Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227312
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

–: <u>પરિપત્ર</u> :–

બી.સી.એ.નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ–૨૦૨૨–૨૩ થી અમલમાં આવનાર T.Y.B.C.A. Sem- 5 & 6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ અભ્યાસસમિતિની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ ૦૨ અન્વયે મંજૂર કરી કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાને કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ ૦૨ અન્વયે સ્વીકારી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૨૩/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૧૫૨ થી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

કોમ્પ્યુટર સાયન્સ અભ્યાસસમિતિની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ– ૨૦૨૨–૨૩ થી અમલમાં આવનાર T.Y. B.C.A. Sem- 5 & 6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ મંજૂર કરી કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ ૨

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ અભ્યાસસમિતિની તા.૨૧/૦૩/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે કરેલ ભલામણ સ્વીકારી શૈક્ષણિક વર્ષ–૨૦૨૨–૨૩ થી અમલમાં આવનાર T.Y. B.C.A. Sem- 5 & 6 નો અભ્યાસક્રમ મંજુર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

<u>એકેડેમિક કાઉન્સિલની તા.૨૩/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૧૫૨</u>

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે કરેલ ભલામણ સ્વીકારી શૈક્ષણિક વર્ષ ૨૦૨૨–૨૩ થી અમલમાં આવનાર T.Y. B.C.A. Sem- 5 & 6 નો અભ્યાસક્રમ મંજુર કરવામાં આવે છે.

ક્રમાંક : એસ./સિલેબસ/પરિપત્ર/૬૫૩૮/૨૦૨૨
તા.૩૧/૦૩/૨૦૨૨

ઈ.ચા.કુલસચિવ

બિડાણઃ ઉપર મુજબ

પ્રતિ,
૧) બી.સી.એ.નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ.
૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

Veer Narmad South Gujarat University, Surat
Bachelor of Computer Application (B.C.A.)
Under the Faculty of
Computer Science, Application and Information Technology

Name of Program:	Bachelor of Computer Application
Abbreviation:	B.C.A.(Honors): Four-year Integrated Program. B.C.A. : Three-year Program.
Duration:	4 year of B.C.A.(Honors) degree program with exit option at 3rd Year to obtain B.C.A. degree.
Eligibility:	Candidate must have passed standard 12th (H.S.C.) Examination in Science (Any Group) / Commerce / vocational / General stream through Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E. etc. which must be approved and possess equivalence certificate from Veer Narmad South Gujarat University) with English as one of the subject. In case of candidates passed out from 12th (H.S.C.) General Stream, Statistics/Economics/Business Mathematics must be one of the subjects. In case of Students passed out with 12th (H.S.C.) vocational stream, Computer and English must be one of the subject.
Objective of the Program:	Objective of the program is to open a channel of admission for courses in Computer Science for students who have completed standard 12th (H.S.C.) and are interested in taking computing/IT as a career. The program caters to the needs of the students aspiring to excel in the field of computer science. The program is designed to develop computer professionals versatile in almost all field of computer application. The main emphasis of the course is an applied computer use in various fields.
Program Outcome:	It will prepare the aspiring students to become computer programmers who can work in corporate/software industry at entry level and can also work independently.
Medium of Instruction:	English
Program Structure:	Semester-wise Breakup of the course is given as follows :

Veer Narmad South Gujarat University, Surat
Program Structure: S.Y.B.C.A. (SEM – 5 and SEM – 6)
(w.e.f. Academic Year June, 2022)
Bachelor of Computer Application (B.C.A.) – Three Year Program
Bachelor of Computer Application (B.C.A.(Hon.)) – Four Year Integrated Program

Program Structure	Semester-wise break up for the courses is given below:

SEMESTER – 5

Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
501-01	Advanced Web Designing	4	0	4	3 Hrs	70	30	100
501-02	Advanced Mobile computing	4	0	4	3 Hrs	70	30	100
502	UNIX and Shell Programming	3	0	3	3 Hrs	70	30	100
503	Network Technology	2	0	2	3 Hrs	70	30	100
504	Web Framework and Services	4	0	4	3 Hrs	70	30	100
505	ASP .NET	4	0	4	3 Hrs	70	30	100
506	Practical and Minor Project	0	12	6	5 Hrs	140	60	200
FND-05	Foundation Elective (to be selected from (University level/ state level/national level representation with evidence for NCC / NSS / Saptadhara) **OR** (minimum Univ. recognized 2 credit certificate course) and produce the evidence)	0	2	2				
Total		17	14	25		490	210	700

- Student can opt any one course out of Course-code:501-01 and 501-02 subject to fulfil the pre-requisite for the selected course.

