(CM601) NETWORK MANAGEMENT

1. **COURSE OBJECTIVES:** In this course students will learn the basic network functions, planning, designing, installing, maintaining and troubleshooting of a computer network.

2. **PRE-REQUISITES:** Students should have the knowledge of Data Communication and Computer Networks

3. **TEACHING AND EXAMINATION SCHEME**

Semester	VI				Examination Scheme				
Course code & course title		Periods/Week (in hours)		Total Hours	Theory Marks		Practical Marks		Total Marks
CM601 Network Management	L	T	P	H	TH	TM	TW	PR/OR	
	3	-	2	5	75	25	-	25	125

4. **COURSE OUTCOMES:** On successful completion of the course, the student will be able to

    CM601.CO1: Explain the various concepts of Network Management.

    CM601.CO2: Identify the components required to setup a simple network.

    CM601.CO3: Design a simple network using the most appropriate networking architecture,hardware and software.

    CM601.CO4: Manage a computer network.

5. **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM601.CO1	2	2	2	2	2	2	2
CM601.CO2	2	2	2	2	2	2	2
CM601.CO3	3	3	3	3	2	3	2
CM601.CO4	3	3	3	3	2	3	2

Relationship: Low-1   Medium-2   High-3

	PSO1	PSO2
CM601.CO1	3	2
CM601.CO2	3	2
CM601.CO3	3	2
CM601.CO4	3	2

6.   DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr=Teaching hours	CO = Course Outcomes			
	UNIT		M	Thr	CO

UNIT I	1. NETWORK MANAGEMENT, GOALS, ORGANIZATION AND FUNCTIONS
	1.1 Network Management
	1.2 Goals of Network management
	1.3 Challenges of Network Management
	    1.3.1 Growth of networks
	    1.3.2 Continuous operations
	    1.3.3 Automation
	    1.3.4 Multivendor networks
	1.4 Network management Functions and sub Functions
	    1.4.1 Network Provisioning-Planning, Design
	    1.4.2 Network Operations and Network Operations Center (NOC)–Fault Management/Service Restoration, Configuration Management, Performance Management, Security Management, Accounting Management
	    1.4.3 Network Maintenance-Fault Management, Trouble Ticket Administration, Network Repairs, Routine Network tests
	1.5 OSI and network management model
	    1.5.1 Organizational model
	    1.5.2 Information model
	    1.5.3 Communication model
	    1.5.4 Functional model
			15	10	CO1, CO2, CO3, CO4

UNIT II	2. NETWORK PLANNING
	2.1 Factors to be considered while planning a Network
	    2.1.1 Identifying the applications that you intend to use on a Network
	    2.1.2 Traffic Requirements
	    2.1.3 Scalability Requirements
	    2.1.4 Geographical consideration
	    2.1.5 Availability
	    2.1.6 Security and Accessibility
	    2.1.7 Cost consideration
	2.2 Designing Network-Network design life cycle
	    2.2.1 Analysis
	    2.2.2 Design
	    2.2.3 Simulation/prototyping
	    2.2.4 Implementation monitoring, Management
	2.3 Network configuration
	    2.3.1 Peer-to-Peer Network
	    2.3.2 Server based Network.
	2.4 Meeting Network Needs
	    2.4.1 Choosing Network Type- LAN, MAN, WAN
			15	10	CO1, CO2, CO3, CO4

	2.4.2 Choosing Network Topology 2.4.3 Choosing Network components: Passive components- connectors- fiber optic connectors, RJ 45 connectors cables, patch panel, Information outlets(IO box). Active components- NIC, Servers, workstations, Switches, Routers and its functions, media converter, wireless access points 2.4.4 Network Interface card functions and features- Selecting a NIC, Installing NIC 2.4.5 Choosing Servers: Hardware server types- tower, rack and blade servers. Software Servers types- File, Print, Mail, Web and Database servers 2.5 Cabling a Network 2.5.1 Cable properties, Cabling standards 2.5.2 Choosing cable types-Co-axial cables Twisted pair cable, Fiber optic cable 2.5.3 Structured cabling 2.5.4 Cable installation- Horizontal wiring and backbone wiring. 2.5.5 Types of LAN cables - crossover cable & Straight through, Concept of color codes 2.5.6 Tools required for preparing LAN cable– Crimping Tool, cable stripper/cutter, punch down tool.			

UNIT III	**3. NETWORK IMPLEMENTATION, CONFIGURATION AND ADMINISTRATION**
	3.1 Network operating systems (NOS)
	   3.1.1 Functions of Network Operating Systems
	   3.1.2 Important features of different NOS (LINUX, WINDOWS & NOVEL NETWARE)
	3.2 Installation steps of Windows Server
	3.3 Steps to setup domain controller functionality
	3.4 Configuring the windows server and client machine: Adding client to domain
	3.5 Working with User Accounts
	   3.5.1 Creating and deleting Users
	3.6 Working with Groups
	   3.6.1 Creating a Group and adding members
	3.7 Working with Shares
	   3.7.1 Creating Share folder
	   3.7.2 Mapping Drives
	3.8 Network Printing
	   3.8.1 Printer connections: Server connections, Workstations/Client connections, Direct network connections
	   3.8.2 Steps to share a printer on a network
	3.9 Locating applications and data on a network
		15	10	CO1, CO2, CO3, CO4

	3.9.1 Server based operating systems and Server based applications 3.10 Network administration 3.10.1 Need of network administration 3.10.2 Task of a network Administrator			

UNIT IV	**4. NETWORK TROUBLESHOOTING AND MAINTENANCE**
	 4.1 Troubleshooting a computer network
	  4.1.1 Basic Steps-Understanding the Problem, Segmenting the problem, isolating the cause, Setting priorities, planning the repair, confirming the results, documenting the outcome
	 4.2 Network faults(Common Network Problems)
	  4.2.1 Loss of connectivity
	  4.2.2 Duplicate IP address
	  4.2.3 Intermittent problems
	  4.2.4 Network configuration issues
	  4.2.5 Performance problems
	 4.3 Network Troubleshooting Tools
	   4.3.1 Hardware, Software and Monitoring tools
	    4.3.1.1 Hardware tools: Cable tester, Network traffic Analyzer, time domain reflectometer (TDR)/ optical time-domain reflectometer (OTDR)
	    4.3.1.2 Software Tools:
	     4.3.1.2.1 Windows OS Utilities: NET, NETDIAG
	     4.3.1.2.2 TCP/IP utilities: ping, tracert/traceroute, netstat, nslookup, ipconfig
	    4.3.1.3 Software applications- Packet sniffer, port scanner, protocol analyzer, bandwidth tester
	    4.3.1.4 Monitoring Tool: Network Management protocol-SNMP
	     4.3.1.4.1 SNMP architecture
	     4.3.1.4.2 SNMP commands: GET, SET, RESPONSE, TRAP, INFORM
		15	8	CO1, CO2, CO3, CO4

UNIT V	**5. BACKUP AND RECOVERY** 5.1 Backup Purpose 5.2 Backup Considerations 5.3 Backup Granularity 5.4 Backup methods 5.5 Backup Architecture 5.6 Backup and restore Operations 5.7 Backup Topologies	15	10	CO1, CO2, CO3, CO4

	5.7.1 Direct attached backup topology
	5.7.2 LAN-based backup topology
	5.8 Backup hardware
	5.9 Implementation of RAID
	    5.9.1 RAID Array Components
	    5.9.2 RAID Levels (up to 3)
	    5.9.3 Hot Spares			

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8.   SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. NETWORK MANAGEMENT, GOALS, ORGANISATION AND FUNCTIONS** 1.1 Network Management 1.2 Goals of Network management 1.3 Challenges of Network Management 1.4 Network management Functions and sub Functions 1.5 OSI and network management model	10	15
II	**2. NETWORK PLANNING** 2.1 Factors to be considered while planning a Network 2.2 Designing Network-Network design life cycle 2.3 Network configuration 2.4 Meeting Network Needs 2.5 Cabling a Network	10	15
III	**3. NETWORK IMPLEMENTATION, CONFIGURATION AND ADMINISTRATION** 3.1 Network operating systems (NOS) 3.2 Installation steps of Windows Server 3.3 Steps to setup domain controller functionality 3.4 Configuring the windows server and client machine- Adding client to domain 3.5 Working with User Accounts 3.6 Working with Groups 3.7 Working with Shares 3.8 Network Printing 3.9 Locating applications and data on a network 3.10 Network administration	10	15

IV	**4. NETWORK TROUBLESHOOTING AND MAINTENANCE**	10	15
	4.1 Troubleshooting a computer network		
	4.2 Network faults(Common Network Problems)		
	4.3 Network Troubleshooting Tools		

V	**5 BACKUP AND RECOVERY** 5.1 Backup Purpose 5.2 Backup Considerations 5.3 Backup Granularity 5.4 Backup methods 5.5 Backup Architecture 5.6 Backup and restore Operations 5.7 Backup Topologies 5.8 Backup hardware 5.9 Implementation of RAID		8	15
		Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

S. No	Practical
1	Study the design of college campus LAN (Campus wide network)
2	Study of Active and passive network components
3	Plan and Design a computer network proposal for a given case.
4	Prepare network cables - straight through and cross cables.
5	Installing and configuring Network Operating System (NOS) (eg: Windows Server-Create Domain Controller, Linux)
6	Execute Basic TCP/IP utilities and commands. (eg: ping, ipconfig, tracert, nslookup)
7	Setting up and Configuring network printer
8	Design and simulate a computer network using Network Simulation tool.
9	Case study on backup and recovery
10	Identify, Segment Network Faults and troubleshoot.
11	Design and implement small network using actual physical components with IP address scheme
12	Create new Users & assign privileges/ Permission on NOS

10.   LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Craig Zacker	The Complete Reference Networking	Tata McGraw Hill
2	Alan Sugano	The Real World Network Troubleshooting Manual	Firewall Media
3	Kornel Terplan	Web-based Systems and Network Management	Pearson
4	Mani Subramanian	Network Management	Pearson
5	G. Somasundaram Alok Shrivastava, EMC Education Services	Information Storage and Management	Wiley Publishing

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	I.T. Frisch, Manu Malek-Zavarei, Manu Malek, S.S. Panwar	Network Management and Control	Springer Science and Business Media, LLC
2	David Groth, Jim McBee, David Barnett	Cabling: The Complete Guide to Network Wiring	John Wiley & Sons; 2nd Edition (17 August 2001)

Internet and Web Resources

S. No.	Description
1	Optical fibre: https://nptel.ac.in/courses/115107095/5
2	SNMP: https://nptel.ac.in/courses/106106091/41
3	https://www.tutorialsweb.com/networking/wireless-networks/computer-networking-tutorial.htm

Videos and Multimedia Tutorials

S. No.	Description
1	Windows server Installation: https://www.youtube.com/watch?v=ScSJMfG5R1Y
2	Cross and Straight Cable: https://www.youtube.com/watch?v=Wq4fSoLXvKg

(CM602) SOFTWARE ENGINEERING AND TESTING

1. **COURSE OBJECTIVES:** In this course the students will learn the basic software engineering methods and practices, various software process models and software testing approaches.

2. **PRE-REQUISITES:** Students should have knowledge of Basic Engineering Practice and Programming skills.

3. **TEACHING AND EXAMINATION SCHEME**

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				Total Marks
Course code & course title						Theory Marks		Practical Marks		
CM602 Software Engineering & Testing		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	-	-	100

4. **COURSE OUTCOMES:** On successful completion of the course, the student will be able to:

CM602.CO1: Explain the concepts of software engineering and testing.

CM602.CO2: Identify appropriate Software development life cycle model for softwaredevelopment.

CM602.CO3: Use tools required for requirement specification, design, testing and maintenance ofsoftware projects.

CM602.CO4: Design simple software projects.

