



Re-Accredited 'B++' 2.86 CGPA by NAAC

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેપ્સ, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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ક્રમાંક : એસ/પરિપત્ર/સિલેબસ/૫૦૩૪/૨૦૨૪
તા.૦૭/૦૩/૨૦૨૪

પ્રતિ,
વડાશ્રી,
જે.પી.દાવર ઇન્સ્ટીટ્યુટ ઓફ ઇન્ફોમેશન
સાયન્સ એન્ડ ટેકનોલોજી,
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,
સુરત.

વિષય :- એમ..એસસી. (આઈ.સી.ટી.) સેમ.-૩ અને ૪ ના અભ્યાસક્રમ બાબત.

મહાશય,

સવિનય જાળાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૪-૨૫ થી અમલમાં આવનાર M.Sc. (ICT) Sem. 3 & 4 નો અભ્યાસ સમિતિ દ્વારા નિયુક્ત પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ સંદર્ભે ઇન્ફોમેશન ટેકનોલોજી વિષયની અભ્યાસ સ સમિતિની તા. ૧૨/૦૨/૨૦૨૪ ની સભાના હરાવ ક્રમાંક :૪ અન્વયે નીચે મુજબ કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ ઇન્ફોમેશન ટેકનોલોજી વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા. ૦૧/૦૩/૨૦૨૪ની સભાનાં હરાવ ક્રમાંક : ૦૬ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાગ્રત્ત કરવામાં આવે છે.

ઇન્ફોમેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા. ૧૨/૦૨/૨૦૨૪ ની સભાના હરાવ ક્રમાંક :૪
આથી હરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૪-૨૫ થી અમલમાં આવનાર એમ..એસસી. (આઈ.સી.ટી.) સેમેસ્ટર-૩ અને ૪નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી કોમ્પ્યુટર સાયન્સ એન્ડ ઇન્ફોમેશન ટેકનોલોજી વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા. ૦૧/૦૩/૨૦૨૪ની સભાનાં હરાવ ક્રમાંક : ૦૬

આથી હરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૪-૨૫ થી અમલમાં આવનાર M.Sc.(ICT) Sem.-3 & 4 નો અભ્યાસ સમિતિ દ્વારા નિયુક્ત પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ સંદર્ભે ઇન્ફોમેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા. ૧૨/૦૨/૨૦૨૪ ની સભાના હરાવ ક્રમાંક :૪ અન્વયે નીચે મુજબ કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ ઇન્ફોમેશન ટેકનોલોજી વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

બિડોઝિન્સ: ઉપર મુજબ

Wifre
કુલસચિવાલ

પ્રતિ,

- ૧) અધ્યક્ષશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઇન્ફોમેશન ટેકનોલોજી વિદ્યાશાખા.
- ૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

...તરફ જાગ્રત્ત તેમજ અમલ સારુ.

M.Sc. (I.C.T.) 3rd Semester

Course: ICT 301: Introduction to Python and Data Science

Course Code	ICT 301																								
Course Title	Introduction to Python and Data Science																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2024																								
Purpose of Course	This course helps students to understand real world problems and application of data science to solve them.																								
Course Objective	To develop practical data analysis skills, which can be applied to practical problems, to explain how math and information sciences can contribute to building better algorithms and software.																								
Pre-requisite	Programming and mathematical background. Basic knowledge of statistics, linear algebra would be plus point.																								
Course Out come	<p>CO1 : Students will be able to understand python language in detail using different python libraries.</p> <p>CO2 : Students will be able to perform data wrangling, statistical operations and EDA using python.</p> <p>CO3 : Students will be able to learn to mine data using python libraries.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> </thead> <tbody> <tr> <td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic concepts of Programming, Mathematics and Statistics.																								
Course Content	<p>Unit : 1: Introduction to Data science</p> <ul style="list-style-type: none"> 1.1 Brief history 1.2 Data Science Life cycle 1.3 Application of data science 1.3.1 Natural Language Processing 1.3.2 Computer Vision 1.3.3 Big Data 1.4 Issues in data science <p>Unit : 2 : Core statistics for data science</p> <ul style="list-style-type: none"> 2.1 Linear algebra 2.2 Vectors 2.3 Matrices 2.4 Descriptive Statistics 2.5 Measures of central tendency 2.6 Measure of variability 2.7 Various forms of distributions 2.8 Z-score 2.9 Correlations 2.10 Introduction to probability 																								

