પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો કોમ્પ્યુટર સાયન્સ વિષયનો (એમ.એસસી (આઇ.ટી અને સી.એ)) પ્રોગ્રામનો સેમેસ્ટર-૩ અને સેમેસ્ટર-૪ નો અભ્યાસક્રમ આ સાથે સામેલ છે.

માનનીય કુલપતિશ્રીની મંજુરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન,૨૦૨૪ થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં કોમ્પ્યુટર સાયન્સ વિષયનાં પી.જી.નો અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં પી.જી.સેન્ટર ધ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.

૧૧/૦૬/૨૦૨૪

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/એકેડેમિક/૭૧૨/૨૦૨૪
ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,
સરકારી પોલીટેકનિક કેમ્પસ,
ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,
ખડીયા, જૂનાગઢ-૩૬૨૨૬૩
તા.૧૯/૦૬/૨૦૨૪

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં પી.જી.(કોમ્પ્યુટર સાયન્સ)નાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાનાઃ-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જુનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થેઃ

- સીસ્ટમ મેનેજરશ્રી, આઇ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH

BOARD OF COMPUTER SCIENCE STUDIES

FACULTY OF SCIENCE

SYLLABUS FOR

M.S.C (IT & CA) PROGRAMME

(SEMESTER- III & IV)

MAJOR/MINOR/MULTIDISCIPLINARY

EFFECTIVE FROM JUNE, 2024

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Syllabus of M.S.C (IT & CA) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

SUMMARY OF THE SYLLABUS

Sem No.	Sr. No.	Course Code	Course Title	Credit	No. Of Lectures/Lab (Per Week)
Sem-3	1	CS-13	NODE JS	5	5
	2	CS-14	APPLICATION DEVELOPMENT USING FLUTTER	5	5
	3	CS-15	PROGRAMMING WITH R FOR DATA SCIENCE	5	5
	4	CS-16	PRACTICAL – 1 (BASED ON CS – 13)	5	5
	5	CS-17	PRACTICAL – 2 (BASED ON CS – 14 & CS – 15)	5	5
	6	CS-18	PROJECT DEVELOPMENT (In House)	5	5
			Total	**30**	

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Syllabus of M.S.C (IT & CA) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Sem No.	Sr. No.	Course Code	Course Title	Credit	No. Of Lectures/Lab (Per Week)
Sem-4	1	CS-19	INDUSTRIAL PROJECT DEVELOPMENT	**30**	-

SEM-3

CS- 13 : NODE JS

Course Objectives:

1. Understand the JavaScript and technical concepts behind Node JS
2. Structure a Node application in modules
3. Understand and use the Event Emitter
4. Build a Web Server in Node and understand how it really works
5. Use npm and manage node packages
6. Build a web application and API more easily using Express
7. Understand how to Connect to database in Node

Pre-Requisites:

1. Basic Knowledge of JavaScript and OOPS

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	**Introduction to Node JS** ▪ What is Node.js? ▪ Different parts of Node.js ▪ Features of Node.js ▪ Install Node.js on Windows ▪ Node.js First Example ▪ Node.js vs JavaScript ▪ Node.js vs AJAX ▪ Node.js vs JQuery **Node.js Basics** ▪ Primitive Types ▪ Loose Typing ▪ Object Literal ▪ Functions ▪ Buffer ▪ Process object	15

		▪ Defaults to local ▪ Access Global Scope	
	2	**Node.js Console/REPL** ▪ Node.js Console • console.log() • console.error() • console.warn() ▪ Node.js REPL • REPL Environment • How to start REPL • Node.js Simple expressions • Using variable • Node.js Multiline expressions • Node.js Underscore Variable • Node.js REPL Commands • Node.js Exit REPL ▪ Node.js Package Manager • Installing Modules using npm • Global vs Local Installation • Uninstalling a Module • Searching a Module	15
	3	**Node.js Module** ▪ Node.js Module Types ▪ Node.js Core Modules ▪ Loading Core Modules ▪ Node.js Local Module ▪ Export Module in Node.js	15
	4	**Node.js Web Server, File System, Debugging Node.js** ▪ Handling HTTP requests ▪ Sending requests ▪ Reading, Writing a File ▪ Writing a file asynchronously ▪ Opening a file ▪ deleting a file ▪ Other IO Operations: Append, Rename, Truncate ▪ File System Module with URL Module Create, Read, Remove a Directory	15

	5	**Event and Database Connectivity** ▪ EventEmitter class ▪ Methods and Events of EvenEmitter Class ▪ Returning event emitter ▪ Extend EventEmitter Class ▪ Passing Arguments and 'this' to listeners ▪ Asynchronous and Synchronous call ▪ Handle Events only Once, Error Events ▪ Connection string for database connectivity, ▪ Configuring, Working with insert, select command, Updating records, Deleting records, Drop tables, Ordered Result Set	15

Suggested Reading:

Reference Books: No.	**Name/ Author / Publication**
1	Dhruti Shah, "Node.JS Guidebook", BPB Publications, 2018.
2	Sebastian Springer, Node.js: The Comprehensive Guide (Grayscale Indian Edition) Paperback - Shroff/Rheinwerk; First edition,2022
3	https://nodejs.org/en/docs/

Web site References:

https://www.tutorialsteacher.com/nodejs

https://www.javatpoint.com/nodejs-tutorial

https://www.tutorialspoint.com/nodejs/index.html

CS – 14 : Application Development using FLUTTER

Course Objectives:

1. To understand the basic concepts of Flutter and Dart programming language, including its history and development environment.
2. To design and build UIs in Flutter, including stateful widgets and responsive design techniques.
3. To manage application state in Flutter using various techniques, such as InheritedWidget and ScopedModel.
4. To integrate networking and persistence into their Flutter apps, including working with APIs and local storage.
5. To understand advanced Flutter topics such as animations, internationalisation, and platform- specific integration.

Pre-Requisites :

1. Basic knowledge of Programming, OOPs Concepts, Knowledge of Native Android Development

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	**Introduction to flutter** ▪ Introduction ▪ History of Flutter ▪ Features of Flutter ▪ Advantage of Flutter ▪ Disadvantages of Flutter ▪ Flutter Installation for windows ▪ Flutter Architecture **Introduction to Dart Programming** ▪ Data Type ▪ Variables and Functions ▪ Operators ▪ Decision Making and Loops ▪ Continue and Break ▪ Final and Const Keyword ▪ OOP Concepts	15
	2	**Flutter Basics** ▪ Flutter Widgets • Types of Widget	15

		• State Management Widget ▪ Flutter Scaffold • **constructor and properties** of the Scaffold widget class ▪ Flutter Layouts ▪ Flutter Gestures system • Gestures and pointers • Gesture Detector ▪ Flutter State Management ▪ Flutter IDE	
	3	**<u>Flutter Container and Controls</u>** ▪ Flutter Container ▪ Flutter Row and Column ▪ Flutter Text ▪ Flutter TextField ▪ Flutter Buttons ▪ Flutter Stack ▪ Flutter Forms ▪ Flutter Alert Dialogs ▪ Flutter Icons ▪ Flutter Images ▪ Flutter Card ▪ Flutter Tabbar ▪ Flutter Drawer ▪ Flutter Lists ▪ Flutter GridView ▪ Flutter Toast ▪ Flutter Checkbox ▪ Flutter Radio Button ▪ Flutter Progress Bar ▪ Flutter Snackbar ▪ Flutter Tooltip ▪ Flutter Slider ▪ Flutter Switch ▪ Flutter Charts ▪ Bottom Navigation Bar ▪ Flutter Themes ▪ Flutter Table ▪ Flutter Calendar ▪ Flutter Animation	15

	4	**Design & Animations** ▪ Customizing Fonts in Flutter ▪ Flutter - Skeleton Text ▪ Flutter - Themes ▪ Flutter - Lazy Loader ▪ Flutter - UI Orientation ▪ Flutter - Animation in Route Transition ▪ Flutter - Physics Simulation in Animation ▪ Flutter - Radial Hero Animation ▪ Flutter - Hinge Animation ▪ Flutter - Lottie Animation **Forms & Gestures** ▪ Form Validation in Flutter ▪ Designing a Form Submission Page in Flutter ▪ Flutter - Gestures	15
	5	▪ Flutter - Read and Write Data on Firebase ▪ Mail and SMS in Flutter ▪ Gallery Access and Camera in Flutter ▪ Camera Access in Flutter ▪ SQLite and local storage ▪ Shared preferences ▪ Background local notifications in Flutter ▪ HTTP GET Response in Flutter	15

Suggested Reading:

Reference Books: No.	Name/ Author / Publication
1	Flutter in Action, written by Eric Windmill, January 2020, Manning Shelter Island, ISBN9781617296147
2	Dart Programming for Flutter, written by Carmine Zaccagnino, Feb-2020, Publisher: PragmaticBookshelf, ISBN: 9781680506952
3	Flutter Cookbook: Over 100 Proven techniques and Solutions for Development with Flutter 2.2and Dart, Simone Alessandria, Brian Kayfitz, 2021, Packt Publishing, ISBN 978-1838823382
4	Learning Dart, 2nd Edition, by Ivo Balbaert, Dzenan Ridjanovic, Packt Publishing, ISBN 10:1785287621
5	Flutter Complete Reference: Create beautiful, fast and native apps for any device, AlbertoMiola , Sep-2020

Web site References:

https://docs.flutter.dev/reference/tutorials
https://www.javatpoint.com/flutter
https://www.geeksforgeeks.org/flutter-tutorial/
https://www.tutorialspoint.com/flutter/index.html

CS – 15 : PROGRAMMING WITH R FOR DATA SCIENCE

Course Objectives:

1. The main objective of this syllabus is to ensure the working aspects of R-Programming.
2. Here, Students will be able to learn R programming with various level of strategic inputs such as Vectors,Arrays, Matrices, Strings and Factors etc.
3. The course also covers the understanding the aspects of Packages and at last Visualize the data in the form of graph in various ways.