For Practical and Minor Project:

(1) Batch Size – 30 Maximum(desirable) (2) In case of additional 10 or more students in a batch, separate batch should be considered. (3) The journal should be certified by the concerned faculty and by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination. (4) Student will submit softcopy of Minor Project duly certified by the internal guide.

SEMESTER – 6

Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
601-01	Computer Graphics	4	0	4	3 Hrs	70	30	100
601-02	Fundamentals of Cloud Computing	4	0	4	3 Hrs	70	30	100
602	E-Commerce and Cyber Security	4	0	4	3 Hrs	70	30	100
603	Project	0	2 Hrs per Week per every 5 Students	12	5 Hrs	280	120	400
604	Seminar [On Information Technology Innovations & Trends]	3	-	3	3 Hrs	70	30	100
FND-06	Foundation Elective (to be selected from (University level/ state level/national level representation with evidence for NCC / NSS / Saptadhara) **OR** (minimum Univ. recognized 2 credit certificate course) and produce the evidence)	-	-	2				
Total		11	14	25		420	180	700

- Institute/College can offer any one course out of 601-01 or 601-02 to the enrolled students subject to minimum 30 students opt the course.

For Project:

(1) Student will work on in-house project assigned and approved by the allotted internal guide. (2) Students are required to report to their internal guide regularly. (3) Students are required to submit the project report softcopy at the end of the project work. (4) Students are required to demonstrate the project/presentation of project at the time of external project viva exams.

For Seminar:

- Students are required to select any current trend related technical subject in field of IT/Computer Science/Technology. - Every individual Student is required to prepare and present the topic minimum twice during the internal presentation. – Seminar documentation softcopy is required to submit by the student verified by the internal faculty and attested by the Department Head during University external examination.

Program Passing Rules:	As per University rules.

Course: 501-1: Advanced Web Designing

Course Code	501
Course Title	Advanced Web Designing
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation Year:	A.Y. 2022-2023
Purpose of Course	Understand the technical foundations, as well as the non-programming / administrative skills needed to be a successful web developer. This course reveals the reasons why a truly successful website developer does more than write code. The course deals with both the Frontend (client-side) and Backend (server-side) of a tech product. This course deals with designing of websites and building the APP.
Course Objective	The students will learn the whole React WebApp building process, from pc to the server. They will work with NoSQL databases. They will learn the whole process of building your App using React.js. At the end of the course, they will develop modern, complex, responsive and scalable web applications with Angular.
Pre-requisite	305-01: Web Designing -1 course of Semester-3. 405-01: Web Designing -2 course of Semester-4.
Course outcome	• Students will be able to develop modern, complex, responsive and scalable websites. • Understand necessary functionalities and elements of clint and server-side development of website.
Course Content	**Unit-1: Concepts of NoSQL: MongoDB** 1.1 concepts of NoSQL. Advantages and features. 1.1.1 MngoDB Datatypes (String, Integer, Boolean, Double, Arrays, Objects) 1.1.2 Database creation and dropping database 1.2 create and Drop collections 1.3 CRUD operations (Insert, update, delete, find, Query and Projection operators) 1.4 Operators (Projection, update, limit (), sort ()) and Aggregation commands **Unit-2: Fundamentals of React.js** 2.1 Overview of React 2.1.1 Concepts of React. 2.1.2 Using React with HTML 2.1.3 React Interactive components: Components within components and Files 2.1.4 Passing data through Props 2.2 Class components 2.2.1 React class and class components 2.2.2 Conditional statements, Operators, Lists 2.2.3 React Events: Adding events, Passing arguments, Event objects **Unit-3: Forms and Hooks in React.JS** 3.1 Forms: (Adding forms, Handling forms, Submitting forms) 3.1.1 event.target.name and event. Target.event, React Memo 3.1.2 Components (TextArea, Drop down list (SELECT)) 3.2 Hooks: Concepts and Advantages 3.2.1 useState, useEffect, useContext 3.2.2 useRef, useReducer, useCallback, useMemo 3.2.3 Hook: Building custom hook, advantages and use **Unit-4: Angular JS** 4.1 Concepts and characteristics of Angular JS 4.1.1 Expressions in Angular JS (Numbers, Strings, Objects, Arrays)