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	<p>2.11 Explanatory and predictive modeling 2.12 Stochastic gradient decent 2.13 Confidence interval 2.14 Root Mean Square Error(RMSE)</p> <p>Unit : 3 :Python</p> <p>3.1 Strings 3.2 Exception 3.3 Lists 3.4 Tuples 3.5 Dictionaries Sets 3.6 Sorting 3.7 Object Oriented Programming 3.8 Visualizing Data 3.8.1 Matplotlib 3.8.2 Bar Chart 3.8.3 Line Chart 3.8.4 Scatter Plot</p> <p>Unit : 4 : Basic Python Libraries for Data Science</p> <p>4.1 NumPy 4.2 SciPy 4.3 Pandas 4.4 IPython 4.5 Matplotlib</p> <p>Unit : 5 : Models</p> <p>5.1 Supervised Vs Unsupervised Learning 5.2 Types of data : training, test, validation 5.3 Dataset Preparation 5.4 Dimension Reduction : Principal Component Analysis (PCA) 5.5 Model Preparation 5.6 Classification 5.7 Regression 5.8 Association rule 5.9 Metrics for Testing and Validation 5.9.1 Cross-Validation 5.9.2 True positive rate 5.9.3 False positive rate 5.9.4 Precision and Recall</p>
Reference Book	<ol style="list-style-type: none"> 1. Python Data Science Handbook: Essential Tools for Working with Data, Jake VanderPlas, 1 January 2016,O'Reilly Media,ISBN : 978-1491912058 2. Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools , Davy Cielen et.al. , 1 January 2016,dreamtech,ISBN: 978-1633430037 3. Data Science From Scratch: First Principles with Python, Second Edition, Joel Grus, 5 May 2019,O'Reilly Media,ISBN: 9781492041139 4. Python for Data Science For Dummies, 2ed., Luca Massaron John Paul Mueller, Paperback – 2019, Wiley; January 2019, ISBN: 9781119547648 5. Data Science with Python, Rohan Chopra, Aaron England, Et al, July 19, 2019,Packt , ISBN: 9781838552862 6. Python Data Science Essentials - Third Edition, Alberto Boschetti, Luca Massaron, September 27, 2018,Packt , ISBN: 9781789537864

P.M. DCS 2020

	7. Statistics for Data Science, James D. Miller, November 17, 2017 , Packt, ISBN: 9781788290678
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

P.M. Dosa

M.Sc. (I.C.T.) 3rd Semester

Course : ICT 302 : Data Communication and Internet of Things

Course Code	ICT 302																								
Course Title	Data Communication and Internet of Things																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2024																								
Purpose of Course	The purpose of this course is to provide understanding of data communication and IoT.																								
Course Objective	The objective of this course is to provide knowledge of data communication, understanding of IoT application, IoT development process, IoT reference architecture, security issues of IoT and embedded system role in IoT.																								
Course Outcomes	<p>CO1 : Students will be able to analyze and understand the vision of IoT.</p> <p>CO2 : Students will be able to learn about embedded devices for IOT, data organizing and data processing in IOT.</p> <p>CO3 : Students will be able to learn about business models in IOT and security requirements.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> </thead> <tbody> <tr> <td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Computer Network																								
Course Content	<p>Unit : 1 : Introduction of IOT</p> <ul style="list-style-type: none"> 1.1 Introduction of IOT, 1.2 IOT reference architecture 1.3 unique requirement of IOT use case 1.4 IoT recommended architecture principles and consideration <p>Unit : 2 : Prototyping the Embedded Devices for IOT and M2M Communication</p> <ul style="list-style-type: none"> 2.1 Introduction of various sensors. 2.2 Sensor and actuator selection guidelines for IoT things pattern for field devices consideration. 																								