5. **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES**

	PO 1 Basic & Discipline Specific Knowledge	PO 2 Problem Analysis	PO 3 Design and Development of Solutions	PO 4 Engg. Tools, Experimentation& Testing	PO 5 Engg. Practices for Society, Sustainability & Environment	PO 6 Project Management	PO 7 Life-long Learning
CM602.CO1	2	3	3	2	2	2	1
CM602.CO2	2	3	2	2	2	3	2
CM602.CO3	3	3	2	3	2	3	2
CM602.CO4	3	3	2	3	2	3	2

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM602.CO1	2	1
CM602.CO2	2	2
CM602.CO3	3	2
CM602.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
UNIT		**M**	**Thr**	**CO**

UNIT I	**1. INTRODUCTION TO SOFTWARE ENGINEERING**
	1.1 Definition of a Software and types-System, Application
	1.2 Characteristics of a Software
	1.3 Definition of Software Engineering
	1.4 Software crisis and emergence of software engineering
	    1.4.1 The Software Crisis
	    1.4.2 Demands of today's business
	    1.4.3 Critical problems of software development.
	1.5 Computer – based System Engineering
	1.6 Software Process
	1.7 The Software Life Cycle
	    1.7.1 Waterfall Model
	    1.7.2 "V" Model
	    1.7.3 Spiral Model
	    1.7.4 Prototype Model
	    1.7.5 Iterative Model
	(Diagram, Advantages and Disadvantages of above models)
		15	10	CO1, CO2, CO3, CO4

UNIT II	**2. SOFTWARE REQUIREMENTS**
	2.1 Requirement Engineering Process
	    2.1.1 Types of Software requirements
	2.2 Requirement Inception
	2.3 Requirement Elicitation
	    2.3.1 Requirement elicitation through interview
	    2.3.2 Requirement elicitation through questionnaire
	    2.3.3 Record review
	    2.3.4 Output of requirement elicitation
	2.4 Negotiation
	2.5 Requirement Validation
	2.6 Requirement Elaboration
	    2.6.1 Initial user requirements
	    2.6.2 Initial technical requirements
	    2.6.3 Final functional requirements
	2.7 Structure of Software Requirement Specification (SRS)
	2.8 Characteristics of RE(Requirement Engineering)
	    Process
		15	10	CO1, CO2, CO3, CO4

UNIT III	**3.SOFTWARE DESIGN**
	 3.1 Different approaches to SAD
	     3.1.1 Overview of Function Oriented Approach
	     3.1.2Models and Tools
	     3.1.3Salient features of SSAD
	 3.2Overview of Object Oriented Approach
	     3.2.1Object Oriented Analysis
	     3.2.2Object Oriented Design
	     3.2.3Object Oriented Testing
	     3.2.4Object Oriented Maintenance
	 3.3Comparison between OOAD and SSAD
	 3.4Data Flow Diagram(DFD)
	     3.4.1Rules for drawing DFD
	     3.4.2Physical and Logical DFD
		15	10	CO1, CO2, CO3, CO4

UNIT IV	**4.CODING, DOCUMENTATION AND MAINTENANCE**
	 4.1Coding
	     4.1.1 Coding standards and guidelines
	     4.1.2Code review
	 4.2Software documentation
	     4.2.1Internal documentation
	     4.2.2External documentation
	 4.3Verification and validation
	 4.4Software Maintenance
	     4.4.1Characteristics of software maintenance
	     4.4.2Software reverse engineering
	     4.4.3Software maintenance Process models
		15	8	CO1, CO2, CO3, CO4

UNIT V	**5.SOFTWARE TESTING PROCESS**
	 5.1Definition of testing
	 5.2The Testing process
	 5.3Characteristics of Test engineer
	 5.4 Levels of Testing
	     5.4.1 Unit, Module, Integration and System, Acceptance
	     5.4.2Stages of Testing, Testing process.
	 5.5 Testing Approach
	     5.5.1Top-down v/s bottom-up approach
	     5.5.2Functional v/s Structural testing
	     5.5.3Mutation testing
	     5.5.4 Regression testing
	 5.6Types of Testing
	     5.6.1Black-box testing
	     5.6.2White-box testing
	     5.6.3 Beta testing
	     5.6.4Performance testing
	     5.6.5Stress testing
	     5.6.6Acceptance testing
	 5.7Manual testing and its limitations
		15	10	CO1, CO2, CO3, CO4

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. INTRODUCTION TO SOFTWARE ENGINEERING** 1.1 Definition of a Software and types-System, Application 1.2 Characteristics of a Software 1.3 Definition of Software Engineering 1.4 Software crisis and emergence of software engineering 1.5 Computer – based System Engineering 1.6 Software Process 1.7 The Software Life Cycle	10	15
II	**2. SOFTWARE REQUIREMENTS** 2.1 Requirement Engineering Process 2.2 Requirement Inception 2.3 Requirement Elicitation 2.4 Negotiation 2.5 Requirement Validation 2.6 Requirement Elaboration 2.7 Structure of Software Requirement Specification (SRS) 2.8 Characteristics of RE (Requirement Engineering) Process	9	15
III	**3. SOFTWARE DESIGN** 3.1 Different approaches to SAD 3.2 Overview of Object Oriented Approach 3.3 Comparison between OOAD and SSAD 3.4 Data Flow Diagram(DFD)	10	15
IV	**4. CODING, DOCUMENTATION AND MAINTENANCE** 4.1 Coding 4.2 Software documentation 4.3 Software Maintenance 4.4 Verification and validation	9	15
V	**5. SOFTWARE TESTING PROCESS** 5.1 Characteristics of Test engineer 5.2 Levels of Testing 5.3 Testing Approach 5.4 Types of Testing 5.5 Manual testing and its limitations	10	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

Sr. No.	Practical
1	Study of basic terminology of Software Engineering.
2	Prepare problem statements for given software projects
3	Comparative study of Software Life Cycle Development Models.
4	Prepare Software Requirement Specification for a given problem.
5	Develop DFD Model of the sample problem.
6	Case study on Software documentation.
7	Case study on Software maintenance.
8	Study and usage of different types of testing tool.
9	Study of test case preparations and execution using tool.
	Mini Project
10	Phase 1: Develop small scale website using the concepts of software engineering
11	Phase 2: Test above developed website using testing tools.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Jibitesh Mishra	Software Engineering	Pearson
2	Dr. K.V.K.K. Prasad	Software Testing Tools	Dreamtech press

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Bharat BhushanAgarwal, Sumit Prakash Tayal	Software Engineering	Firewal Media
2	Rajib Mall	Fundamentals of software engineering	PHI Learning

Internet and Web Resources

S. No.	Description
1	www.tutorialspoint.com/software_engineering
2	http://www.ece.rutgers.edu/~marsic/books/SE/

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=ITIyBV4ttts
2	https://www.youtube.com/watch?v=4b1D1QFEeI0

(CM603) COMPUTER ENGINEERING PROJECT

1. COURSE OBJECTIVES:

After learning various computer and allied engineering subjects, it is time to learn the application of this knowledge to real life situations by identifying, analyzing, designing, implementing and testing computer systems. This may be done individually or in group. This is known as Project work. Thus, it is a purposeful time bound student activity to accomplish higher level cognitive, psychomotor and affective domain learning.

2. PRE-REQUISITES: Students should have knowledge of Computer and allied engineering subjects.

3. TEACHING AND EXAMINATION SCHEME

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				Total Marks
Course code & course title						Theory Marks		Practical Marks		
CM603 Computer Engineering Project		L	T	P	H	TH	TM	TW	PR/OR	
		-	-	6	6	-	-	100	50	150

4. COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM603.CO1: Recognize ethical and professional responsibilities in engineering situations and make informed judgments.

CM603.CO2: Apply engineering design to produce solutions that meet specified needs considering social and economic factors.

CM603.CO3: Function efficiently within a team and communicate effectively with the target audiences.

CM603.CO4: Identify, formulate, and solve engineering problems by applying principles of computer and allied engineering subjects and apply new knowledge as needed.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1 Basic & Discipline Specific Knowledge	PO 2 Problem Analysis	PO 3 Design and Development of Solutions	PO 4 Engg. Tools, Experimentation & Testing	PO 5 Engg. Practices for Society, Sustainability & Environment	PO 6 Project Management	PO 7 Life-long Learning
CM603.CO1	2	2	1	1	1	1	1
CM603.CO2	3	3	3	2	2	3	2
CM603.CO3	2	2	1	1	1	1	1
CM603.CO4	3	3	3	3	3	3	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM603.CO1	2	2
CM603.CO2	2	2
CM603.CO3	2	2
CM603.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
		UNIT	**M**	**Thr**	**CO**
I		**1.** Selection/Identification of project work by market survey/industrial survey.	-	-	CO1, CO2, CO3, CO4
II		**2.** Prepare the project proposal which should preferably contain complete details in the following form: 2.1 Title of the project. 2.2 Introduction and Objectives of the Project. 2.3 Project Category (Software oriented / Hardware oriented etc.) 2.4 Tools / Platform, Hardware and Software Requirement specifications. 2.5 Analysis (Block diagrams /DFDs/ ER Diagrams/ Class Diagrams/ Database Design, etc. as per the project requirements). 2.6 A complete structure which includes(as per the project): 2.6.1 Number of modules and their description to provide an estimation of the student's effort on the project. 2.6.2 Data Structures as per the project requirements for all the modules. 2.6.3 Process logic of each module. 2.6.4 Testing process to be used. 2.6.5 Reports generation (Mention tentative content of report).	-	-	CO1, CO2, CO3, CO4
III		**3.** Design and Implement the Project.	-	-	CO1, CO2, CO3, CO4

IV	**4.** Prepare a project report which should preferably contain following details: 4.1 Abstract 4.2 Project overview 4.3 Introduction and Motivation 4.4 Problem Statement 4.5 Requirement Analysis 4.6 Project design 4.7 Implementation Details 4.8 Technologies used 4.9 Conclusion & future work 4.10 References, and Appendix. *Every student must prepare well formatted, printed and hard bound report.	-	-	CO1, CO2, CO3, CO4

5. SUGGESTIVE AREAS OF PROJECT WORK:
• Database Management Systems
• Software Engineering and Software Development
• Web page Designing
• Digital Image Processing
• Computer Graphics and Animation
• Multimedia Systems
• Computer Networks
• Artificial Intelligence
• Robotics
• Internet and e-commerce
• Computer Security and Cryptography
• Computer hardware and embedded systems
• Improving existing systems / equipments
• Mobile applications
• Internet of things (IOT)
• Any other emerging area found worth

(CC 602) BUSINESS COMMUNICATION

1. COURSE OBJECTIVES:

The students will able to:

1. Use speaking, writing and presentation skills to communicate effectively.
2. Develop business etiquettes, manners, grooming and improve personal appearance
3. Improve non-verbal forms of communication.

2. TEACHING AND EXAMINATION SCHEME

Semester	VI								
Course code & course title		**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**			
						Theory Marks		**Practical Marks**	**Total Marks**
(CC 602) BUSINESS COMMUNICATION		L	T	P	H	TH	TM	TW	PR/OR	
		-	-	2	2	-	-	25	25	50

3. COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

CC 602.CO1: Apply principles of effective communication in business

environmentCC 602.CO2: Use ICT in business communication effectively.

CC 602.CO3: Demonstrate soft skills required in business environment.

CC 602.CO4: Prepare Technical Writing for various functions of business communication.

4. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2
CC 602.CO1	1	0	1	0	1	2	2	0	1
CC 602.CO2	2	2	2	1	2	2	3	1	2
CC 602.CO3	2	2	2	1	2	2	3	0	2
CC 602.CO4	1	1	1	1	2	3	3	0	3

Relationship: Low-1 Medium-2 High-3

5. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M = Marks	Phr = Practical hours	CO = Course Outcomes		

Unit	M	Phr	CO
1 COMMUNICATION SKILLS AT WORKPLACE		04	CO1
1.1 **Principles of communication in business** Importance of communication in a business organization, types of communication (formal and informal Internal and External Communication), Channels of communication: Vertical, Horizontal, Diagonal, Grapevine			CO2 CO3 CO4
1.2 **Modern Office technology for communication**: email communication and sending text (etiquettes, components, tips for writing effective emails, spellcheck), internet and use of social media for work (to communicate, search for information about suppliers, specifications, networking, quick feedback, e-commerce, video conferencing)			
2 SEMINARS		06	CO1
2.1 **Organization of seminars and workshops** Organizers role: planning, objectives, topic selection, planning the date, time, venue, creating event organization material: creating Facebook page, WhatsApp group, invitations, advertisement on pamphlet, hand-outs, signage, name badges, registration form, press note, inviting key note speaker, schedule			CO2 CO3 CO4
2.2 **Presentation** Speakers role: Gathering relevant material, organization of the material, knowing the occasion and audience, preparing handouts for distribution, time management, interaction with audience, non-verbal communication. (Checklist of significant aspects of oral presentation to be provided)			
2.3 **Role of audience** Audience's role: Listening effectively and asking relevant questions, note taking			
3 TECHNICAL WRITING		10	CO1
3.1 **Reports** **Understanding objective report writing, types of reports, parts of a formal report, illustrations** inspection reports: procedure and format, Project Report			CO2 CO3 CO4
3.2 **Business letters** Sales letters: parts of sales letter complaint letters: elements of a complaint letter adjustment letters: elements of an adjustment letter			

3.3 Tenders procedure, Preparation, Types of tenders, Single tender, limited tender, Open tenders, government e tender, structure of a tender document, tender notice, terms and conditions, payment details, specification, documents to be submitted, drafting advertisement for tender. 3.4 Generic notices, notice for meetings: purpose, format of notice for meeting, agenda, quorum and writing minutes			
4 JOB INTERVIEWS		06	CO1 CO2 CO4
4.1 **Job application and resume** draft job application and resume, draft letter of acceptance and cold contact letter			
4. 2 **Job interviews** preparing for job interview, guidelines on facing job interviews, mock interviews			
5 SOFT SKILLS **5.1 Business etiquettes** Importance of business etiquettes and manners, Tips for good business etiquettes		06	CO1 CO2 CO3 CO4

5.2 Nonverbal Communication
    grooming, personal appearance, hygiene, deportment and body language
5.3 Interpersonal skills
    Leadership skills, team work, active listening
5.4 Critical thinking
    How to improve critical thinking, tips for critical thinking			

Total		32	-

6. COURSE DELIVERY:
The Course will be delivered through lectures, class room interactions, exercises and case studies

7. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical	Marks 50
	Practical Title	
1.	Modern office technology	03
2.	Seminar	03
3.	Technical writing	10
4.	Job interviews	04
5.	Soft skills	05
	Total	25
No	**Class room Assignments**	
1.	Email communication	
2.	Power point presentation	
3.	drafting seminar invites	

4.	Drafting hand outs for seminars	
5.	Drafting sales letter	
6.	Drafting complaint letters	
7.	Drafting adjustment letters	
8.	Drafting tender notice	
9.	Filling maintenance reports	
10.	Drafting inspection reports	
11.	Drafting abstract	
12.	Drafting notice for meetings	
13.	Drafting agenda of meetings	
14.	Drafting minutes of meeting	
15.	Drafting resume and job application	
16.	Drafting letter of acceptance	
17.	Drafting cold contact cover letter	
18.	Group discussions	
19.	Debates	
20.	Group presentations	

8. LEARNING RESOURCES

8.1 Reference books

S. No.	Author	Title of Books	Publishers
1	P.Prasad, Rajendra k. Sharma	The functional aspects of communication skills	s.k. kataria &sons
2	Pal & Rorualling	Essentials of business communication	Sultan chand & sons
3	Grount Taylor	English conversation practice	Tata MCgraw Hill
4	R.C. Sharma & Krishna Mohan	Business Correspondence & report writing	Tata MCgraw Hill

ELECTIVE II

Elective–II	
Course Code	**Course**
CM611	Computer Graphics
CM612	Cyber Law and Computer Forensics
CM613	Internet of Things
CM614	E-Governance

(CM611) COMPUTER GRAPHICS

1. **COURSE OBJECTIVES:** In this course the students will gain the fundamental knowledgeof computer graphics and learn computer graphics algorithms.