	4.1.2 Setting up Environment, Angular JS Filters 4.1 3 Understanding MVC (Model, View, Controller) architecture 4.2 AngularJS Directive (ng-app, ng-init, ng-controller, ng-model, ng-repeat) 4.2.1 Some other directives: ng-class, ng-animate, ng-show, ng-hide 4.2.2 Expressions and Controllers 4.2.3 Filters (Uppercase, Lowercase, Currency, order by) **Unit-5: Angular JS: Single page application:** 5.1 Single page application using AngularJS 5.1.1 Create a module, Define Simple controller 5.1.2 Embedding AngularJS script in HTML 5.1.3 AngularJS's routine capability 5.1.3.1 $routeProvider service from ngRoute 5.1.3.2 Navigating different pages 5.2 HTML DOM directives 5.2.1 ng-disabled, ng-show, ng-hide, ng-click 5.2.2 Modules (Application, Controller) 5.2.3 Forms (Events, Data validation, ng-click) [All Units carry Equal Weightage]
Reference Books	1. Web Development with Node and Express, Ethan Brown, O'Reilly Media, Inc., ISBN: 978-1-491-94930-6 2. Node.js, MongoDB, React, React Native Full-Stack Fundamentals and Beyond, Eric Bush, Blue Sky Productions Inc., ISBN: 978-0-9971966-8-9 3. MongoDB Fundamentals: A hands-on guide to using MongoDB and Atlas in the real world, Amit Phaltankar, Juned Ahsan, Michael Harrison, Liviu Nedov , ISBN:978-1-83921-064-8 4. Sams Teach Yourself NoSQL with MongoDB in 24 Hours, Pearson Education ISBN-13: 9780672337130 5. MongoDB Basics, David Hows, Peter Membrey, Eelco Plugge, Apress, ISBN-13 (electronic): ISBN:978-1-4842-0895-3 6. Fullstack React: The Complete Guide to ReactJS and Friends, Anthony Accomazzo, Lean Publishing, Ari Learner, Clay Allsopp, David Guttman, Tyler McGinnis, Nate Murray, 7. The Road to React: Your journey to master React.js in JavaScript, by Robin Wieruch 8. Beginning React Native with Hooks, Greg Lim 9. Full-Stack React Projects: Learn MERN stack development by building modern web apps using MongoDB, Express, React, and Node.js, 2nd Edition 10. Angular From Theory To Practice, Asim Hussain, Version 1.2.0, 2017-11-24 11. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O'Reilly Media, Inc. 12. Mastering Web Application Development with AngularJS, Pawel Kozlowski Peter and Bacon Darwin, Packt Publishing
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 501-02 - Advanced Mobile computing

Course Code	501-02
Course Title	Advanced Mobile computing
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	February, 2022
Implementation	A.Y.2022-2023
Purpose of Course	Mobile application development with Kotlin is a modern programming language that brings together the best of object-oriented and functional programming. Kotlin remains one of the most widely used and fastest-growing programming languages in recent years. The demand for Kotlin is on the rise and it will continue to grow in the years to come. Exchanging data between application is also most popular. It is essential to perform database operation on Android application such as storing, manipulating or retrieving data from database. Knowledge about all this concept in Android platform is enhance the skills.
Course Objective	1) To understand the concept of Kotlin 2) Developing basic application 3) To understand various concepts of JSON, building multiple screen application and use of Intent in application. 4) Concepts of storing Android application data into database
Pre-requisite	Paper-305-02 (Mobile Application Development -1) in Semester-3. Paper-405-02 (Mobile Application Development -2) in Semester-4.
Course outcome	- Students will be able to understand the concepts Kotlin - Students will have knowledge of object-oriented concept and development of basic apps using Kotlin - Working with JSON - Knowledge of storing data into database
Course Content	**Unit-1: Introduction to Kotlin** 1.1 Concepts of Kotlin and its introduction. 1.2 Downloading IntelliJ and its settings. 1.3 Variables: 1.3.1 val vs. var, Byte, Short, Int, Long, Float, Double, Boolean, and Char. 1.3.2 String, Nullable variables. 1.4 Conditional statements: if and when. Difference between if and when. 1.4.1 ranges, types, values of function calls 1.5 Arrays and Lists: 1.5.1 create, modify, and access arrays 1.5.2 creating, modifying, and accessing lists 1.6 Loops (Iterative statements) 1.6.1 for and while loop. 1.6.2 break, continue and return **Unit-2: OOPS Concepts with Kotlin** 2.1 Object oriented concepts: 2.1.1 Properties, methods and basics of objects and classes in Kotlin 2.1.2 Named parameters, constructors. 2.2 open classes and inheritance. 2.2.1 Named parameters and Default values 2.2.2 Open and Abstract 2.2.3 Interface 2.2.4 Getters and Setters 2.2.5 visibility of properties, methods and class **Unit-3: Kotlin Apps**