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| | <p>2.4 IoT pattern for central server
 2.5 hardware Development Platforms for Prototyping
 2.6 Short range communication technologies for M2M communication and IOT.
 2.7 Long range communication technologies for M2M communication and IOT.</p> |
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Unit : 3 : Analytics in IoT context

- 3.1 Data Acquiring and Storage and Organizing the data
- 3.2 Implementation of IoT data analytics
- 3.3 understanding the Importance of data quality
- 3.4 Relevant edge analytics
- 3.5 Consideration for IoT visualization

Unit : 4 : IOT Privacy, security and vulnerabilities solutions

- 4.1 Key terms / definitions
- 4.2 Comparing IoT security and IT security
- 4.3 Challenges in securing IoT solutions
- 4.4 IoT security Vulnerabilities
- 4.5 Major IoT security breaches
- 4.6 Mitigation IoT security Vulnerabilities
- 4.7 Domain specific securities
- 4.8 Applicable security standards and best practices

Unit : 5 : Use cases of IoT

- 5.1 consumer domain
- 5.2 Smart cities domain
- 5.3 Retail domain
- 5.4 Manufacturing domain agriculture domain
- 5.5 Value creation through IoT
- 5.6 Business Model scenarios for IoT
- 5.7 IoT case studies.

Reference Books	<ol style="list-style-type: none"> 1. Architectural pattern and techniques for developing IoT solutions, Jasbir singh Dhaliwal, pact publication,2023 2. IoT and Edge computing for Architects, perry Lea,pact publication,2020 3. Raspberry pi and MQTT Essentials, Dhairy Parikh, pact publication,2022 4. Architecture high performance Embedded systems, jim ledin, pact publication, 2021 5. Artificial Intelligence for IoT cook book,Michael Roshak, pact publication,
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	<p>2021</p> <p>6. Bulding IoT visualizations using Grafana, Radrigo jaun Hernandez, pact publication, 2022</p> <p>7. Designing The Internet of Things, Hakin Cassimally Adrian Mcewen,Willey, 2015</p> <p>8. The Internet of Things: Key Applications and Protocols, David Boswarthick, Omar Elloumi Olivier Hersent,Wiley,2015</p>
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

P. M. D. O. A.

M.Sc. (I.C.T.) 3rd Semester

Course : ICT 303 : Cloud Computing

Course Code	ICT 303																								
Course Title	Cloud Computing																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2024																								
Purpose of Course	This course helps students to understand concepts of Cloud Computing and Micro Service Architecture implementations.																								
Course Objective	To impart knowledge of Cloud Computing concepts and cloud services for application development, deployment and management on cloud.																								
Course Outcomes	<p>CO1 : Students will be able to learn about cloud infrastructure and architectures.</p> <p>CO2 : Students will be able to learn concepts of cloud computing and basic services of AWS, Azure and GCP</p> <p>CO3 : Students will be able to learn about Micro-services architecture and DevOps toolchain.</p>																								
Mapping between COs and PSOs	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic concepts of Programming, Operating System and Networking																								
Course Content	<p>Unit : 1: Introduction to Cloud Computing</p> <ul style="list-style-type: none"> 1.1 Characteristics of Cloud Computing 1.2 Cloud Service Models - Infrastructure as a Service, Platform as a Service, Software as a Service and Anything as a Service 1.3 Cloud Deployment Models - Private Cloud, Community Cloud, Public Cloud and Hybrid Cloud 1.4 Difference Between Traditional Commuting and Cloud Computing 1.5 Virtualization <ul style="list-style-type: none"> 1.5.1 Need of Virtualization 1.5.2 Types of Virtualization 1.5.3 Virtualization in Cloud Computing 1.6 Containerization <ul style="list-style-type: none"> 1.6.1 Concept of Containerization 1.6.2 Need of Containerization 1.6.3 Containerization and Virtualization <p>Unit : 2 : Cloud Infrastructure and Architectures</p> <ul style="list-style-type: none"> 2.1 Cloud Computing Stack <ul style="list-style-type: none"> 2.1.1 Composability 2.1.2 Infrastructure 2.1.3 Platforms 2.1.4 Virtual Applications 2.1.5 Communication Protocols 2.1.6 Applications 2.2 Cloud Data Center Architecture 2.3 Conceptual View of Networking in Cloud Computing 2.4 Cloud Data Storage (Overview of SAN, DFS, etc.) 2.5 Computing Cluster in Cloud 2.6 Service Level Agreement and Cloud Pricing Model 2.7 Cloud Security Concepts 2.8 QoS Measurement in Cloud <p>Unit : 3 : Cloud Service Offerings</p> <ul style="list-style-type: none"> 3.1 Compute Services 																								