2. **PRE-REQUISITES:** NIL

3. TEACHING AND EXAMINATION SCHEME

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				Total Marks
Course code & course title						Theory Marks		Practical Marks		
CM611 Computer Graphics		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	25	25	150

4. **COURSE OUTCOMES:** On successful completion of the course, the student will be able to:

CM611.CO1: Explain concepts of computer graphics.

CM611.CO2: Implement various computer graphics algorithms.

CM611.CO3: Compare different computer graphics algorithms and color

models. CM611.CO4: Develop simple computer graphic images and

animation.

5. **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM611.CO1	2	2	2	3	0	0	1
CM611.CO2	3	3	1	3	2	1	1
CM611.CO3	0	2	1	3	0	0	1
CM611.CO4	3	3	2	3	0	2	1

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM611.CO1	2	1
CM611.CO2	2	1
CM611.CO3	2	1
CM611.CO4	2	1

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
	UNIT	M	Thr	CO

UNIT I	1. INTRODUCTION TO COMPUTER GRAPHICS SYSTEMS AND APPLICATIONS
	1.1 Overview of Graphics Systems
	    1.1.1 Video display devices
	        1.1.1.1 Refresh cathode ray tubes
	        1.1.1.2 Raster scan displays
	            1.1.1.2.1 Video controller
	            1.1.1.2.2 Raster scan display processor
	        1.1.1.3 Random scan displays
	        1.1.1.4 Color CRT monitors
	        1.1.1.5 Flat panel displays
	        1.1.1.6 Liquid crystal displays
	1.2 Computer Graphics Applications
	    1.2.1 Computer-aided design
	    1.2.2 Presentation graphics
	    1.2.3 Computer art
	    1.2.4 Entertainment
	    1.2.5 Education and training
	    1.2.6 Visualization
	    1.2.7 Image Processing
	    1.2.8 Graphical user interfaces
		15	9	CO3, CO5

UNIT II	2. OUTPUT PRIMITIVES AND THEIR ATTRIBUTES
	2.1 Output Primitives
	    2.1.1 Points and Lines
	    2.1.2 Line Drawing Algorithms
	        2.1.2.1 DDA Algorithm
	    2.1.3 Circle Generating Algorithms
	        2.1.3.1 Properties of Circles
	        2.1.3.2 Midpoint Circle Algorithm
	    2.1.4 Ellipse Generating Algorithms
	        2.1.4.1 Properties of Ellipses
	        2.1.4.2 Midpoint Ellipse Algorithm
	2.2 Attributes of Output Primitives
		15	10	CO2, CO4

	2.2.1 Line attributes
	    2.2.1.1 Line Type
	    2.2.1.2 Line Width
	    2.2.1.3 Pen and Brush Options
	    2.2.1.4 Line Color
	2.2.2 Color and Grayscale Levels
	    2.2.2.1 Color Tables
	    2.2.2.2 Grayscale
	2.2.3 Area Fill Attributes
	    2.2.3.1 Fill Styles
	    2.2.3.2 Pattern Fill
	2.2.4 Character Attributes
	2.2.5 Text Attributes			

UNIT III	**3. FILLED AREA PRIMITIVES AND TWO DIMENSIONAL GEOMETRIC TRANSFORMATIONS**
	3.1 Filled Area Primitives
	    3.1.1 Scan Line Polygon Fill Algorithm
	    3.1.2 Inside Outside Tests
	    3.1.3 Boundary Fill Algorithm
	    3.1.4 Flood Fill Algorithm
	3.2 Two-Dimensional Geometric Transformations
	    3.2.1 Basic Transformations
	        3.2.1.1 Translation
	        3.2.1.2 Rotation
	        3.2.1.3 Scaling
	    3.2.2 Other Transformations
	        3.2.2.1 Reflection
	        3.2.2.2 Shear
		15	10	CO2,
				
				CO4

UNIT IV	**4. TWO-DIMENSIONAL VIEWING AND THREE DIMENSIONAL CONCEPTS**
	4.1 Two Dimensional Viewing
	    4.1.1 The Viewing Pipeline
	    4.1.2 Clipping Operations
	        4.1.2.1 Point Clipping
	        4.1.2.2 Cohen-Sutherland Line Clipping
	        4.1.2.3 Sutherland Hodgeman Polygon Clipping
	        4.1.2.4 Curve Clipping
	        4.1.2.5 Text Clipping
	4.2 Three Dimensional Concepts
		15	10	CO2,
				
				CO4

	4.2.1 Three Dimensional Display Methods
	    4.2.1.1 Parallel Projection
	    4.2.1.2 Perspective Projection
	    4.2.1.3 Depth Cueing
	    4.2.1.4 Visible Line and Surface
	          Identification			

UNIT V	**5. COLOR MODELS AND COMPUTER ANIMATION**
	5.1 Color Models
	    5.1.1 Properties of Light
	    5.1.2 Standard Primaries and the Chromaticity
	        diagram
	    5.1.3 Intuitive Color Concepts
	    5.1.4 RGB Color Model
	    5.1.5 YIQ Color Model
	    5.1.6 CMY Color Model
	    5.1.7 HSV Color Model
	5.2 Computer Animation
	    5.2.1 Design of Animation Sequences
	        5.2.1.1 Storyboard Layout
	        5.2.1.2 Object Definitions
	        5.2.1.3 Key-frame specifications
	        5.2.1.4 Generation of in-between frames
	    5.2.2 Brief description of Computer Animation
	        Languages
	        5.2.2.1 Key - frame Systems
	        5.2.2.2 Parameterized Systems
	        5.2.2.3 Scripting Systems
		15	9	CO1

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies.

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks

I	**1.INTRODUCTION TO COMPUTER GRAPHICS SYSTEMS AND APPLICATIONS** 1.1 Overview of Graphics Systems 1.2 Computer Graphics Applications	9	15

II	**2.OUTPUT PRIMITIVES AND THEIR ATTRIBUTES**
	    2.1 Output Primitives
	    2.2 Attributes of Output Primitives
		10	15

III	**3.FILLED AREA PRIMITIVES AND TWO**
	    DIMENSIONAL GEOMETRIC TRANSFORMATIONS
	    3.1 Filled Area Primitive
	    3.2 Two-Dimensional Geometric Transformations
		10	15

IV	**4.TWO DIMENSIONAL VIEWING AND THREE**
	    DIMENSIONAL CONCEPTS
	    4.1 Two Dimensional Viewing
	    4.2 Three Dimensional Concepts
		10	15

V	**5.COLOR MODELS AND COMPUTER ANIMATION**
	    5.1 Color Model
	    5.2 Computer Animation
		9	15

	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study of Video Display Devices
2.	Implementation of DDA Line Drawing Algorithm.
3.	Implementation of Midpoint Circle Algorithm.
4.	Implementation of Midpoint Ellipse Algorithm.
5.	Implementation of Flood Fill Algorithm.
6.	Implementation of Basic 2D transformation: Translation
7.	Implementation of Basic 2D transformation: Rotation
8.	Implementation of Basic 2D transformation: Scaling
9.	Implementation of Point Clipping Algorithm.
10.	Implementation of Line Clipping Algorithm.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Donald Hearn and M. P. Baker	Computer Graphics	PHI
2	James D. Foley	Computer Graphics: Principals and Practice	Pearson Education
3	N. Krishnamurthy	Introduction to Computer Graphics	McGraw Hill

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Steven Harrington	Computer Graphics	McGraw Hill
2	Samit Bhattacharya	Computer Graphics	Oxford Publication

Internet and Web Resources

S. No.	Description
1	https://www.tutorialspoint.com/computer_graphics/
2	http://www.darshan.ac.in/Upload/DIET/Documents/2160703_CG_Study_Material_01022019_011300PM.pdf

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.nptelvideos.com/computer_graphics/

(CM612) CYBER LAW & COMPUTER FORENSICS

1. COURSE OBJECTIVES: In this course the student will learn various aspects of IT Act 2000, Computer forensics fundamentals and perform investigation at cybercrime site.

2. PRE-REQUISITES: NIL

3. TEACHING AND EXAMINATION SCHEME

Semester	VI				Examination Scheme				
Course code & course title		Periods/Week (in hours)			Total Hours	Theory Marks		Practical Marks		Total Marks
CM612 Cyber law & computer Forensics		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	25	25	150

4.COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM612.CO1: Describe the various aspects of IT Act, Cybercrimes and Forensic process.

CM612.CO2: Identify various provisions of the IT Act in the context of Cybercrimes. CM612.CO3: Use various provisions of IT act for protecting cyber consumers.

CM612.CO4: Examine a simple forensic lab for investigations and evidence collection.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM612.CO1	2	2	1	2	2	2	3
CM612.CO2	2	2	1	2	2	2	2
CM612.CO3	2	2	1	2	2	2	2
CM612.CO4	2	2	1	2	2	2	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM612.CO1	1	2
CM612.CO2	1	2
CM612.CO3	1	2
CM612.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
	UNIT	M	Thr	CO

UNIT I	**1. INTRODUCTION TO IT ACT 2000**
	1.1 Power of arrest without warrant under the IT Act, 2000: A Critique
	   1.1.1 Crimes of this millennium
	   1.1.2 Section 80 of the IT Act, 2000-A Weapon or a Farce?
	   1.1.3 Necessity of Arrest without warrant from any place, public or otherwise
	   1.1.4 Arrest, but no punishment
	1.2 Cyber Crime & Criminal justice: Penalties, Adjudication & Appeals under the IT act, 2000
	   1.2.1 Concept of Cyber Crime & IT Act 2000
	   1.2.2 Hacking (Concept and Section)
	   1.2.3 Teenage Web vandals
	   1.2.4 Cyber Fraud and Cyber Cheating
	   1.2.5 Virus on the Internet
	   1.2.6 Defamation, Harassment and Email Abuse
	1.3 Jurisdiction in the Cyber World
	   1.3.1 Civil law of jurisdiction in India
	   1.3.2 Cause of Action
	   1.3.3 Jurisdiction and the Information Technology Act, 2000
		15	10	CO1, CO2, CO3, CO4

UNIT II	**2. COPYRIGHT PROTECTON IN CYBER WORLD AND THE INDIAN EVIDENCE ACT V. IT ACT 2000**
	2.1 Copyright Protection in the Cyber world
	   2.1.1 Works in which Copyright subsists and meaning of Copyrights
	   2.1.2 Copyright Ownership and Assignments
	   2.1.3 License of Copyrights
	   2.1.4 Copyright protection of content on Internet: Copyright notice, Disclaimer and Acknowledgement
		15	9	CO1, CO2, CO3, CO4

	2.1.5 Computer Software Piracy			
	2.2 Protection of Cyber Consumers in India			
	2.2.1 Introduction			
	2.2.2 Are Cyber Consumers covered under the Consumer protection Act?			
	2.2.3 Goods and Services			
	2.2.4 Consumer Complaints			
	2.2.5 Defects in goods and Deficiency in Services			
	2.2.6 Restrictive and Unfair trade practices			
	2.2.7 Instances of Unfair trade Activities			
	2.2.8 Reliefs under CPA			
	2.2.9 Beware Consumers			

UNIT III	**3. INTRODUCTION TO COMPUTER FORENSIC**
	3.1 The Forensic Process
	    3.1.1 Types of Investigations
	    3.1.2 The Role of Investigator
	    3.1.3 Elements of Good Process
	    3.1.4 Defining a Process
	    3.1.5 After the investigation
	3.2 Forensic Lab Environment Preparation
	    3.2.1 The Ultimate Computer Forensics Lab: What Is a Computer Forensic Laboratory, Forensic Lab Security, Protecting Forensic Lab
	    3.2.2 Forensic Hardware and Software Tools: Using Hardware Tools, Using Software Tools
	    3.2.3 The FLYAWAY kit
	    3.2.4 Case Management: Poor Case Management, Misplacing Evidence, Improper Evidence destruction
		15	10	CO1,
				CO2,
				CO3,
				CO4

UNIT IV	**4. INTRODUCTION TO EVIDENCE COLLECTION AND CONSUMER FRAUD**
	4.1 Forensically Sound Evidence Collection
	    4.1.1 Collecting Evidence from a single system: Power down the suspect system, Remove the Drive(s) from the suspected system, check for other media, Record BIOS information, forensically image the drive, Record Cryptography Hashes, Bag and Tag
	4.2 Documenting the Investigation
	    4.2.1 Internal report
	    4.2.2 Declaration
	    4.2.3 Affidavit
		15	10	CO1,
				CO2,
				CO3,
				CO4

	4.2.4 Expert report
	 4.3 Consumer Fraud
	    4.3.1 What is Consumer Fraud?
	    4.3.2 Types of Consumer Fraud: Identity Theft, Detecting Spam Attacks, Phishing Websites, Identity Theft Malware, Theft of Personal Records by an Insider, Investment Fraud			