	3.1 Developing basic Apps using Kotlin 3.1.1 Setup Play Project, The Constraint Layout 3.1.2 Constraints and Resizing, Positioning Widgets, Inner Lines within a Widget 3.1.3 Layouts on Different Devices, Layout Designer rendering error 3.1.4 Baseline Constraints 3.2 Constraining Widgets, Add Scrolling Capabilities 3.2.1 Events and setonclicklistener 3.2.2 Fixing Kotlin Gradle Issues 3.2.3 The Activity Lifecycle 3.2.4 The Logcat Pane 3.2.5 Logging the Activity Lifecycle 3.2.6 Saving and Restoring Instance State **Unit-4: JSON Concept** 4.1 Concept and Features of JSON, Similarities and difference among JSON and XML 4.2 JSON objects (with string and Numbers)) 4.3 JSON Arrays and their examples: 4.3.1 Array of string, Array of Numbers, Array of Booleans, Array of objects, Multi-Dimensional Arrays 4.3.2 JSON comments 4.4 Building multi-screen apps: 4.4.1 Intents and their applications, types of intents, 4.4.2 Data exchange from one activity to another using intent 4.5 Working with implicit intents: 4.5.1 Opening web URLs through app 4.5.2 Sharing media from our app to other apps **Unit-5: Storing Android application data using Database and JSON** [Any open-source database can be used. MySQL or SQLite is preferable] 5.1 Setting up virtual server on local computer 5.2 Connecting Android based App with Database 5.3 CRUD operations (Create, Read, Update, Delete) using APP: 5.3.1 Create and insert data to the database 5.3.2 Read, Update and Delete data from database. 5.4 Accessing user's current location 5.5 Capturing image using device camera (ACTION_IMAGE_CAPTURE Intent of MediaStore class.) [All Units carry Equal Weightage]
Reference Books	1. Android Studio 4.0 Development Essentials – Kotlin Edition, Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1 – 951442 – 19 – 4 2. Android Programming with Kotlin for Beginners, Author – John Horton, Publisher: Packt Publication, ISBN – 13: 978 – 1789615401 3. Mastering Kotlin - Learn advanced Kotlin programming techniques to build apps for Android, iOS, and the web, Author – Nate Ebel, Publisher: Packt Publication, ISBN – 13: 978 – 1838555726 4. Kotlin in Action 1st Edition, Author – Dmitry Jemerov & Sevtlana Isakova, Publisher: Manning Publications Co., ISBN – 13: 978 – 1617293290 5. JSON Quick Syntax Reference, Author – Wallace Jackson, Publisher: Apress, ISBN: 9781484218631 6. Beginning Json, Author – Ben Smith, Publisher – Apress, ISBN: 9781484240427 7. Android Studio 3.0 Development Essentials: Android 8 Edition Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1977540096
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 502 - UNIX and Shell Programming

Course Code	502
Course Title	UNIX and Shell Programming
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation	A.Y.2022-2023
Purpose of Course	To provide basic knowledge and working of Multi-User Operating System – UNIX. The course includes CLI mode with BASH, I/O redirections, Init System, Processes, Users and Groups, File Systems, Files, Ownership, Permissions etc. It also includes VI text editor for creating shell scripts.
Course Objective	Unix provides an essential and simple set of tools in a distraction-free environment. The students will learn to write little pieces of software in a programming language called Bash, which allows to use and to connect together the UNIX tools.
Pre-requisite	Fundamental Knowledge of Operating System.
Course outcome	• Students will have practical introduction to commonly used Linux / UNIX shell commands and basics of Bash shell scripting to automate a variety of tasks. • Students will learn general purpose commands, directory management commands, file management commands, access control commands, text processing commands, etc with shell scripts. • Students will create simple to more advanced shell scripts that involve Metacharacters, Quoting, Variables, Command substitution, I/O Redirection, Pipes & Filters, and Command line arguments.
Course Content	**Unit - 1. Introduction of UNIX OS** 1.1. Features 1.2. System Structure and Architecture of UNIX OS 1.3. Shell & its Features 1.4. Kernel & its Structure **Unit 2. Overview** 2.1. Logging in & out 2.2. I-node and File System Structure 2.3. Booting Sequence & 'init' process 2.4. File Access Permissions **3. Shell Programming** 3.1. Screen Editor (vi) 3.2. Environmental & user defined variables 3.3. Conditional Execution 3.4. Arithmetic expression evaluation 3.5. Control Structure 3.6. Redirection 3.7. Background process & priorities of process, Batch Process 3.8. Argument Processing & Shells interpretation **Unit 4. Advanced Shell Programming** 4.1. Splitting, Comparing, Sorting, Merging & Ordering Files 4.2. Filtering utilities: grep, sed etc. 4.3. awk utility **Unit 5. Communication with other users** 5.1 write, wall and mesg 5.2 mail, motd and news