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	<ul style="list-style-type: none"> 3.1.1 AWS EC2 – Elastic Cloud Compute 3.1.2 Azure Virtual Machine 3.1.3 GCP Compute Engine 3.1.4 AWS Lambda 3.1.5 Azure Functions 3.1.6 Google Cloud Functions 3.1.7 AWS Elastic Beanstalk 3.1.8 AWS Elastic Container Service 3.1.9 Azure Container Instances 3.1.10 AWS Elastic Kubernetes Service 3.1.11 Azure Kubernetes Service
3.2	<ul style="list-style-type: none"> Storage Services
3.2.1	AWS S3 – Simple Storage Service
3.2.2	Azure Blob Storage
3.2.3	AWS EBS - Elastic Block Storage
3.2.4	Azure Managed Disks
3.3	<ul style="list-style-type: none"> Database Services
3.3.1	AWS RDS - Relational Database Service
3.3.2	Azure SQL Database
3.3.3	AWS DynamoDB
3.3.4	Azure CosmosDB
3.4	VPC - Virtual Private Cloud
3.5	Overview of Authentication and Access Management Services
3.5.1.	AWS IAM - Identity and Access Management
3.5.2.	Azure Active Directory
Unit : 4 : Micro Services Architecture (MSA)	
4.1	An Overview of Current Architectural Patterns
4.1.1	Monolithic architecture
4.1.2	Enterprise Architecture
4.1.3	Service Oriented Architecture
4.1.4	Micro Services Architecture
4.2	Microservice Architecture
4.2.1	Decomposition
4.2.2	Decompose by Business Capability
4.2.3	Decompose by Subdomain
4.2.4	Self-Contained Service
4.2.5	Service per Team
4.3	Data Management
4.3.1	Database per Service
4.3.2	Saga Design Pattern for Database Transactions in MSA
4.3.3	API Composition
4.3.4	Command Query Responsibility Segregation (CQRS)
4.3.5	Domain Event
4.3.6	Event Sourcing
4.4	Transactional Messaging
4.4.1	Transactional Outbox
4.4.2	Transaction Log Tailing
4.5	Health Check API
4.6	Log Deployments and Changes
Unit : 5 : Realizing Micro Services with DevOps	
5.1	Ecology for MSA
5.2	Micro Servers
5.3	Rest API
5.4	Packaging Micro Services Applications
5.5	Containerization with Docker
5.6	Docker Client Commands
5.7	Cluster Management with Hazelcast
5.8	Data Caching for Micro Services
5.9	Container Orchestration and Load Balancing
5.10	Continuous Integration / Continuous Development