UNIT V	**5. ETHICAL HACKING**
	 5.1 Concept of Ethical Hacking
	    5.1.1 Hacking
	    5.1.2 Hacker
	    5.1.3 Hacker v/s Cracker
	    5.1.4 Types of Hackers: Coders, Admins, Script Kiddies, White Hat Hacker, Black Hat Hacker, Grey Hat Hacker
	    5.1.5 Ethical Hacking
	    5.1.6 Hacktivists
	    5.1.7 Cyber Terrorist
	    5.1.8 Why Hackers Hack?
	    5.1.9 Prevention from Hackers
	    5.1.10 Steps Performed by Hackers: Reconnaissance, Scanning, Gaining Access, Maintaining Access, Clearing Tracks
	    5.1.11 Working of Ethical Hacker: Obeying the Ethical Hacking Commandments, working ethically, Respecting privacy, Not crashing your systems, Executing the plan
	 5.2 Concepts of Email Hacking
	    5.2.1 Email Security
	    5.2.2 Email Spoofing
	    5.2.3 Methods to send fake emails: Open Relay Server, Web Scripts
	    5.2.4 Consequences of fake email
	    5.2.5 Proving a fake email
	    5.2.6 Email Bombing
	    5.2.7 Email Spamming
	    5.2.8 Email password hacking
		15	9	CO1, CO2, CO3, CO4

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION TO IT ACT 2000** 1.1 Power of arrest without warrant under the IT Act, 2000: A Critique 1.2 Cyber Crime & Criminal justice: Penalties, Adjudication & Appeals under the IT act, 2000 1.3 Jurisdiction in the Cyber World	10	15
2	**2. COPYRIGHT PROTECTON IN CYBER WORLD AND THE INDIAN EVIDENCE ACT V. IT ACT 2000** 2.1 Copyright Protection in the Cyber world 2.2 Protection of Cyber Consumers in India	9	15
3	**3. INTRODUCTION TO COMPUTER FORENSIC** 3.1 The Forensic Process 3.2 Forensic Lab Environment Preparation	10	15
4	**4. INTRODUCTION TO EVIDENCE COLLECTION AND CONSUMER FRAUD** 4.1 Forensically Sound Evidence Collection 4.2 Documenting the Investigation 4.3 Consumer Fraud	10	15
5	**5. ETHICAL HACKING** 5.1 Concept of Ethical Hacking 5.2 Concepts of Email Hacking	9	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1.	Study and analysis of Cyber Laws in India and its effectiveness
2.	Study of Email fraud and Internet Virus
3.	Case Study on Copyright issues in Cyberspace
4.	Case study on Online Sale of Goods and Consumer Protection
5.	Study and analysis of Computer frauds and Abuse
6.	Study on Software piracy
7.	Study of Forensic Hardware and software Tools
8.	Tracing E–mail – Finding senders IP Address of received e – mail, tracing route of e – mail received using tools available on internet e.g. Visual Trace Route.

9.	Study of Encase forensic Software
10.	Study of Tools for Ethical Hacking
11.	Study of email hacking, wireless hacking and mobile hacking
12.	Study of various reporting techniques after the investigation.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Vivek Sood	Cyber Law Simplified	Tata McGraw-Hill
2	Chris Davis,David Cowen & Aaron Philipp	Hacking Exposed^{TM} Computer Forensics Secrets & Solutions	Tata McGraw-Hill
3	Manthan Desai	Basics of Ethical Hacking	Manthan Desai

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Jonathan Rosenoer	CyberLaw: The Law of the Internet	Springer
2	Marie-Helen Maras	Computer Forensics	Jones & Bartlett
3	Ankit Fadia	An Unofficial Guide to Ethical Hacking	Macmillan

Internet and Web Resources

S. No.	Description
1	http://www.cyberlawsindia.net/
2	https://www.tutorialspoint.com/information_security_cyber_law/
3	https://www.hackingarticles.in/best-of-computer-forensics-tutorials
4	https://www.tutorialspoint.com/ethical_hacking

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=TAz-E06SdBk
2	https://www.youtube.com/watch?v=2gcX9EzTBJc
3	https://www.youtube.com/watch?v=i8oPtGFPtBU
4	https://www.youtube.com/watch?v=2VSNn7UIXn8

(CM613) INTERNET OF THINGS

1. **COURSE OBJECTIVES:** In this course the students will learn the uses and applications of IoTand implement simple IoT models.

2. **PRE-REQUISITES:** Knowledge of Digital Electronics, Microprocessor and assembly language programming

3. **TEACHING AND EXAMINATION SCHEME**

Semester	VI								
Course code & course title		**Periods/Week (in hours)**		**Total Hours**	**Examination Scheme**				**Total Marks**
					Theory Marks		**Practical Marks**		
CM613		L	T	P	H	TH	TM	TW	PR/OR	
Internet of Things		3	-	2	5	75	25	25	25	150

4. **COURSE OUTCOMES:** On successful completion of the course, the student will be able to:

CM613.CO1 Explain the basics of IoT.

CM613.CO2 Apply the concept of IoT to different domains.CM613.CO3 Examine IoT enabled solutions.

CM613.CO4 Develop simple IoT systems using Arduino and Raspberry Pi.

5. **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM613.CO1	2	2	2	2	2	2	3
CM613.CO2	3	3	3	3	2	2	3
CM613.CO3	2	3	3	3	2	2	3
CM613.CO4	3	3	3	3	2	2	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM613.CO1	2	2
CM613.CO2	3	2
CM613.CO3	3	2
CM613.CO4	3	2

7.DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
	UNIT		**M**	**Thr**	**CO**
UNIT I	**1 INTRODUCTION TO INTERNET OF THINGS** 1.1 Introduction 1.2 Characteristics of IoT: Interconnectivity, Things related services, Heterogeneity, Dynamic changes, Enormous scale, Safety, Connectivity, Naming and Addressing 1.3 Applications of IoT: Smart Home, Wearables, Smart Cars, Smart Industry, Smart Cities, Smart Agriculture, Smart Retail, Energy Management, Smart Healthcare, Smart Poultry and Farming, Smart Dust 1.4 IoT Categories: Industrial IoT, Consumer IoT 1.5 Challenges for IoT: Security, Privacy, Scalability, Bandwidth Management, Interoperability, Data Storage, Data Analytics, Standards, Regulation 1.6 IoT Protocols: 802.3 Ethernet, 802.11-WiFi, 2G/3G/4G-Mobile Communication, CoAP, MQTT, XMPP 1.7 IoT Functional Blocks: Device, Communication, Services, Management, Security, Application 1.8 IoT Communication Models: Request-Response, Publish-Subscribe, Push-Pull, Exclusive Pair		15	10	CO1, CO2, CO3, CO4
UNIT II	**2 INTERNET OF THINGS AND M2M** 2.1 Introduction to M2M 2.2 M2M Ecosystem 2.3 M2M Service Platform: M2M Device Platform, M2M User Platform, M2M Application Platform, M2M Access Platform 2.4 M2M Applications: Manufacturing, Home Appliances, Healthcare Device Management, Smart Utility Management, Traffic Control 2.5 IoT Ecosystem		15	9	CO1, CO2, CO3, CO4

	2.6 Enabling Technologies in IoT: Sensors, Edge Devices, Embedded Systems, Communications, Wireless Sensor Networks, Cloud Computing 2.7 Difference between IoT and M2M: Communication Protocols, Machines in M2M and Things in IoT, Hardware vs Software emphasis, Data Collection & Analysis, Applications 2.8 IoT Levels: IoT Level-1, IoT Level-2, IoT Level-3, IoT Level-4, IoT Level-5, IoT Level-6			

UNIT III	**3. SENSORS, ACTUATORS AND WIRELESS SENSOR NETWORKS**
	
	 3.1 Introduction to Sensors
	    3.1.1 Workflow of a sensor in a typical system
	    3.1.2 Classification of sensors: Analog Sensors, Digital Sensors
	    3.1.3 Pros and Cons of Analog Sensors
	    3.1.4 Pros and Cons of Digital Sensors
	    3.1.5 Types of sensors: Thermal Sensors, Mechanical Sensors, Electrical Sensors, Chemical Sensors, Optical Light Sensors, Acoustic Sensors, Motion Sensors, Biological Sensors
	 3.2 Introduction to Actuators
	    3.2.1 Workflow of an actuator in a system
	    3.2.2 Classification of actuators: Thermal Actuators, Electric Actuators, Mechanical Actuators
	 3.3 Introduction to Wireless Sensor Networks (WSN)
	    3.3.1 Architecture of WSN: Application Layer, Transport Layer, Network Layer, Data Link Layer, Physical Layer
	    3.3.2 Network topologies in WSN: Peer-to-Peer networks, Star networks, Tree networks, Mesh networks
	    3.3.3 Issues and challenges in WSN: Fault Tolerance, Life Time, Scalability, Data Aggregation, Cost, Environment, Heterogeneity Support, Autonomous Operations
	    3.3.4 Security in WSN: Confidentiality, Integrity, Availability
		15	10	CO1, CO2, CO3, CO4

UNIT IV	**4. DEVELOPING INTERNET OF THINGS**	15	10	CO1, CO2, CO3, CO4
	4.1 IoT Connectivity technologies			
	4.1.1 IEEE 802.15.4			
	4.1.2 ZigBee			
	4.1.3 RFID			
	4.1.4 NFC			
	4.2 IoT Design Methodology			
	4.2.1 Purpose and Requirements Specification			
	4.2.2 Process Specification			
	4.2.3 Domain Model Specification			
	4.2.4 Information Model Specification			
	4.2.5 Service Specifications			
	4.2.6 IoT Level Specification			
	4.2.7 Functional View Specification			
	4.2.8 Operational View Specification			
	4.2.9 Device & Component Integration			
	4.2.10 Application Development			
	4.3 IoT Implementation with Raspberry Pi			
	4.3.1 Raspberry Pi Architecture			
	4.3.2 Raspberry Pi PIN Configuration			
	4.3.3 Case Study: Blinking LED using Raspberry Pi, DHT Sensor with Raspberry Pi			
	4.4 IoT Implementation with Arduino			
	4.4.1 Features of Arduino			
	4.4.2 Components of Arduino Board			
	4.4.3 Arduino IDE			
	4.4.4 Case Study: Traffic Control System using Arduino, DHT Sensor with Arduino			
UNIT V	**5. DOMAIN SPECIFIC IoTs**	15	9	CO1, CO2, CO3, CO4
	5.1 Smart Homes			
	5.1.1 Examples of Smart Home Technologies			
	5.1.2 Introduction to Home Area Networks (HANs): HAN Elements, HAN Standards – Universal Plug and Play, Konnex, HAN Architectures - DomoNet, Jini, HAN Initiatives			
	5.1.3 Smart Home Benefits and Issues			
	5.2 Smart Grids			
	5.2.1 Characteristics of Smart Grid			
	5.2.2 Benefits of Smart Grid			
	5.2.3 Smart Grid Architecture			
	5.3 Smart Cities			
	5.3.1 Characteristics of Smart Cities			

| | 5.3.2 Smart City Frameworks: Technology Framework, Human Framework, Institutional Framework, Energy Framework
5.4 Industrial IoT (IIoT)
    5.4.1 IIoT Requirements
    5.4.2 Applications of IIoT
    5.4.3 Benefits of IIoT | | | |

8. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

9. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. INTRODUCTION TO INTERNET OF THINGS** 1.1 Introduction 1.2 Characteristics of IoT 1.3 Applications of IoT 1.4 IoT Categories: Industrial IoT, Consumer IoT 1.5 Challenges for IoT 1.6 IoT Protocols 1.7 IoT Functional Blocks 1.8 IoT Communication Models	10	15
II	**2. INTERNET OF THINGS AND M2M** 2.1 Introduction to M2M 2.2 M2M Ecosystem 2.3 M2M Service Platform 2.4 M2M Applications 2.5 Difference between IoT and M2M 2.6 IoT Levels	10	15
III	**3. SENSORS, ACTUATORS AND WIRELESS SENSOR NETWORKS** 3.1 Introduction to Sensors 3.2 Introduction to Actuators 3.3 Introduction to Wireless Sensor Networks (WSN)	10	15
IV	**4. DEVELOPING INTERNET OF THINGS** 4.1 IoT Connectivity technologies 4.2 IoT Design Methodology 4.3 IoT Implementation with Raspberry 4.4 IoT Implementation with Arduino UNO	10	15

V	**5. DOMAIN SPECIFIC IoTs**	8	15
	5.1 Smart Homes		
	5.2 Smart Grids		
	5.3 Smart Cities		
	5.4 Industrial IoT		
	Total	48	75

10. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Familiarization with Arduino and perform necessary software installation.
2.	Familiarization with Raspberry Pi and perform necessary software installation.
3.	To interface LED with Arduino and write a program to turn ON LED for 1 sec after every 2 seconds.
4.	To interface LED with Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
5.	To interface DHT11 sensor with Arduino and write a program to print temperature and humidity readings.
6.	To interface DHT11 sensor with Raspberry Pi and write a program to print temperature and humidity readings.
7.	To interface Servo Motor with Arduino
8.	To interface Servo Motor with Raspberry Pi
9.	Remote Data Logging using Arduino
10.	Remote Data Logging using Raspberry Pi

11. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	ArshdeepBahga and Vijay Madisetti	Internet of Things	Universities Press (India)
2	Jeeva Jose	Internet of Things	Khanna Publishing House
3	Srinivasa K.G., Siddesh G.M., Hanumantha Raju R.	Internet of Things	Cengage Learning

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Adrian McEwen, Hakim Cassimally	Designing the Internet of Things	Wiley Publications
2	Imad Saleh, Mehdi Ammi, Samuel Szoniecky	Challenges of the Internet of Things: Technique, Use, Ethics	Wiley Publications

Internet and Web Resources

S. No.	Description
1	https://www.tutorialspoint.com/internet_of_things/
2	https://pythonprogramming.net/introduction-raspberry-pi-tutorials/

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=Q3ur8wzzhBU (IOT)
2	https://www.youtube.com/watch?v=QSIPNhOiMoE (IOT)
3	https://www.youtube.com/watch?v=3DH_SryMwzs (Python and Raspberry Pi)

(CM614) E-GOVERNANCE

1.COURSE OBJECTIVE: In this course the students will learn the concepts of e-Governance and understand how technologies and business models shape the contours of government for improvingcitizen services and bringing in transparency.

