionals in the application and use of information systems and technology. The
	issues contributing to successful planning, design, development, implementation, and
	management of 11 systems will be discussed in this course.
Course	Introduction to Information Systems: Computer-Based Information Systems, IT
Contents:	Impact on Organizations, Importance of Information Systems to Society;
	Organizational Strategy, Competitive Advantage, and Information Systems:
	Business Process Reengineering, Business Process Improvement, and Business Process
	Management, Business Pressures, Organizational Responses, and Information Technology
	Support, Competitive Advantage and Strategic Information Systems;
	Etnics and Privacy: Etnical Issues, Privacy;
	Information Security: Unintentional Infeats to Information Systems, Denderate Infeats
	to information Systems, information Security Controls;
	Data and Knowledge Management: Managing Data, The Database Approach, Big
	Data, Data warehouses and Data Marts, Knowledge Management
	Applicational Discourse Communication Collaboration Educational
	F Puginess and F Commerces P2P , P2C, Ethical and Legal Legues
	E-Dusiness and E-Commerce: D2D, D2C, Editical and Legal issues
	Social Computing: Eurodemontals of Social Computing in Business, Social Computing in
	Business: Shopping Marketing Customer Relationship Management Human Resource
	Management
	Information Systems Within the Organization: Transaction Processing Systems
	Functional Area Information Systems Enterprise Resource Planning Systems ERPSupport
	for Business Processes.
	Customer Relationship Management and Supply Chain Management: Defining
	Customer Relationship Management. Operational Customer Relationship Management
	Systems, Supply Chain Management:
	Project management, documentation, and team organization: Project Definition,
	Project Management, Typical Project Management, Trade-Offs, Activities, Project
	Measurement, Essential Components, Project Cycle Plan, Organizational Integration,
	Team Management, Risk And Opportunity Management, Project Control, Project
	Visibility, Project Leadership, Project Development, Methodologies, Systems
	Development Life Cycle, Managing Organizational And Socioeconomic Influences,
	Managing Project Risk, Document Writing;
	System installation and commissioning; Analysis of system maintenance and
	upgrading;
	Business Analytics: Managers and Decision Making, The Business Analytics Process,
	Descriptive- Predictive- Prescriptive Analytics, Presentation Tools.
	Acquiring Information Systems and Applications: Planning for and Justifying IT
	Applications, Strategies for Acquiring IT Applications, Traditional Systems
	Development Life Cycle, Alternative Methods and Tools for Systems Development
	Technology Guide: Hardware, Software, Cloud Computing, Artificial Intelligence.
References	1. R. Kelly Rainer, Brad Prince (2020), Introduction to Information Systems, 8 th
	Edition
	2. Management Information Systems: Managing the Digital Firm (2020), 16 th Edition,
	Kennein C. Laudon, Jane P. Laudon, Pearson Publication
	5. MICINUTIIN, B., Sprague, K., & Bui, I. (2013). Information Systems Management:
	Pearson New International Edition. Pearson Higher Ed.

Course Code : 4238		Marks : 200	Credits : 8	Class Hours :
Course Title :	Thesis			

Course Code : 4239		Marks : 50	Credits : 2	Class Hours :
Course Title :	Viva-voce			