P. V. Dinesh
Date: 2023-01-10

	5.11 Security Propagation across Micro Services 5.12 Event Based MSA Applications with KAFKA 5.13 Micro Profile based Application for MSA 5.14 MSA Service Observability 5.15 Deploying MSA based Applications on cloud
Reference Book	1. Cloud Native Architecture and Design by Shivakumar Goniwada, Apress, 2022 2. Cloud Computing and Virtualization by Dac-Nhuong Le, Raghvendra Kumar, Gia Nhu Nguyen, Jyotir Moy Chatterjee, WILEY, 2018 3. Cloud Computing : A Practical Approach by Anthony Velte, Toby Velte, Robert Elsenpeter, Mc Graw Hill, 2017 4. AWS Cloud Computing Concepts by Ashish Prajapati, Juan Ruiz, Marco Tamassia, Packt Publication, 2023 5. Accelerating DevSecOps on AWS by Nikit Swaraj, Packt Publication, 2022 6. Learning AWS by Aurobindo Sarkar, Amit Shah, Packt Publication, 2015 7. Google Cloud for Developers by Hector Martinez, Packt Publication, 2023 8. Google Cloud Platform Cookbook by Legorie Rajan, Packt Publication, 2018 9. Microsoft Azure Fundamentals by Jim Cheshire, Pearson, 2019 10. Cloud-Based Microservices by Chandra Rajasekhariah, Apress, 2021 11. Microservice Architecture: Aligning Principles, Practices, and Culture by Mike Amundsen, Ronnie Mitra, SPD Publications, 2016 12. DevOps for Azure Applications by Suren Machiraju, Suraj Gaurav, Apress, 2020 13. Microservices for Java EE Architects: Addendum for The Java EE Architect's Handbook by Derek C. Ashmore, 2017 14. Kubernetes Microservices with Docker by Deepak Vohra, Apress Publication, 2018 15. Docker Quick Start Guide: Learn Docker like a boss, and finally own your applications by Earl Waud, PACKT publications, 2018 16. Apache ZooKeeper Essentials by Saurav Haloi, Packt Publications, 2015 17. Hazelcast A Complete Guide - 2019 Edition by Gerardus Blokdyk publication: 5STARCOOKS, 2019 18. Microservices Patterns: With examples in Java by Chris Richardson, Publisher: Manning Publications, 2018 19. Microservices and Containers 1st Edition by Parminder Singh, Kocher Publisher - Addison-Wesley Professional, 2018 20. Hands-On Microservices with Kubernetes: Build, deploy, and manage scalable microservices on Kubernetes, by Gigi Sayfan, Packt Publications
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

P.M.D. 2023

M.Sc. (I.C.T.) 3rd Semester
Course : ICT 304 : Open Source Web Development

Course Code	ICT 304					
Course Title	Open Source Web Development					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)					
Effective From	June 2024					
Purpose of Course	The purpose of the course is to provide knowledge of web application development using open source web technologies.					
Course Objective	The objective of the course is to impart knowledge of web application development using PHP and Nodejs.					
Course Outcomes	CO1 : Students will be able to learn web development and backend development using NodeJS and Express.js. CO2 : Students will be able to learn web development and API development using PHP. CO3 : Students will be able to deploy web application and manage version control using Git.					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Basic concepts of Web development and Object-Oriented programming					
Course Content	Unit : 1 : Introduction to Open Source Web Technology and node.js 1.1 Open source web technology 1.2 Client server architecture, Web servers , Apache , Nginix 1.3 Understanding of frontend and backend technologies 1.4 Fullstack development architecture 1.5 Architecture of Node.js Eco system 1.6 Installing node.js 1.7 REPL Unit 2 : Node.js 2.1 Module and npm 2.1.1 npm 2.1.2 package.json 2.1.3 The node_modules 2.1.4 require() 2.2 Node concepts 2.1.1 The Event Loop 2.1.2 Asynchronous Coding 2.1.3 Callback Functions 2.1.4 Calling Conventions 2.1.5 Exception Handling 2.1.6 Callback Hell 2.1.7 Event Emitters 2.1.8 Extending EventEmitter 2.1.9 Listening for Events 2.1.10 Promise 2.1.11 async .. await 2.3 Core Modules 2.3.1 Command Line Arguments 2.3.2 Working with the File System 2.3.3 Global objects 2.3.4 File Systems and Streams 2.3.5 Utility Modules					