2. TEACHING AND EXAMINATION SCHEME

Semester	VI								
Course code & course title		**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**				**Total Marks**
						Theory Marks		**Practical Marks**		
CM614		**L**	**T**	**P**	**H**	**TH**	**TM**	**TW**	**PR/OR**	
E-Governance		**3**	**-**	**2**	**5**	**75**	**25**	**25**	**25**	**150**

3.COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM614.CO1: Familiarize with the concepts of e-governance.

CM614.CO2: Examine e-governance models and infrastructure developments.CM614.CO3: Prepare e-government proposals, plans and strategies.

CM614.CO4: Evaluate Government e-services.

4. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM614.CO1	2	2	1	1	3	2	2
CM614.CO2	2	2	1	1	3	2	2
CM614.CO3	2	2	3	2	3	2	2
CM614.CO4	2	2	3	2	3	2	2

Relationship: Low-1   Medium-2   High-3

	PSO1	PSO2
CM614.CO1	2	2
CM614.CO2	2	2
CM614.CO3	3	2
CM614.CO4	3	2

5.   DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr=Teaching hours	CO = Course Outcomes			
UNIT			M	Thr	CO

UNIT I	**1. INTRODUCTION TO E-GOVERNANCE**	15	10	CO1, CO2, CO3, CO4
	1.1 Meaning of Governance			
	1.2 Definition of E-governance			
	1.3 E-Governance and E-Government			
	1.4 Objectives of E-governance			
	1.4.1 To Build an Informed Society			
	1.4.2 To Increase Interaction between Government and Citizens			
	1.4.3 To Encourage Citizen Participation			
	1.4.4 To Bring Transparency in the Governing Process			
	1.4.5 To Make the Government Accountable			
	1.4.6 To Reduce the Cost of Governance			
	1.4.7 To Reduce the Reaction Time of the Government			
	1.5 SMART Government: Simple, Moral, Accountable, Responsive and Transparent			
	1.6 Benefits /Advantages of E-governance			
	1.7 Disadvantages of E-governance			
	1.8 Stakeholders/Models of E-governance			
	1.8.1 G2G (Government to Government)			
	1.8.2 G2C (Government to Citizen)			
	1.8.3 G2B (Government to Business)			
	1.8.4 G2E (Government to Employees)			
	1.9 Stages of development of E-Government (E-Governance Maturity Model/Gartner E-Governance Maturity Model)			
	1.9.1 Information			
	1.9.2 Interaction			
	1.9.3 Transaction			
	1.9.4 Integration / Transformation			
	1.10 Rise of E-Governance			

	1.11 Status of E-Governance Around the World			

UNIT II	**2. E-GOVERNANCE IN INDIA**
	2.1 E-Governance Development in India / Evolution of e-Governance in India
	2.2 Structure of E-Governance in India
	2.3 National E-Governance Plan Framework
	   2.3.1 Initiatives
	      2.3.1.1 National E-Governance Plan (NEGP): Introduction, Emergence, Vision, Key stakeholders
	      2.3.1.2 Implementation Strategy, Approach and Methodology of NeGP
	   2.3.2 National E-Governance Division
	   2.3.3 Services
	   2.3.4 Projects
	      2.3.4.1 Mission Mode Projects
	   2.3.5 Capacity-Building Scheme
	   2.3.6 Awareness and Communication
	   2.3.7 Standards, Policies and Frameworks
	   2.3.8 Impact and Outcomes
	2.4 E-Governance Infrastructure
	   2.4.1 NeGP Infrastructure Plan
	   2.4.2 Other Initiatives under NeGP
	   2.4.3 E-Governance under Digital India
		15	10	CO1, CO2, CO3, CO4

UNIT III	**3. E-GOVERNANCE INITIATIVES IN STATES AND M-GOVERNANCE**
	3.1 Introduction
	   3.1.1 Agriculture
	   3.1.2 Commerce and Industry
	   3.1.3 Tourism
	   3.1.4 Consumer Affairs, Food and Public Distribution
	   3.1.5 Railways
	   3.1.6 Labor
	   3.1.7 Health and Family Welfare
	
	3.2 E-Governance Initiatives in Goa
	   3.2.1 Goa online project: Introduction, vision, objectives
	   3.2.2 G2C, G2G and G2E services offered in Goa (Objectives and features)
	   3.2.3 G2C services - Case Studies: Land records (Dharani), Municipal services, Infogram software for village panchayats, RTO (Vahan, sarathi & RTO services)
	   3.2.4 G2G services - Case Studies: Computerizing the Finance Department and Directorate of Accounts (DOA) (Accounts online)
		15	10	CO1, CO2, CO3, CO4

	3.2.5 G2E services- Case Studies: General Provident Fund, Employee advances
	3.2.6 Initiatives towards integrated services: Goanet to Goa Broadband Network, MahithiGhars and Citizen Service Centres, State data centre
	
	3.3 M-governance
	    3.3.1 Need of M-governance
	    3.3.2 Mobile Services Delivery Gateway (MSDG)
	    3.3.3 Government initiatives for M-governance
	    3.3.4 Mobile Seva
	    3.3.5 Advantages of M-governance
	    3.3.6 Disadvantages of M-governance			

UNIT IV	**4. GOVERNMENT PROCESS RE-ENGINEERING (GPR) & E-GOVERNANCE PROJECT DEVELOPMENT LIFECYCLE**
	 4.1 Government Process Re-engineering (GPR)
	    4.1.1 E-Governance and Traditional Approach to e-Governance
	    4.1.2 Re-engineering defined
	    4.1.3 Steps involved in GPR (6: Steps)
	
	 4.2 Challenges in current environment (e-Governance Projects)
	    4.2.1 Key factors contributing to current environment
	    4.2.2 Need for a more robust approach for e-Governance
	    4.2.3 Essential elements of E-Governance project
	 4.3 e-Governance Project Lifecycle
	    4.3.1 Phase 1: E-Governance Strategy Development
	    4.3.2 Phase 2: Current State Assessment
	    4.3.3 Phase 3: Define Future State (To-be definition)
	    4.3.4 Phase 4: Implementation approach and sourcing
	    4.3.5 Phase 5: Develop and Implement IT System
	    4.3.6 Phase 6: Operate and Sustain Key Activities
	 4.4 eGLC vs Software Development Lifecycle (SDLC)
		15	8	CO1, CO2, CO3, CO4

UNIT V	**5. CHANGING TECHNOLOGICAL TRENDS FOR E-GOVERNANCE**
	
	 5.1 E-Governance Technology Trends
	    5.1.1 Ubiquitous Computing
	    5.1.2 Free and Open Source Software (FOSS)
	    5.1.3 Lean Six Sigma
	    5.1.4 Integrated Single-Window System
	    5.1.5 Blockchain Technology
	 5.2 E-Governance Plan for near Future
	    5.2.1 From Assisted Services to Mobile and Digitally Assisted Services
		15	10	CO1, CO2, CO3, CO4

	5.2.2 From Solutions for Departments/Ministries to Solutions for Citizens/Businesses			
	5.2.3 From Management-Driven Policy to Inclusive Decision Making			
	5.2.4 From Large and Stand-Alone Systems to Smart and Integrated Systems			
	5.2.5 From Individual Initiatives to Institutional Initiatives			
	5.2.6 From Multiple Download of Information to Need Fulfillment of G2C Services Online			
	5.2.7 Outsourcing and Deferred Payment to Shared Services and PPP			
	5.3 Pillars of Digital India Leading to E-Governance vision			
	5.3.1 Vision			
	5.3.2 Nine Pillars of Digital India			
	5.3.3 Some of the initiatives: Direct Benefit Transfer (DBT), JAM Trinity, Smart Cities, National Optical Fibre Network (NOFN), Wi-Fi Hotspots, Skill India Initiative, E-Hospital, E-Sign Framework, Digital Chip Maker, E-Kranti, Cloud Computing, Service Enablement Support for 2G, 3G and 4G, Machine to Machine (M2M), Social Media			
	5.4 Security Concerns			
	5.4.1 Challenges of e-government security			
	5.4.2 Sources of threat to e-government: Internal sources, external sources			
	5.4.3 Types of threats			
	5.4.4 Security management model: User Environment, Transport Environment, ICT Assets Environment			
	5.4.5 Security management tools for User management Passwords, Digital identity tokens, Access control Lists (ACL), PKI, Biometrics, e-government gateway			
	5.4.6 Security Management tools for Transport environment: Government secure intranet, Virtual private networks, Government Secure Internet (GSI), Encryption			
	5.4.7 Security Management tools for ICT assets environment: Firewalls, Intrusion detection systems, anti-virus systems, disaster recovery site			

6. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

7. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. INTRODUCTION TO E-GOVERNANCE** 1.1 Meaning of Governance 1.2 Definition of E-governance 1.3 E-Governance and E-Government 1.4 Objectives of E-governance 1.5 SMART Government: Simple, Moral, Accountable, Responsive and Transparent 1.6 Benefits /Advantages of E-governance 1.7 Disadvantages of E-governance 1.8 Stakeholders/Models of E-governance 1.9 Stages of development of E-Government (E-Governance Maturity Model/Gartner E-Governance Maturity Model) 1.10 Rise of E-Governance 1.11 Status of E-Governance Around the World	10	15
II	**2.E-GOVERNANCE IN INDIA** 2.1 E-Governance Development in India / Evolution of E-Governance in India 2.2 Structure of E-Governance in India 2.3 National E-Governance Plan Framework 2.4 E-Governance Infrastructure	10	15
III	**3. E-GOVERNANCE INITIATIVES IN STATES AND M-GOVERNANCE** 3.1 Introduction 3.2 E-Governance Initiatives in Goa 3.3 M-governance	10	15
IV	**4. GOVERNMENT PROCESS RE-ENGINEERING (GPR) & E-GOVERNANCE PROJECT DEVELOPMENT LIFECYCLE** 4.1 Government Process Re-engineering (GPR) 4.2 Challenges in current environment (e-Governance Projects) 4.3 e-Governance Project Lifecycle 4.4 eGLC vs Software Development Lifecycle (SDLC)	08	15
V	**5. CHANGING TECHNOLOGICAL TRENDS FOR E-GOVERNANCE** 5.1 E-Governance Technology Trends 5.2 E-Governance Plan for near Future 5.3 Pillars of Digital India Leading to E-Governance vision 5.4 Security Concerns	10	15
	Total	48	75

8. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

S. No	Practical
1	Identify and study the G2G, G2B, G2E and G2C E-governance application.
2	Study of On-line Water bill payment system of PWD, Goa state.
3	Study of E-Learning applications. (Online experiments in a virtual laboratory of a college, Online tutorials for physics)
4	Create a bid document - Tender schedule or Request for Proposal (RFP)
5	Visit to a (eSeva) citizen service centre and find out the E-services available. Note down the shortcomings and limitations of eSeva.
6	Smart Government - towards a paperless office. Design a proposal for a paperless office for: administration of your college or a clinic / hospital/ doctor etc.
7	E-procurement system- a case study.
8	Identify a service that can be converted into an E-governance service and prepare a detailed report.
9	Study of security management tools.
10	Study of M- Governance initiatives.

9. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Sunil K. Muttoo, Rajan Gupta, Saibal K. Pal	E-Governance in India: The Progress Status (Unit 1, 2, 5)	Palgrave Macmillan
2	J Satyanarayana	e-Government -The Science of the Possible (Unit 1, 5)	Prentice Hall, India
3	http://www.nisg.org/	e-Governance Project Lifecycle Reading Supplement Handbook (Unit 4)	National Institute for Smart Government

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	J Satyanarayana	Managing Transformation – Objectives to Outcomes	Prentice Hall India

Internet and Web Resources

S. No.	Description
1	https://informatics.nic.in/uploads/pdfs/c6f44b83_Goa.pdf (Unit 3)
2	https://egov.eletsonline.com/2007/02/e-governance-a-rising-wave-in-goa/ (Unit 3)
3	http://www.csi-sigegov.org/publications.php
4	https://negd.gov.in
5	https://www.nisg.org/case-studies-on-e-governance-in-india

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=tQ0aZzATFsM
2	https://www.youtube.com/watch?v=LNYQQuUsvEE
3	https://www.youtube.com/watch?v=LNrLmKtl3QY
4	https://www.youtube.com/watch?v=u7iqhAItBBw

ELECTIVE III

Elective–III	
CM615	Mobile Application development
CM616	Principles of Multimedia
CM617	Data Science
CM618	Python Programming

(CM615) MOBILE APPLICATION DEVELOPMENT

1. COURSE OBJECTIVES: In this course the students will learn various mobile devices, platforms, mobile operating systems, mobile application development tools and technologies.

2. PRE-REQUISITES: NIL

3. TEACHING AND EXAMINATION SCHEME

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				
Course code & course title						Theory Marks		Practical Marks		Total Marks
CM615 Mobile App. Dev.		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	25	25	150

4. COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM615.CO1: Use mobile application development technologies.

CM615.CO2: Compare mobile devices with respect to operating system and architecture.CM615.CO3: Design simple responsive webpages for mobile device.