	[All Units carry Equal Weightage]
Reference Books	1. Unix Shell Programming, 3rd Edition Stephen G Kochan, Patrick Wood Sams Publishing 2. sed & awk, 2nd Edition Dale Dougherty, Arnold Robbins O'Reilly Media 3. The UNIX Programming Environment Kernighan & Pike PHI 4. The design of the UNIX OS M. J. Bach - Prentice Hall 5. Operating Systems A. S. Godbole Tata McGrew Hill 6. Working with UNIX Vijay Mukhi BPB Publications 7. UNIX Shells Vijay Mukhi BPB Publications. 8. UNIX System Concepts & Applications Das Tata McGraw Hill. 9. UNIX & Shell Programming Yashwant Kanetkar BPB Publications. 10. UNIX: The Complete Reference, Second Edition - Kenneth H.Rosen, Douglas A. Host,Rachel Klee, James Farber, Richard Rosinski - 2007 by The McGraw-Hill Companies
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 503 - Network Technologies

Course Code	503
Course Title	Network Technologies
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation	A.Y.2022-2023
Purpose of Course	With extensive use of Internet and Network at offices, it has now become quite essential for students of IT and Computer Science to acquire basic knowledge of Computer Networks. The purpose of this course is to provide basic knowledge of Computer Networks.
Course Objective	The objective is to provide basic knowledge of network components, network operating system, working of networking and security on networks.
Pre-requisite	Fundamental Knowledge of Operating System.
Course outcome	Students will get knowledge of networking, OSI model, configuration & troubleshooting of different network topologies using various network devices.
Course Content	**Unit-1: Introduction to Network** 1.1 Basics of network 1.1.1 Types of networks 1.1.2 Different topologies (Bus, ring, star, mesh, tree) 1.2 Types of networks (LAN, MAN, WAN) 1.3 Terminologies (Intranet, Internet, Unicast, Broadcast, Multicast) **Unit-2: Internet and Intranet** 2.1 Concepts of Internet and Intranet 2.1.1 Working of Internet and its architecture 2.1.2 Working of Intranet and its architecture 2.1.3 Network Devices terminologies: Hub, modem, switch, Routers, Gateways, Access point 2.2 Types of Cables: co-axial, UTP, Fiber Optic cable **Unit-3: Mobile Ad hoc network** 3.1 Concepts and types of MANET (Mobile Ad hoc network) 3.1.1 VANET (Vehicular Ad hoc Network) 3.1.2 Smart phone Ad hoc Network (SPANC) 3.1.3 Flying Ad hoc network (FANET) 3.2 concepts of OSI(Open Source Interconnection) layers 3.2.1 types of layers 3.2.2 Introduction of OSI Layers and their purpose: Physical layer, Data link layer and Network Layer Transport layer and Session Layer. **Unit-4: Important protocols of Network layers** 4.1 Concepts of Data packets and Datagram 4.2 Concepts and purpose of various protocols: 4.2.1 Purpose of Presentation layer 4.2.2 Presentation layer protocols and their purpose: 4.2.2.1 SSL, HTTP, FTP, Telnet 4.2.3 Concepts of Application Layer protocols and terminologies: 4.2.3.1 SMTP, DNS (Domain Name Server), POP (Post office Protocol) 4.3 Concepts of IP address

	4.4 Difference between http and https **Unit-5: Mail Services** 5.1 Application Layer services: 5.1.1 concepts of email 5.1.2 working of email account and services 5.1.3 URL and URL types (Absolute, Relative) 5.2 Case study of email: 5.2.1 From sender to receiver (Mailer, Mail Server, Mailbox) 5.2.2 Functionality and use of protocols at different layers 5.3 Case study of locating Website: 5.3.1 URL and locating URL 5.3.2 Steps and protocols involved in accessing URL 5.3.3 Concepts of search engine and purpose. [All Units carry Equal Weightage]
Reference Books	1. Networking Complete – 3 rd Edition – BPB Publications 2. Networking Essentials Study Guide – MCSE – Tata McGraw Hill Publication 3. Computer Networks – A S Tanenbaum - PHI 4. Data Communication & Networking – B A Forouzan – Tata McGraw Hill Publication 5. Computer Networks – Bhushan Trivedi – Oxford University Press
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 504: Web Framework and Services