P. M. Yeram

	<p>2.3.6 http module 2.3.7 Routes 2.3.8 Accessing Request Headers 2.3.9 Using TypeScript for Node.js programming</p> <p>Unit : 3: Express</p> <ul style="list-style-type: none"> 3.1 Routing 3.2 HTTP Methods 3.3 URL Building 3.4 Middleware 3.5 Templating 3.6 Static Files 3.7 Form Data 3.8 Database 3.9 Cookies 3.10 Sessions 3.11 Authentication 3.12 Working with Database Engine like Mongo and use Mongoose to insert, update and delete data 3.13 RESTful APIs 3.14 API Security 3.15 Introduction to GraphQL <p>Unit : 4 : Web Development with PHP</p> <ul style="list-style-type: none"> 4.1 PHP Language Characteristics, Features and Extensions 4.2 Dependencies, Use of Composer 4.3 Language Constructs, Variables, Declarations and Types, Constants 4.4 Use of Operators and Control Structures 4.5 Arrays, Functions and References 4.6 PHP Configuration Directives of php.ini file 4.7 Super Global Arrays 4.8 Handling Session, Cookies, Form Data, File Uploads, Server Data, Server Environment 4.9 OOP Features of PHP, Use Of Constructors, Destructors, Inheritance, Serialization 4.10 Built-In Libraries: String, Array, Mathematics, Graphics Library, File System, Date and Time, Files and Directory, XML, 4.11 Security, Encryption, Securing Request Data, Filtering, Using CAPTCHA 4.12 Mysql Connection libraries, MySQLi, PDO, Error Handling, SQL Injection Attack and Prevention 4.13 Develop REST API <p>Unit : 5 : Developer Tools</p> <ul style="list-style-type: none"> 5.1 Browser Tools 5.2 Version control using Git and others 5.3 Client side and server side Websocket Programming
Reference Book	<ol style="list-style-type: none"> 1. Web Development with PHP and jQuery, By Dr. Payal Joshi, Dr. Dhaval Joshi - NotionPress 2. Programming PHP - Rasmus Lerdorf, Kevin Tatroe - O'Reilly 3. PHP 7 Programming Cookbook - Doug Bierer- O'Reilly - PACKT 4. Mastering PHP 7 by Branko Ajzele - O'Reilly 5. NoSQL For Dummies 1st Edition by Adam Fowler Publisher: For Dummies 6. Node.js for PHP developers - Daniel Howard - First edition - O'Reilly 7. Node.js 8 the Right Way: Practical, Server-Side JavaScript That Scales-- Jim Wilson --Andy Hunt 8. Mastering Node.js - Second Edition: Build robust and scalable real-time

9/1/2023

	server-side web application -- Sandro Pasquali Paperback
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

P. M. P. M. 

M.Sc. (I.C.T.) 3rd Semester

Course: ICT 305: Practical 5

Course Code	ICT 305																								
Course Title	Practical 5																								
Credit	3																								
Teaching per Week	3 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, examination, preparation, holidays etc.)																								
Effective From	June 2024																								
Purpose of Course	The purpose of this course is to provide introductory practical knowledge of Python programming, data science and application development using Micro Services Architecture.																								
Course Objective	The objective of the course is to impart practical knowledge of Python programming, data science concepts and application development using Micro Services Architecture.																								
Course Outcomes	<p>CO1 : Students will be able to develop the application using the python programming.</p> <p>CO2 : Students will be able to develop data analysis models using the data science concepts.</p> <p>CO3 : Students will be able to develop the application using Micro Service Architecture.</p>																								
Mapping between COs with PSOs	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> </thead> <tbody> <tr> <td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic concepts of Programming, Mathematics and Statistics.																								
Course Content	Practical based on Paper No. 301 - Introduction to Python and Data Science and Paper 303 - Cloud Computing.																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								

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M.Sc. (I.C.T.) 3rd Semester

Course: ICT 306: Practical 6

Course Code	ICT 306																								
Course Title	Practical 6																								
Credit	3																								
Teaching per Week	3 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, examination, preparation, holidays etc.)																								
Effective From	June 2024																								
Purpose of Course	The purpose of the course is to provide practical knowledge of web application development using open source web technologies.																								
Course Objective	The objective of the course is to impart practical knowledge of web application development using PHP and NodeJS.																								
Course Outcomes	<p>CO1 : Students will be able to develop web applications in PHP.</p> <p>CO2 : Students will be able to develop web applications in NodeJS and express.</p> <p>CO3 : Students will be able to develop backend applications using PHP & NodeJS and version control using git practically.</p>																								
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	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic concepts of Object-Oriented programming																								
Course Content	Practical based on Paper No. 304 - Open Source Web Development.																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								