CM615.CO4: Develop simple android based native Application.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life -long Learning
CM615.CO1	2	2	1	1	1	2	2
CM615.CO2	2	3	2	2	2	2	2
CM615.CO3	3	3	2	3	2	2	2
CM615.CO4	3	3	2	3	2	3	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM615.CO1	1	2
CM615.CO2	2	2
CM615.CO3	3	2
CM615.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
UNIT			**M**	**Thr**	**CO**
UNIT I	**1. THE MOBILE ECOSYSTEM** 1.1 What is a Mobile Device 1.1.1 Portable 1.1.2 Personal 1.1.3 Companion 1.1.4 Easy Usage 1.1.5 Connected device 1.2 Mobile Device Categories 1.2.1 Mobile Phones 1.2.2 Low-end mobile devices 1.2.3 Mid-end mobile devices 1.2.4 High-end mobile devices 1.2.5 Smart phones 1.2.6 Tablets, net books and Notebooks 1.3 Mobile Knowledge 1.3.1 Display 1.3.2 Resolution 1.3.3 Physical Dimension 1.3.4 Aspect ratio 1.3.5 Input Methods 1.3.6 Other features 1.4 Mobile Operating Systems 1.4.1 Operating Systems (no diagrams) 1.4.1.1 Android OS 1.4.1.2 Windows OS 1.4.1.3 iOS 1.4.1.4 Blackberry OS 1.4.1.5 Symbian OS 1.4.1.6 Tizen OS 1.4.1.7 Comparison of Mobile Operating Systems	15	9	CO1, CO2, CO3, CO4

UNIT II	**2. MOBILE BROWSING ARCHITECTURE AND DESIGN**	15	9	CO1, CO2, CO3, CO4
	2.1 Mobile Browsing			
	2.1.1 What Is the Mobile Web?			
	2.1.2 Differences between Mobile Web and desktop web			
	2.1.3 Brief of WAP 1-Wireless Application Protocol			
	2.1.4 Browsing types			
	2.1.4.1 Focus navigation			
	2.1.4.2 Cursor navigation			
	2.1.4.3 Touch navigation			
	2.1.4.4 Multi touch navigation			
	2.1.5 Zoom Experience			
	2.1.2.1 Basic Zoom			
	2.1.2.2 Smart zoom			
	2.1.6 Reflow Engine			
	2.1.7 Direct Versus Cloud-Based Browsers			
	2.1.8 Multipage experience			
	2.2 Architecture & Design			
	2.2.1 Website Architecture			
	2.2.1.1 Navigation			
	2.2.1.2 Context			
	2.2.1.3 Progressive enhancement			
	2.2.1.4 Different version approach			
	2.2.1.5 Design and usability			
	2.2.1.6 Touch Design patterns			
	2.2.1.6.1 Panorama UI			
	2.3 Brief of Official UI Guidelines			
UNIT III	**3. MOBILE APPLICATION DEVELOPMENT TECHNOLOGIES**	15	12	CO1, CO2, CO3, CO4
	3.1 Setting up your Environment			
	3.1.1 Working with Code			
	3.1.2 Emulators and Simulators			
	3.1.3 Brief description of Android Emulator			
	3.1.4 Brief description of I phone Simulator			
	3.2 Building Android Apps with HTML, CSS and JavaScript			
	3.2.1 Web Apps Versus Native Apps			
	3.2.1.1 What is a Web App			
	3.2.1.2 What is a Native App			
	3.2.1.3 Pros and Cons			
	3.2.1.4 Choice of Web or Native Approach			

	3.3 Web Programming for Mobile Application Development(A Quick Recap)
	    3.3.1 HTML, CSS and JavaScript
	       3.3.1.1 What is HTML, CSS and Javascript
	       3.3.1.2 Why use HTML, CSS and Javascript
	       3.3.1.3 How to insert CSS and Javascript in a webpage
	 3.4 Introduction to jQuery
	    3.4.1 What is jQuery
	    3.4.2 Why jQuery
	    3.4.3 Adding a jQuery to a webpage
	    3.4.4 jQuery basic syntax
	 3.5 Introduction to jQuery Mobile
	    3.5.1 What is jQuery Mobile
	    3.5.2 Why use jQuery Mobile
	    3.5.3 Adding jQuery Mobile to a webpage
	    3.5.4 jQuery Mobile Pages
	 3.6 Introduction to Bootstrap
	    3.6.1 What is Bootstrap
	    3.6.2 Why use Bootstrap
	    3.6.3 Where to get Bootstraps
	    3.6.4 What Bootstrap package contains
	 3.7 Cross platform Mobile Application Development tools
	    3.7.1 Appcelerator Titanium
	       3.7.1.1 Overview
	       3.7.1.2 Benefits of Appcelerator Titanium
	    3.7.2 PhoneGap
	       3.7.2.1 Overview
	       3.7.2.2 Benefits of PhoneGap
	    3.7.3 Xamarin
	       3.7.3.1 Overview
	       3.7.3.2 Benefits of Xamarin
	 3.8 Brief of Introduction to MIT App Inventor			

UNIT IV	**4. INTRODUCTION TO ANDROID**
	
	 4.1 Getting Started with Android Programming
	    4.1.1 What is Android
	    4.1.2 Android Versions
	    4.1.3 Features of Android
	    4.1.4 Architecture of Android (with Diagram)
	    4.1.5 Android Devices in the Market
	 4.2 Why Develop for Android?
	    4.2.1 Market share
	    4.2.2 Time to market
	    4.2.3 Open Platform
	    4.2.4 Cross- Compatibility
		15	8	CO1, CO2, CO3, CO4

	4.2.5 Mash up Capability			
	4.3 Android Programming Basics			
	4.3.1 Java: Your Android programming language			
	4.3.2 Activities			
	4.3.3 Intents			
	4.3.4 Cursorless Controls			
	4.3.5 Views and widgets			
	4.3.6 Asynchronous calls			
	4.3.7 Background Services			
	4.3.8 Hardware Tools			
	4.3.8.1 Touch Screen			
	4.3.8.2 GPS			
	4.3.8.3 Accelerometer			
	4.3.8.4 SD card			
	4.3.9 Software Tools			
	4.3.9.1 Internet			
	4.3.9.2 Audio and Video Support			
	4.3.9.3 Contacts			
	4.3.9.4 Security			
	4.3.9.5 Google API's			

UNIT V	**5. ANDROID APPLICATION DEVELOPMENT**
	
	5.1 Android Application Development Tools
	    5.1.1 Android Studio
	        5.1.1.1 Installation Process
	    5.1.2 Android SDK
	    5.1.3 Creating Android Virtual Device
	        5.1.3.1 Steps to create Android Virtual
	             Device (AVD)
	5.2 Creating an Example Android Application in
	    Android Studio
	    5.2.1 Creating a new Android Project
	    5.2.2 Defining the project and SDK settings
	    5.2.3 Creating an Activity
	    5.2.4 Modifying the Example Application
	    5.2.5 Reviewing the Layout and Resources Files
	    5.2.6 Previewing the Layout
	5.3 Activities and Intents
	    5.3.1 Life Cycle of an Activity
	        5.3.1.1 Understanding Activities
	        5.3.1.2 Life Cycle of an Activity (with
	             Life Cycle diagram)
	             5.3.1.2.1 onCreate( ) method
	             5.3.1.2.2 onStart( ) method
	             5.3.1.2.3 onResume( )method
	             5.3.1.2.4 onPause( )method
	             5.3.1.2.5 onStop( )method
		15	10	CO1,
				CO2,
				CO3,
				CO4

	5.3.1.2.6 onRestart( )method
	5.3.1.2.7 onDestroy( )method
	5.3.2 Intents
	    5.3.2.1 Linking Activities using Intents
	    5.3.2.2 Returning results from Intent			

	Total	75	48	

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises.

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
I	**1. THE MOBILE ECOSYSTEM** 1.1 What is a Mobile Device 1.2 Mobile Device Categories 1.3 Mobile Knowledge 1.4 Mobile Operating Systems	9	15
II	**2. MOBILE BROWSING ARCHITECTURE AND DESIGN** 2.1 Mobile Browsing 2.2 Architecture & Design 2.3 Brief of Official UI Guidelines	9	15
III	**3. MOBILE APPLICATION DEVELOPMENT TECHNOLOGIES** 3.1 Setting up your Environment 3.2 Building Android Apps with HTML, CSS and JavaScript 3.3 Web Programming for Mobile Application Development(A Quick Recap) 3.4 Introduction to jQuery 3.5 Introduction to jQuery Mobile 3.6 Introduction to Bootstrap 3.7 Cross platform Mobile Application Development tools 3.8 Brief of Introduction to MIT App Inventor	12	15
IV	**4. INTRODUCTION TO ANDROID** 4.1 Getting Started with Android Programming 4.2 Why Develop for Android? 4.3 Android Programming Basics	8	15
V	**5. ANDROID APPLICATION DEVELOPMEN** 5.1 Android Application Development Tools 5.2 Creating an Example Android Application in Android Studio 5.3 Activities and Intents	10	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study of history of Mobile Devices
2.	Study of Resolution, Physical Dimensions and Aspect Ratio for Mobile Devices.
3.	Study of various Mobile Brands in the Market.
4.	Study of Panorama User Interface for Mobiles.
5.	Study of Android Emulators and IPhone Simulator.
6.	Implementation of HTML, CSS and JavaScript for Mobile Application Development
7.	Implementation of jQuery Mobile Pages.
8.	Implementing Simple web page using Bootstrap.
9.	Study of PhoneGap, Appcelerator Titanium and Xamarine tools.
10.	Study of Latest versions of Android Operating System.
11.	Study of Android Studio in details.
12.	Create a Hello Android Application using Android Studio.
13.	Implementation of Activities and Intents in Android using Android Studio
14.	Case Study of MIT App Inventor
15.	Study of Google API.

10. LEARNING RESOURCES

Text Books

Sr. No.	Author	Title of Books	Publishers
1	Donn Felker	Android Application Development for Dummies	John Wiley & Sons,
2	Ed Burnette	Hello Android, Introducing Google's Mobile Development Platform, 3rd Edition	Pragmatic Bookshelf
3	Maximiliano Firtman [O'Reilly].	Programming the Mobile Web	O'Reilly Media, Inc
4.	Neil Smyth (Unit 5)	Android studio development essentials-Second Edition	eBookFrenzy
5.	Jonathan Stark with Brian Jespon [O'Reilly].(Unit 3)	Building Android Apps with HTML, CSS and JavaScript-Second Edition	O'Reilly Media, Inc
6.	J.K. DiMarzio (Unit 4 and 5)	Beginning Android Programming with Android Studio	John Wiley & Sons

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Joseph Annuzzi, Jr. Lauren Darcey, Shane Conder	Introduction to Mobile Application Development	Pearson
2	Budi Kurniawan, Daniel Perry	Introduction to Android Application Development	Brainy Software Inc

Internet and Web Resources

S. No.	Description
1	www.w3schools.com
2	http://www.diva-portal.org/smash/get/diva2:626531/fulltext01.pdf
3	http://scienceeq.org/uploaded/editorial/1475902795.pdf

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=ujgL44AEUzs
2	https://www.youtube.com/watch?v=EOfCEhWq8sg

(CM616) PRINCIPLES OF MULTIMEDIA

1. COURSE OBJECTIVES: In this course students will learn the fundamental elements of Multimedia, its technologies and develop small multimedia applications.

2. PRE-REQUISITES: Computer Graphics

3. TEACHING AND EXAMINATION SCHEME

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				Total Marks
Course code & course title						Theory Marks		Practical Marks		
CM616 Principles of multimedia		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	25	25	150

4. COURSE OUTCOMES

CM616.CO1: Discuss multimedia elements and technologies. CM616.CO2: Use audio and video processing software.

CM616.CO3: Implement different animation techniques. CM616.CO4: Create simple multimedia applications.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CM616.CO1	1	2	1	1	3	1	2
CM616.CO2	1	2	1	3	3	3	2
CM616.CO3	3	2	1	3	3	3	2
CM616.CO4	3	3	3	3	3	3	2

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM616.CO1	1	2
CM616.CO2	2	2
CM616.CO3	3	2
CM616.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
		UNIT	**M**	**Thr**	**CO**
UNIT I	**1.MULTIMEDIA: AN OVERVIEW** 1.1 Introduction 1.2 Multimedia Presentation and production 1.3 Characteristics of Multimedia, Multiple media, non-linearity, interactivity, integrity, digital representation. 1.4 Utilities of Multisensory perception 1.5 Hardware and software requirements, Multimedia playback, Multimedia production 1.6 Uses of Multimedia, Home entertainment, Educational purpose, Industrial training, Info. Kiosks, corporate presentations, business, electronic shopping, communication & networks, medicine, engineering applications – etc 1.7 Promotion of Multimedia based contents, Demand, compression technique, processing power, standards, bandwidth, distribution mechanisms 1.8 Steps for creating a multimedia presentation (8 steps in brief)	15	8	CO1, CO2, CO3, CO4
UNIT II	**2. TEXT AND IMAGE** 2.1 Text 2.1.1 Introduction 2.1.2 Types of text 2.1.3 Architecture of HyperText document 2.1.4 Unicode standards, UCS-4, UTF-32, UTF-16 2.1.5 Font Appearance, size and style 2.1.6 Insertion of Text Using keyboard, copy-paste, using OCR software 2.1.7 Text Compression: Huffman coding, LZ coding 2.1.8 Text File Formats: Text, doc, rtf, pdf, post-script 2.2 Image 2.2.1 Introduction 2.2.2 Types of Image: Hard Copy, Soft-copy, Continuous Tone, Half-tone, Bitone	15	10	CO1, CO2, CO3, CO4

	2.2.3 Seeing Color			
	2.2.4 Color Models: RGB, CMYK, device dependency and Gamut			
	2.2.5 Basic steps for Image Processing			
	2.2.6 Specification of Digital Images, Pixel dimension, Image resolution, file size, color depth			
	2.2.7 Image processing software, Selection tool, Painting and drawing tool, color selection tool, gradient tool, clone tool, transformation tool, retouching tool, text tool, changing image chars, filters, layers, color channel, mask			
	2.2.8 Image – File formats: Bmp, jpeg, gif, tiff, png, pict, tga, psd.			