Course Code	504
Course Title	Web Framework and Services
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation	A.Y. 2022-2023
Purpose of Course	To make students aware of Open Source Web Based Tools and Database
Course Objective	1. To make students understand the concepts of Open Source Web Based Dynamic Scripting Language. 2. To make students understand the concepts of Open Source Database.
Pre-requisite	Basic knowledge of Scripting Language & HTML and Python.
Course outcome	Ability to develop Web Based Applications.
Course Content	**Unit-1: PHP fundamentals** 1.1 Concepts of Php and introduction 1.2 Php syntax: variables, constants, echo and print commands 1.3 Data types 1.4 Operators, Conditional Statements (if. Else, Switch. Case), Arrays 1.5 Sorting Arrays, Php Loops **Unit-2: PHP functions** 2.1 Math functions, Date and Time functions, GET and POST methods 2.2 Files: include, file parsing, directories, file upload, file download 2.3 Cookies and Sessions, Send Email 2.4 Forms: creating, handling, validation of forms, Php filters, Json parsing 2.5 Classes and objects in Php 2.6 Regular expressions and exception handling **Unit-3: PHP interaction with Database** [MySQL / MongoDB or any other database can be used] 3.1 Create database, Create table, Table handling: insert, update, delete operations. 3.2 Querying database using Php: select, update, delete, insert, where, order by 3.3 Processing search query in backend using Ajax **Unit-4: PHP – Python integration** 4.1 Executing python script using PHP: 4.1.1 Calling Python script using echo 4.1.2 Calling Python script using escapeshellcmd() , shell_exec() method 4.2 Executing PHP script using Python: 4.2.1 subprocess module in Python: 4.2.1.1 Methods: check-call(), check-output(), declode(), Popen() , communicate(), split() 4.2.2 os module in Python: 4.2.2.1 write(), read(), close(), mkdir(), makedirs(), path, exists(), isfile(), join() 4.2.2.2 isdir(), listdir(), walk(), chdir()

	Unit-5: Python Web Framework: Flask 5.1 Installation of Flask and Environment setup 5.1.1 Web server Gateway Interface 5.1.2 Web template engine (Jinja2) 5.1.2 creating the Flask class object 5.1.3 creating and hosting first basic Flask app. 5.1.3.1 route() , run(), add_url_rule() 5.2 URl building and its advantages 5.2.1 url_for() function 5.3 Flask HTTP methods: 5.3.1 GET, POST, HEAD, PUT, DELETE 5.3.2 Dynamic data representation using Jinja2. 5.3.2.1 Jinja2 Delimiters 5.3.2.2 Embedding Python statement in HTML 5.3.2.3 Static File reference in HTML 5.4 Flask request object: (Form, args, files, redirect) 5.4.1 Form request object, render_template() method, Form data Handling 5.4.2 Flask Session, Creating session, session variable, session.pop() 5.4.3 file uploading: request.files[] object, save() method, saving file to specific folder. 5.4.4 Redirecting : redirect() method, location, status code and response. [All Units carry Equal Weightage]
Reference Books	1. Core PHP Programming – Leon Atkinson – Pearson Publishers – ISBN 978- : 0130463463 2. The Complete Reference PHP – Stever Holzner – McGraw Hill – ISBN 978- : 0070223622 3. PHP 5.0 and MySql Bible – Tim Converse, Joyce Park, Clark Morgan John – Wiley & Sons – ISBN 978-0764557460 : 4. MySQL Bible – Steve Suehring John – Wiley &Sons – ISBN 978- : 0764549328 5. PHP Black Book – Peter Moulding – Paraglyph, Incorporated – ISBN 978- : 1932111095 6. PHP and MongoDB Web Development Beginner's Guide – Rubayeet Islam – Packt Publishing Limited – ISBN : 978-1849513623 7. Beginning Ajax with PHP: From Novice to Professional - Lee Babin – Apress – ISBN 978-1590596678 : 8. Developing Web Applications in PHP and AJAX – B. M Harwani – McGraw Hill Education – ISBN 978-0070144521 : 9. JSON: Main principals – David V. 10. Python 101 – Michael Driscoll – ISBN : 9780996062817 11. Flask: Building Python Web Services – Gareth Dwyer, Shalabh Aggarwal, Jack Stouffer – Packt Publishing – ISBN : 9781787288225 12. Building Web Apps with Python and Flask – Malhar Lathkar – BPB PUBN – ISBN : 9789389898835
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 505 - ASP.Net