P. V. D. M. A.

M.Sc. (I.C.T.) 3rd Semester

Course: ICT 307: Part Time Project 3

Course Code	ICT 307																								
Course Title	Part Time Project 3																								
Credit	3																								
Teaching per Week	3 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, examination, preparation, holidays etc.)																								
Effective From	June 2024																								
Purpose of Course	The purpose of this course is to develop skills to solve real world problems using Mobile / JS Framework / IoT / PHP / Data Science / Cloud technologies.																								
Course Objective	The objective of this course is to acquaint students for the development of software application based on Mobile / JS Framework / IoT / PHP / Data Science / Cloud.																								
Course Outcomes	<p>CO1 : Students will be able to develop project in Mobile / JS Framework / IOT / PHP / Data science / Cloud technology.</p> <p>CO2 : Students will be able to apply Software Engineering concepts to solve real world problems.</p> <p>CO3 : Students will be able to apply database related concepts to design database for the project.</p>																								
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CO1																									
CO2																									
CO3																									
Pre-requisite	Fundamentals of software application development																								
Course Content	<p>The students must prepare documentation of the project completed as per the Software Engineering Guidelines.</p> <p>At the end of the semester, the students have to submit their project report in bounded form to the institution.</p> <p>The Project Presentation and Viva – Voce will be conducted as per the University exam schedule.</p> <p>The students have to submit the following reports at the institution:</p> <ol style="list-style-type: none"> 1. Project Joining Report 2. Project Title Report 3. Progress Report 4. Project Completion Certificate 5. Institution Certificate 6. Non-disclosure of Source Code Certificate (In case the student is unable to demonstrate project source code) <p>Note : If a student's performance is not satisfactory then as per the direction of the internal project guide / external examiner student may have to do coding in the lab according to the project work submitted during internal submission / external examination.</p>																								
Reference Books	NIL																								
Teaching Methodology	Project guidance																								



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M.Sc. (I.C.T.) 4th Semester

Course: ICT 401: Project

Course Code	ICT 401																								
Course Title	Project																								
Credit	25																								
Teaching per Week	-																								
Duration	-																								
Minimum weeks per Semester	15 (Including Practical Work, examination, preparation, holidays etc.)																								
Effective From	June 2024																								
Purpose of Course	To acquaint students with technological practices followed in the IT industry by making them work on project for 6 months.																								
Course Objective	To familiarize students with IT projects development and management practices in industry.																								
Course Outcomes	<p>CO1 : Students will be able to apply digital communication technologies and develop software applications in industry.</p> <p>CO2 : Students will be able to apply software engineering concepts to solve real world problems.</p> <p>CO3 : Students will be able to apply database related concepts to design databases for projects.</p>																								
Mapping between COs with PSOs	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr> </thead> <tbody> <tr> <td>CO1</td><td style="background-color: #cccccc;"></td><td style="background-color: #cccccc;"></td><td></td><td style="background-color: #cccccc;"></td><td style="background-color: #cccccc;"></td></tr> <tr> <td>CO2</td><td></td><td></td><td style="background-color: #cccccc;"></td><td></td><td style="background-color: #cccccc;"></td></tr> <tr> <td>CO3</td><td></td><td></td><td></td><td style="background-color: #cccccc;"></td><td style="background-color: #cccccc;"></td></tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Fundamental of software application development																								
Course Content	<p>The students must prepare documentation of the project completed as per the Software Engineering Guidelines.</p> <p>At the end of the semester, the students have to submit their project report in bounded form to the institution.</p> <p>The Project Presentation and Viva – Voce will be conducted as per the University exam schedule.</p> <p>The students have to submit the following reports at the institution:</p> <ol style="list-style-type: none"> 1. Project Joining Report 2. Project Title Report 3. Progress Report 4. Project Completion Certificate 5. Institution Certificate 6. Non-disclosure of Source Code Certificate (In case the student is unable to demonstrate project source code) <p>Note : If a student's performance is not satisfactory then as per the direction of the internal project guide / external examiner student may have to do coding in the lab according to the project work submitted during internal submission / external examination.</p>																								
Reference Books	NIL																								
Teaching Methodology	Project guidance																								

P. M. Dinesh