UNIT III	**3. AUDIO AND VIDEO**
	  3.1 Audio
	    3.1.1 Introduction
	    3.1.2 Acoustics
	    3.1.3 Nature of Sound waves
	    3.1.4 Fundamental Characteristics of sound: Amplitude, Frequency, Waveform, Speed
	    3.1.5 Elements of audio system
	    3.1.6 Audio – File formats: WAV, AIFF, MID, DLS, XMF, MOD, AU, MP3,WMA
	    3.1.7 Audio Processing Software: Playing a file, Playing selected Portions of a file, Accurately Positioning the Playback head, Copying and Pasting Portions of a file, Saving a file, Using Cut, Trim and Undo functions, Magnifying and zooming, Mixing Sounds, Crossfading sounds
	  3.2 Video
	    3.2.1 Introduction
	    3.2.2 Motion video
	    3.2.3 Video recording and storage formats: Betamax, Betacam, Video Cassette Recorder, Camcoder, Video 8, DV, MiniDV, DVCAM
	    3.2.4 Video file formats: AVI, MOV, MPG, RM, WMV, FLV, 3GPP, 3GPP2, MP4
	    3.2.5 Video editing concepts: Online Editing and Offline Edition, SMPTE Time, Code, Non drop Mode, Drop Mode Timebase.
	    3.2.6 Video Processing Software: Timeline Structure, Trimming, Splitting, Transitions, Audio Content, Speed and Opacity, Filters, Superimposing Content.
		15	10	CO1, CO2, CO3, CO4

UNIT IV	**4. ANIMATION**	15	10	CO1, CO2, CO3, CO4
	4.1 Introduction			
	4.2 Uses of Animation			
	4.3 Traditional Animation: Keyframes and tweening, cel animation, Rotoscoping, stop-motion, flip-book, motion cycling.			
	4.4 Principles of Animation: Squash and Stretch, Anticipation, Staging, Follow through and Overlapping, Slow-in Slow-Out, Arcs, Secondary Action, Timing, Exaggeration, and Appeal.			
	4.5 Computer-based animation, Frame-based Animation, Path-based Animation, Transformations			
	4.6 Animation on the web, Shockwave Format, Client-Pull Animation, Server-Push Animation			
	4.7 Steps involved in creation of 3D Animation			
	4.8 Animation software			
	4.8.1 2D Animation: Shape Tweening, Motion Tweening, Path Animation, Masking, Changing color, and Transparency, Onion Skinning and Buttons.			
	4.8.2 3D Animation: Key Frame based Animation, Path Animation, Particle Systems and Space Wraps.			
UNIT V	**5. MULTIMEDIA DATABASE**	15	10	CO1, CO2, CO3, CO4
	5.1 Introduction			
	5.2 What is multimedia database			
	5.3 Content-based storage and retrieval (CBSR)			
	5.4 Designing a basic multimedia database			
	5.5 Image color features			
	5.6 Image texture features			
	5.7 Image-shape features			
	5.8 Classification of data			

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. MULTIMEDIA: AN OVERVIEW** 1.1 Introduction 1.2 Characteristics of Multimedia 1.3 Uses of Multimedia	8	15
	1.4 Promotion of Multimedia based contents 1.5 Steps for creating a multimedia presentation		
2	**2. TEXT AND IMAGES** 2.1 Introduction 2.2 Images	10	15
3	**3. AUDIO AND VIDEO** 3.1 Audio 3.2 Video	10	15
4	**4. ANIMATION** 4.1 Introduction 4.2 Uses of Animation 4.3 Traditional Animation 4.4 Principles of Animation 4.5 2D Animation 4.6 3D Animation 4.7 Animation software	10	15
5	**5. MULTIMEDIA DATABASE** 5.1 Introduction 5.2 Content-based storage and retrieval (CBSR) 5.3 Designing a basic multimedia database 5.4 Image color features 5.5 Image texture features 5.6 Image-shape features 5.7 Classification of data	10	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	To study Flash fundamentals.
2	To study and use Drawing and Painting tools available in Flash.
3	To study handling Images in Flash.
4	To export Audio in flash.
5	To add Video to flash.

6	To learn adding Effects in flash.
7	To develop Animation in flash.
8	A mini-project to create and manage interactive multimedia web applications using Flash technology.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Ranjan Parekh.	Principles of Multimedia	Tata McGraw-Hill
2	Ranjan Parekh (Edition 2)	Principles of Multimedia	Tata McGraw-Hill

Reference Books for further study

Sr. No.	Author	Title of Books	Publishers
1	Prabhat K. Andleigh and KiranThakrar	Multimedia Systems Design	PHI publication
2	John F. Koegal	Multimedia systems	Buford-Pearson Education.
3	Ze-Nian Li and MS Drew	Fundamentals of multimedia	PHI EEE edition
4.	Adobe	ADOBE® FLASH® PROFESSIONAL Help and tutorials (for Practicals)	Adobe

Internet and Web Resources

S. No.	Description
1	https://en.wikibooks.org/wiki/Introduction_to_Computer_Information_Systems/Multimedia
2	https://en.wikipedia.org/wiki/Video_editing

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=uDqjIdI4bF4

(CM617) DATA SCIENCE

1. COURSE OBJECTIVES: In this course students will learn the basics of Data Science, Big Data and its tools.

6. PRE-REQUISITES: Knowledge of Database Management Systems

3. TEACHING AND EXAMINATION SCHEME

Semester	VI	Periods/Week (in hours)			Total Hours	Examination Scheme				Total Marks
Course code & course title						Theory Marks		Practical Marks		
		L	T	P	H	TH	TM	TW	PR/OR	
CM617 Data Science		3	-	2	5	75	25	25	25	150

4. COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM617.CO1: Explain the concepts of Data Science, Data Warehousing, Data Mining, Big Data.

CM617.CO2: Use the concepts of Data Science, Data Warehousing, Data Mining, Big Data.

CM617.CO3: Compare various data management methods and technologies. CM617.CO4: Develop solutions to real life problems using data science.

5. MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation & Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CM617.CO1	2	2	3	2	3	3	3
CM617.CO2	2	3	3	2	3	3	3
CM617.CO3	2	2	3	3	3	3	3
CM617.CO4	2	2	3	3	3	3	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM617.CO1	2	2
CM617.CO2	3	2
CM617.CO3	3	2
CM617.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes		
	UNIT	**M**	**Thr**	**CO**
UNIT I	**1. INTRODUCTION TO DATA SCIENCE** 1.1 What is Data science? 1.2 Why Data Science? 1.3 Types of Data Science Jobs: Data Analyst, Machine Learning Expert, Data Engineer, Data Scientist 1.4 Data Science components: Statistics, Visualization, Machine Learning, Deep Learning. 1.5 Data Science Lifecycle: Discovery, Data preparation, Model Planning, Model-building, Operationalize, Communicate results 1.6 Tools for data science: Data Analysis tools, Data Warehousing, Data Visualization tools, Machine learning tools 1.7 Applications of data science 1.8 Challenges of Data science Technology	15	8	CO1, CO2, CO3, CO4
UNIT II	**2. DATA WAREHOUSING** 2.1 Introduction 2.2 What is Data Warehouse? 2.3 Definition: Subject-Oriented, Non-volatile, Time varying, Integrated 2.4 Multidimensional data model 2.4.1 Data Cube 2.4.2 Dimension Modelling 2.5 OLAP operations: Slicing, Dicing, Drilling, Drill-up, Drill-down, Drill-within, Drill-across, Pivot(rotate) 2.6 Warehouse Schema: Star Schema, Snowflake Schema 2.7 Data warehousing architecture 2.8 Warehouse server: Enterprise warehouse, Data Marts 2.9 OLAP Engine 2.10 Data warehousing backend processes: Data extraction, Data cleaning, Data transformation	15	10	CO1, CO2, CO3, CO4

UNIT III	**3. DATA MINING**
	3.1 Introduction
	3.2 What is Data mining?
	3.3 Why data mining?
	3.4 Knowledge Discovery in Database (KDD) Vs. Data Mining
	3.5 Stages of KDD: Selection, Preprocessing, transformation, Data mining, Interpretation and evaluation, Data Visualization
	3.6 Database Management System (DBMS) Vs. Data Mining
	3.7 DM Techniques: Classification, Association, Clustering, Regression, Prediction
	3.8 Issues and challenges in Data Mining
	3.9 DM application area:
	    3.9.1 Business and e-commerce data
	    3.9.2 Scientific, Engineering and Health care data
	3.10 DM application- Case studies:
	    3.10.1 Crime detection
	    3.10.2 Store-level fruits purchasing prediction
		15	10	CO1,
				CO2,
				CO3,
				CO4

UNIT IV	**4. INTRODUCTION TO BIG DATA**
	4.1 Classification of Digital Data:
	    4.1.1 Structured Data : Sources, Ease of Working
	    4.1.2 Semi-Structured Data: Sources
	    4.1.3 Unstructured Data: Sources, Issues, How to deal with Unstructured data
	4.2 Characteristics of Data
	4.3 Evolution of Big Data
	4.4 Definition of Big Data
	4.5 Challenges of Big Data
	4.6 Characteristics of Big Data: Volume, Velocity, Variety
	4.7 Other characteristics: Veracity and validity, Volatility, Variability
	4.8 Why Big Data?
	4.9 Traditional Business Intelligence (BI) vs Big Data
	4.10 Typical Data Warehouse Environment
	4.11 Typical Hadoop Environment
	4.12 Coexistence of Big data and Data warehouse
	4.13 What is changing in realms of Big Data?
		15	10	CO1,
				CO2,
				CO3,
				CO4

UNIT V	**5. BIG DATA TECHNOLOGIES**
	5.1 Hadoop
	    5.1.1 Introduction
	    5.1.2 Features and key advantages of Hadoop
		15	10	CO1,
				CO2,

	5.1.3 Overview of Hadoop ecosystems
	5.1.4 Hadoop vs SQL
	5.2 NoSQL
	    5.2.1 What is NoSQL?
	    5.2.2 Where is NoSQL Used?
	    5.2.3 Why NoSQL?
	    5.2.4 Types of NoSQL databases
	    5.2.5 Advantages of NoSQL
	    5.2.6 Use of NoSQL in Industry,
	    5.2.7 SQL vs. NoSQL vs. NewSQL
	5.3 MongoDB
	    5.3.1 What is MongoDB?
	    5.3.2 Why MongoDB?
	    5.3.3 MongoDB's Core Server tools
	    5.3.4 Data Types in MongoDB's: String, Integer, Boolean, Double, Arrays, Object, Date
	    5.3.5 MongoDB Query Language: Insert, Save, Update, Remove, Find
	5.4 MapReduce: Introduction, Mapper, Reducer, Combiner, Partitioner, Searching Sorting, Compression
				CO3, CO4

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO–LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION TO DATA SCIENCE** 1.1 What is Data science? 1.2 Why Data Science? 1.3 Types of Data Science Jobs: Data Analyst, Machine Learning Expert, Data Engineer, Data Scientist 1.4 Data Science components: Statistics, Visualization, Machine Learning, Deep Learning. 1.5 Data Science Lifecycle: Discovery, Data preparation, Model Planning, Model-building, Operationalize, Communicate results 1.6 Tools for data science: Data Analysis tools, Data Warehousing, Data Visualization tools, Machine learning tools 1.7 Applications of data science 1.8 Challenges of Data science Technology	10	15
2	**2. DATA WAREHOUSING** 2.1 Introduction 2.2 What is Data Warehouse? 2.3 Definition: Subject-Oriented, Non-volatile, Time varying, Integrated 2.4 Multidimensional data model 2.5 OLAP operations: Slicing, Dicing, Drilling, Drill-up, Drill-down, Drill-within, Drill-across, Pivot(rotate) 2.6 Warehouse Schema: Star Schema, Snowflake Schema 2.7 Data warehousing architecture 2.8 Warehouse server: Enterprise warehouse, Data Marts 2.9 OLAP Engine 2.10 Data warehousing backend processes: Data extraction, Data cleaning, Data transformation	9	15

	3.DATA MINING 3.1 Introduction 3.2 What is Data mining? 3.3 Why data mining? 3.4 Knowledge Discovery in Database (KDD) Vs. Data Mining 3.5 Stages of KDD: Selection, Preprocessing, transformation, Data mining, Interpretation and evaluation, Data Visualization 3.6 Database Management System (DBMS) Vs. Data Mining 3.7 DM Techniques: Classification, Association, Clustering, Regression, Prediction 3.8 Issues and challenges in Data Mining 3.9 DM application area 3.10 DM application- Case studies	10	15
4	**4. INTRODUCTION TO BIG DATA** 4.1 Classification of Digital Data: 4.2 Characteristics of Data 4.3 Evolution of Big Data 4.4 Definition of Big Data 4.5 Challenges of Big Data 4.6 Characteristics of Big Data: Volume, Velocity, Variety 4.7 Other characteristics: Veracity and validity, Volatility, Variability 4.8 Why Big Data? 4.9 Traditional Business Intelligence (BI) vs Big Data 4.10 Typical Data Warehouse Environment 4.11 Typical Hadoop Environment 4.12 Coexistence of Big data and Data warehouse 4.13 What is changing in realms of Big Data?	10	15
5	**5. BIG DATA TECHNOLOGIES** 5.1 Hadoop 5.2 NoSQL	9	15
	5.3 MongoDB 5.4 MapReduce		
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Creating a simple data warehouse
2	OLAP operations: Roll Up, Drill Down, Slice, Dice through SQL- Server
3	Install and Configure WEKA Tool