Course Code	505
Course Title	ASP.NET
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation	A.Y.2022-2023
Purpose of Course	To make students aware of Web Based Tools and Database
Course Objective	To make students understand concepts of Web Technology
Pre-requisite	Basic knowledge of Scripting Language & HTML.
Course outcome	Student will get good hands on experience to develop, manage and maintain Web based application.
Course Content	**Unit-1. Introduction to ASP.NET** 1.1 What is ASP.NET 1.2 .Net framework 2.0 1.3 Compile Code 1.3.1 Code Behind and Inline Coding 1.4 The Common Language Runtime 1.5 Object Oriented Concepts 1.6 Event Driven Programming **Unit-2. Server Control** 2.1 Post back 2.2 Data Binding 2.2.1 Grid View 2.2.2 List Box 2.2.3 Data list 2.2.4 Data binding Events 2.2.5 Repeater 2.2.6 Form view 2.3 Web Server Controls, HTML Server Controls (basic HTML Server Control), Validation Controls, Navigation Controls, Login Control 2.4 Master Page, Themes & CSS **Unit-3. Database Access** 3.1 Introduction about ADO.NET 3.2 Introduction about Provider, Adapter, Reader, Command Builder 3.3 Database Access using ADO.NET **Unit-4. Client Server Communication** 4.1 Communications with Web Browser 4.2 Response Object 4.3 Cookies 4.4 Query String 4.5 Session Management and Variable Scope **Unit-5. Advance ASP.NET** 5.1 Web.config 5.2 Sitemappath Server Control 5.3 User Control 5.4 User Profile 5.5 Web Services 5.5.1 Basics of Web Services

	5.5.2 Interacting with web services 5.6 Error Handling 5.6.1 Unstructured Error 5.6.2 Structured Error 5.6.3 Error handling in Database [All Units carry Equal Weightage]
Reference Books	1. ASP.NET – A Beginner's Guide by Dave Mercer – TMH 2. ASP.NET Bible – Mridula Parihar et. Al. – Wiley India 3. Programming ASP.NET 4 – Dino Esposito 4. Professional ADO.NET – Bipin Joshi, Donny Mack, Doug Seven, Fabio Claudio Ferracchiati, Jan D Narkiewiez - Wrox 5. ASP.NET for Developers – Amundsen 6. The Complete Reference ASP.NET -Matthew MacDonald –TMH 7. ASP.NET – Black Book – dreamTech 8. Beginning ASP.NET 3.5 in C# and VB –Wrox-Imar Spaanjaars
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: Foundation Elective (FND – 05)

Course Code	FND-05
Course Title	Foundation Elective
Credit	2
Teaching / Week	-
Minimum Weeks/Semester	-
Review/Revision	2021-2022
Implementation Year	A.Y.2022-2023
Purpose of Course (POC)	To enhance the student's capabilities in terms of extra curriculum activity or by gaining additional knowledge in any field including their core subjects.
Course Objective	Make students to participate and learn new technology or any multi-disciplinary subject by joining university approved 2 credit certificate course. Students are encouraged to participate in sports/NSS/NCC and contribute at University level or state level or National level.
Pre-requisite	No specific requirement.
Course Outcome	Students will be able to obtain additional 2 credits by active participation in field of NSS/NCC/Sports/ Certificate course.
Structure of the Course:	Students are required to select any one from the following and produce the evidence. Additional 2 credits will be granted to the students on recommendation by the principal on fulfilment of any of the following criteria during the semester. 1) Active participation in NSS/ NCC at University level / State level / National level and produce the certificate. 2) Active Participation in any one Saptdhara/Sports activity and representation at University level / State level / National level and produce the certificate. 3) Successful completion of any minimum two credit course recognized by the University from any university affiliated institution. The credits will be granted on producing the completion certificate. (Certification course fees will be bared by the student only. The Institute/College is not liable to provide such certificate course. It is an optional activity in lieu of NSS/NCC/Sports.)
Evaluation Method:	On producing the supporting document as per the need described in Structure of Course.