Pre-Requisites:

1. A basic understanding of any of the computer programming language will help in understand the Rprogramming concepts.
2. Relevant knowledge of Linux OS needed if working in Open source OS for various IDE's

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	**Introduction to Data Analysis & Fundamentals of R** ▪ Overview of Data Analytics, Need of Data Analytics ▪ Classification of Data: Structured, Semi-Structured, Unstructured, ▪ Characteristics of Data, Applications of Data Analytics. ▪ Setup with R Studio ▪ R Commands, Variables, Data Types. ▪ Vectors o Sequences, Lengths, Names, Indexing vectors, Vector Recycling and Repetition ▪ Matrices and Arrays o Creating Arrays and Matrices, o Row, Columns and Dimensions o Row, Column and Dimension names, Array Arithmetic ▪ Lists o Creating Lists, Atomic and Recursive Variables, List Dimensions and Arithmetic o Indexing Lists, Converting Between Vectors and Lists o Combining Lists, NULL. Pair lists ▪ Data Input o Data Input from Keyboard, Input from files(CSV), input from files using scan, Reading data from a fileusing readLines, Masking Input and output formats,	15

		Checking Files from cmd. ▪ Data Frames o Creating Data Frames, Indexing Data Frames, Basic Data Frames Manipulation	
	2	**Environment, Functions, String, Factors, Flow Control and Loops** ▪ Environments ▪ Functions – Creating and calling Functions, Passing functions to and from other functions, Variable scope, Commands to Functions, Functions and Functional Programming, Function Objects and Function Calls, Debugging, Interactive Tracing and Editing, Conditions: Errors and Warnings, Testing R Software. ▪ Strings ▪ Constructing and Printing Strings, Formatting Numbers, Special Characters, Changing Case, Extracting Substrings Splitting Strings, File Paths ▪ Factors Creating Factors, Changing Factor Levels, Dropping Factor Levels, Ordered Factors, Converting Continuous Variables to Categorical, Converting Categorical Variables to continuous, Generating Factor Levels, Combining Factor Levels ▪ Flow Control and Loops Flow Control – if and else, Vectorized if, Multiple selections Loops – repeat, while, for, lapply, sapply, ▪ Advance Loops – Replication, Looping over Lists, Looping Over Arrays, Multiple Inputs, Split-Apply-	15

		Combine, the plyr package.	
	3	**Creating Packages and working with date & time** ▪ Packages o Loading Packages – The search path, Libraries and Installed packages o Installing Packages o Maintaining Packages ▪ Dates and Time	15
	4	**Data Visualization and Graphics** ▪ Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files,Databases, Excel files. ▪ Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, PieCharts	15
	5	**Analytics Using R** ▪ Big Data analytics using R. ▪ Business Foundation Analytics Using R ▪ Data Flow and Management for Business Operations and Problem Solving ▪ Typical Analytical Process Flow ▪ Data Collections Method ▪ Data Summarization and Presentation ▪ Managing Data using Analytics Tools (R) ▪ Data Manipulation and Report Generation Using R	15

Suggested Reading:

Reference Books: No.	Name/ Author / Publication
1	Data Manipulation with R by Phil Spector ISBN 978-0-387-74731-6
2	Learning R by Richard cotton https://books.google.co.in/books?id=7dyzAAAAQBAJ&printsec=frontcover#v=onepage&q &f=false
3	The R Book by Michael J. Crawley https://books.google.co.in/books?id=XYDl0mlHmoC&printsec=frontcover&dq=r+programming&hl=en&sa=X&redir_esc=y#v=onepage&q=r%20programming&f=false
4	Software for Data Analysis Programming with R. by John M. Chambers http://www.ereading.club/bookreader.php/137398/Software_for_Data_Analysis_-_Programming_with_R.pdf https://www.tutorialspoint.com/r/index.html

CS – 16	**PRACTICAL – 1 (Based on CS – 14)** CS – 14 – Application Development using FLUTTER • Each session is of 3 hours for the purpose of practical Examination. • Practical examination may be arranged before or after theory exam	**100 Marks**
CS – 17	**PRACTICAL – 2 (Based on CS – 13 & CS – 15)** CS – 13 – NODE JS CS – 15 – Programming With R For Data Science • Each session is of 3 hours for the purpose of practical Examination. • Practical examination may be arranged before or after theory exam	**100 Marks**
CS – 18	**PROJECT** (Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of previous semester or current semester. **(At the time of Project-Viva examination student must show Project Report (in hard copy) along with all the Workouts in workbook, implementation of project in SDLC Documentation, Program codes and project in running mode** **Note :** • Project must be submitted before two week of commencement of theory exam. • Project viva examination may be arranged before or after theory exam. During the project viva examination project must be run.	**100 Marks**