4	Demonstration of Weka Explorer, Mining techniques and Attribute Relation File Format (ARFF).
5	Create an Employee Table with the help of Data Mining Tool WEKA.
6	Create a Weather Table with the help of Data Mining Tool WEKA.
7	Apply Pre-Processing techniques (Add, Remove, Normalization) to the training data set of Weather Table
8	Apply Pre-Processing techniques to the training data set of Employee Table
9	Normalize Weather Table data using Knowledge Flow.
10	Finding Association Rules for Banking data.
11	Study of Hadoop ecosystem
12	Programming exercises on Hadoop e.g. Word count program

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Arun K Pujari	Data Mining Techniques (Unit 2 and 3)	Orient Longman Publishers
2	Seema Acharya, Subhashini Chellappan	Big Data and Analytics (Unit 4 and 5)	Wiley

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Elmasri Ramez, Navathe Shamkant Kamber and Han	Fundamentals of Database System	Pearson

Internet and Web Resources

S. No.	Description
1	https://www.javatpoint.com/data-science (Unit 1)
2	https://www.tutorialspoint.com/mongodb/index.htm (Unit 4)
3	http://www.tutorialspoint.com/data_mining/ (Unit 3)

Videos and Multimedia Tutorials

S. No.	Description
1	https://www.youtube.com/watch?v=-ETQ97mXXF0 (Data Science)
2	https://www.youtube.com/watch?v=J326LIUrZM8 (Data Warehousing)
3	https://www.youtube.com/watch?v=zez2Tv-bcXY (Big Data)
4	https://www.youtube.com/watch?v=rzRJsNeS0KI (Data Mining)

(CM618) PYTHON PROGRAMMING

1. COURSE OBJECTIVES: In this course students will learn how to work with a scripting language.

2.PRE-REQUISITES: NIL

3. TEACHING AND EXAMINATION SCHEME

Semester	VI					Examination Scheme				
Course code & course title		Periods/Week (in hours)			Total Hours	Theory Marks		Practical Marks		Total Marks
CM618 Python Programming		L	T	P	H	TH	TM	TW	PR/OR	
		3	-	2	5	75	25	25	25	150

4.COURSE OUTCOMES: On successful completion of the course, the student will be able to:

CM618.CO1: Explain the various constructs of Python programming.

CM618.CO2: Experiment with various constructs of Python Programming

CM618.CO3: Select the appropriate features of Python programming for solving real worldproblems.

CM618.CO4: Develop simple Python programs.

5.MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline Specific Knowledge	Problem Analysis	Design and Development of Solutions	Engg. Tools, Experimentation& Testing	Engg. Practices for Society, Sustainability & Environment	Project Management	Life-long Learning
CM618.CO1	2	2	3	3	2	3	2
CM618.CO2	3	3	3	3	2	3	2
CM618.CO3	3	3	3	3	2	3	2
CM618.CO4	3	3	3	3	2	3	3

Relationship: Low-1 Medium-2 High-3

	PSO1	PSO2
CM618.CO1	2	2
CM618.CO2	3	2
CM618.CO3	3	2
CM618.CO4	3	2

6. DETAILED COURSE CONTENTS / MICRO-LESSON PLAN

M=Marks	Thr= Teaching hours	CO = Course Outcomes			
	UNIT		M	Thr	CO

UNIT I	**1. INTRODUCTION TO PYTHON, DATA TYPES AND OPERATORS**
	1.1 Introduction
	1.2 Features of Python
	1.3 How to run Python
	1.4 Identifiers
	1.5 Reserved Words
	1.6 Variables
	1.7 Comments in Python
	1.8 Indentation in Python
	1.9 Multiline Statements
	1.10 Multiple statement group
	1.11 Quotes in Python
	1.12 Input, Output and import functions
	1.13 Operators
	    1.13.1 Arithmetic operators
	    1.13.2 Comparison operators
	    1.13.3 Assignment operators
	    1.13.4 Bitwise operators
	    1.13.5 Logical operators
	    1.13.6 Membership operators
	    1.13.7 Identity operators
	1.14 Data Types
	    1.14.1 Numbers
	        1.14.1.1 Mathematical Functions [abs(), sqrt(), ceil(), floor(), pow(), exp(), max(), min()]
	        1.14.1.2 Trigonometric Functions ([sin(), cos(), tan(), degrees(), radians()]
	        1.14.1.3 Random Number Functions [choice(), shuffle(), random(), randrange(), seed(), uniform()]
	    1.14.2 Strings
	        1.14.2.1 Escape characters
	        1.14.2.2 String Formatting operator
			15	10	CO1, CO2, CO3, CO4

	1.14.2.3 String formatting Functions [len(), lower(), upper(), swapcase(), capitalize(), replace
	 1.14.3 Lists
	     1.14.3.1 Built in List functions [len (), max(), min(), list(),
	     1.14.3.2 Built in list methods [append(), count(), remove(), reverse(), sort()
	     1.14.3.3 Using List as a Stack
	     1.14.3.4 Using List as a Queue
	 1.14.4 Tuple
	 1.14.5 Dictionary			

UNIT II	**2. FLOW CONTROL**
	 2.1 Decision Making
	     2.1.1 *if* statements
	     2.1.2 *if ... else* statements
	     2.1.3 *if .. elif.. else* statements
	     2.1.4 nested *if* statement
	 2.2 Loops
	     2.2.1 *for* loop
	     2.2.2 range() function
	     2.2.3 enumerate() function
	     2.2.4 *for* loop with *else* statement
	     2.2.5 *while* loop
	     2.2.6 *while* loop with *else* statement
	     2.2.7 nested loops
	 2.3 Control Statements
	     2.3.1 break
	     2.3.2 continue
	     2.3.3 pass statement
	 2.4 Types of loops
	 2.5 List comprehensions
	     2.5.1 Nested Lists
	 2.6 Dictionary comprehensions
	 2.7 Programming using flow control statements
		15	9	CO1, CO2, CO3, CO4

UNIT III	**3. FUNCTIONS, MODULES AND PACKAGES**
	 3.1 Functions
	     3.1.1 Function Definition
	     3.1.2 Function calling
	     3.1.3 Function arguments: required arguments, keyword arguments, default arguments and variable-length arguments
	     3.1.4 Anonymous functions (Lambda functions): Filter () and reduce () function
	     3.1.5 Recursive functions
		15	10	CO1, CO2, CO3, CO4

	3.1.6 Functions with more than one return values
	3.2 Modules
	    3.2.1 Creating modules
	    3.2.2 *Import* statements: *import* with renaming, *from..import* statements, *import* all names
	    3.2.3 Locating modules: PHYTHONPATH variable
	    3.2.4 Namespaces and scope
	    3.2.5 The *dir()* function
	    3.2.6 The *reload* () function
	3.3 Packages
	    3.3.1 Importing modules from a package
	    3.3.2 Date and Time modules: The *time* module, The *calender* module, The *datetime* module				

UNIT IV	**4. FILE HANDLING AND DATABASE PROGRAMMING**
	  4.1 File Handling
	    4.1.1 Opening a File: Modes for Opening a File, Attributes of File object
	    4.1.2 Closing a File
	    4.1.3 Writing to a File: with Statement
	    4.1.4 Reading from a File
	    4.1.5 Deleting a File
	    4.1.6 Directories in Python: mkdir() method, chdir() method, getcwd() method, rmdir() method
	  4.2 Database Programming
	    4.2.1 Connecting to a database
	    4.2.2 Creating tables
	    4.2.3 INSERT operation
	    4.2.4 UPDATE operation
	    4.2.5 DELETE operation
	    4.2.6 READ operation
	    4.2.7 Transaction control: COMMIT operation, ROLLBACK operation
	    4.2.8 Disconnecting from a database
		15	10	CO1, CO2, CO3, CO4	

UNIT V	**5. GUI PROGRAMMING AND FRAMEWORKS**
	
	  5.1 GUI Programming:
	    5.1.1 Tkinter widgets: Label, message widget, entry widget, text widget, tk message box, button widget, radio button, checkbutton, listbox, frames, top level
		15	9	CO1, CO2, CO3, CO4	

	widgets, menubutton widgets, scrollbar, scale widget (slider widget), canvas. 5.1.2 Layout managers: pack , place, grid 5.2 Frameworks: 5.2.1 Introduction to Frameworks in Python. 5.2.2 Advantages of Frameworks. 5.2.3 Library vs Framework 5.2.4 Frameworks in Python 5.2.4.1 Django: Brief Introduction, Features 5.2.4.2 Web2Py: Brief Introduction, Features 5.2.4.3 CherryPy: Brief Introduction, Features			

7. COURSE DELIVERY:

The Course will be delivered through lectures, class room interactions, exercises and case studies

8. SPECIFICATION TABLE FOR THEORY/ MACRO-LESSON PLAN

Unit No	Unit	Number of lectures	Marks
1	**1. INTRODUCTION TO PYTHON, DATA TYPES AND OPERATORS** 1.1 Introduction 1.2 Features of Python 1.3 How to run Python 1.4 Identifiers 1.5 Reserved Words 1.6 Variables 1.7 Comments in Python 1.8 Indentation in Python 1.9 Multiline Statements 1.10 Multiple statement group 1.11 Quotes in Python 1.12 Input, Output and import functions 1.13 Operators 1.14 Data Types	10	15

2	**2.FLOW CONTROL** 2.1 Decision Making 2.2 Loops 2.3 Control Statements 2.4 Types of loops 2.5 List comprehensions 2.6 Dictionary comprehensions	9	15
	2.7 Programming using flow control statements		
3	**3.FUNCTIONS, MODULES AND PACKAGES** 3.1 Functions 3.2 Modules 3.3 Packages	10	15
4	**4.FILE HANDLING AND DATABASE PROGRAMMING** 4.1 File Handling 4.2 Database Programming	10	15
5	**5. GUI PROGRAMMING AND FRAMEWORKS** 5.1 GUI Programming 5.2 Frameworks	9	15
	Total	48	75

9. SPECIFICATION TABLE FOR TERM WORK & PRACTICALS HOURS

No	Practical
1	Study how to run Python program.
2	Python program to implement various data types like numbers, Strings, Lists, Tuple and Dictionary.
3	Python program to implement Decision making statements.
4	Python program to Implement Looping statements.
5	Python program to implement Control statements.
6	Python program to implement Functions, modules and Packages.
7	Python program to implement File Handling.
8	Python program to perform Database programming.
9	Python program to implement Tkinter Widgets in GUI programming.
10	Case study of frameworks in python.

10. LEARNING RESOURCES

Text Books

S. No.	Author	Title of Books	Publishers
1	Jeeva Jose	Taming Python by Programming	Khanna Publishing
2	Tony Gaddis	Starting Out with Python	Pearson

Reference Books for further study

S. No.	Author	Title of Books	Publishers
1	Wesley J. Chun	Core Python Programming,	Prentice Hall
2	Reema Thareja	Python Programming: Using Problem Solving Approach	Oxford University
3	Paul Gries	Practical Programming: An Introduction to Computer Science using Python 3	The Pragmatic Bookshelf

Internet and Web Resources

S. No.	Description
1	https://www.learnpython.org/
2	https://www.programiz.com/python-programming
3	https://www.codecademy.com/learn/learn-python

Videos and Multimedia Tutorials

S. No.	Description
1	Python Tutorial - Python for Beginners [Full Course] https://www.youtube.com/watch?v=_uQrJ0TkZlc
2	Python Tutorial | Python Programming Tutorial for Beginners | Course Introduction https://www.youtube.com/watch?v=QXeEoD0pB3E&list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3
3	Python Full Course - Learn Python in 12 Hours | Python Tutorial For Beginners | Edureka https://www.youtube.com/watch?v=WGJJIrtnfpk

AUDIT COURSE

(AC102) INDIAN CONSTITUTION

1. COURSE OBJECTIVES:

As a proud citizen of this country every student must be aware about the Indian Constitution to appreciate the provisions available for the people of this biggest democracy in Indian Constitution so that the youth of this country plays active role in development of the country by participating in the formation of sensitive and proactive Government at national and state level. This course intends to make students aware about various constituents of the Indian Constitution.

2. TEACHING AND EXAMINATION SCHEME

Semester	VI								
Course code & course title		**Periods/Week (in hours)**			**Total Hours**	**Examination Scheme**			
						Theory Marks		**Practical Marks**	**Total Marks**
(AC102) INDIAN CONSTITUTION		L	T	P	H	TH	TM	TW	PR/OR	
		2	-	-	2	-	-	-	-	-

3. Course Content

Unit 1 – The Constitution - Introduction
• The History of the Making of the Indian Constitution
• Preamble and the Basic Structure, and its interpretation
• Fundamental Rights and Duties and their interpretation
• State Policy Principles
Unit 2 – Union Government
• Structure of the Indian Union
• President – Role and Power
• Prime Minister and Council of Ministers
• Lok Sabha and Rajya Sabha
Unit 3 – State Government
• Governor – Role and Power
• Chief Minister and Council of Ministers
• State Secretariat
Unit 4 – Local Administration
• District Administration
• Municipal Corporation
• Zila Panchayat

Unit 5 – Election Commission
• Role and Functioning
• Chief Election Commissioner
• State Election Commission

4. Suggested Learning Resources:

Title of Book Author Publication
1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi,2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition

5. Suggested Software/Learning Websites:

a. https://www.constitution.org/cons/india/const.html
b. http://www.legislative.gov.in/constitution-of-india
c. https://www.sci.gov.in/constitution
d. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-ofindia/