Course: 506: Practical and Project

Course Code	506
Course Title	Practical
Credit	6
Teaching per Week	**Lab. Practical Duration:** 10 Hours per week (5 Hours under Supervised mode and 5 Hours under un-supervised mode) **Lab. Project Duration:** 2 Hours per week (1 hour under Supervised mode and 1 hour under Un-Supervised mode)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2021-2022
Implementation	A.Y.2022-2023
Purpose of Course	To acquire practical and applied knowledge related to subjects studied during the semester.
Course Objective	Students can learn applied subjects (P-501-1 or P-501-2, P-502, P-504, P-505) during lab hours under supervised and un-supervised mode. Students can apply their practical knowledge by developing a limited size in-house(minor) project.
Pre-requisite	Basic knowledge of Semester 3 and Semester 4 subjects including scripting languages, HTML, Object Oriented Concepts, Java and Python programming, Web Technologies, Android Technologies and Database concepts.
Course outcome	After completion of this course, the students will be able to create web based or Android based Applications. Also, they will be able to implement practical problems in UNIX Shell Programming, PHP-Python, and ASP.NET application.
Course Content	**(i) Minor Project:** During allocated project hours' students apply their knowledge by generating limited duration in-house minor project for any of the subject out of 501-01 or 501-02. **(ii) Practical:** Students gain hands-on practical knowledge for Paper code: 502, 504 and 505 during practical hours under supervised and un-supervised mode.
Reference Books	As per Courses: 501-1 or 501-2, 502, 504, 505 reference books.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Max. Marks:	Practical Exam: 140 Marks (External Exam) + 60 marks (Internal Exam) External: 105 marks for Practical exam + 35 marks for project viva Internal: 45 marks for Practical exam + 15 marks for Project viva
Evaluation Method	(i) Students will develop an in-project based on any of the 501-01 or 501-02. One internal guide will be allocated to the student. The student can form a group or perform individually to work on the given project topic. Per week 2 hours of lab. timing is expected to allocate in un-supervised mode. At end of the semester, the students are required to submit their project report verified by their internal guide. The external exam for project performance evaluation will be conducted separately where students are expected to present their project content and face the viva-voce. Allocated marks for **External Exam:** 35 marks **Internal Exam:** 15 marks (ii) Students will work in computer lab during the allocated practical time in supervised and un-supervised mode. During lab hours, students are expected to work and implement various given problems based on subjects covered under paper-502, paper-504 and paper-505. Allocated marks for **External Exam:** 105 marks **Internal Exam:** 45 marks.
External Practical and Project Exam:	• **Duration:** 4 Hours for Practical exam and 1 Hour for Project exam (Project demo and viva). • **Passing Criteria:** The final result for 506- Practical and Project will be based on consolidated Marks combining Practical and Project out of 140 for External and 60 for Internal exams.

B.C.A. SEMESTER - 6

Course 601-1 : Computer Graphics

Course Code	601-1
Course Title	Computer Graphics
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	Make students aware and understand Computer Graphics.
Course Objective	To make students understand and learn the geometrical processes on various shapes, objects and text.
Pre-requisite	Basic concepts of computer-based animation, various objects and basic school geometry.
Course Outcome	Students will be able to understand and write algorithms for construction of various shapes like line, circle & ellipse, and various processes on them.
Course Content	**Unit 1. Introduction** 1.1 Application areas of Graphics Systems 1.1.1. Presentation Graphics 1.1.2. Entertainment 1.1.3. Education and Training 1.1.4. Image Processing 1.2 Computer Graphics Files 1.3 Introduction to graphic standards **Unit 2. Graphics Systems** 2.1. Video Display Devices 2.1.1. Refresh CRT 2.1.2. Color CRT 2.1.3. LCD 2.1.4. Direct View Storage Tube 2.2. Raster scan and Random Scan Display 2.3. Raster Graphics and Vector Graphics 2.4. Concepts of various objects: Point, Line, Circle, Ellipse and Polygons **Unit 3. Line generation** 3.1. Geometry of line 3.2. Frame Buffer 3.3. Line Drawing Algorithms 3.3.1. DDA Algorithm 3.3.2. VECGEN 3.3.3. Bresenham 3.4. Line Styles 3.4.1. Thick line 3.4.2. Line caps and joint 3.5. Anti-aliasing of line **Unit 4. Polygons** 4.1 Polygon Representation

	4.2 Polygon Inside Tests 4.2.1 Even-odd method 4.2.2 Winding number method 4.3 Polygon Area Filling Algorithm 4.3.1 Flood Fill 4.3.2 Scan Line 4.3.3 Boundary Fill 4.4 Filling polygon with a pattern **Unit 5. Geometric Transformations** 5.1 Basic Transformations 5.1.1 Scaling 5.1.2 Translation 5.1.3 Rotation 5.1.3.1 Rotation about origin 5.1.3.2 Rotation about Homogeneous Coordinates 5.2 Other transformations 5.2.1 Reflection 5.2.2 Shearing [All Units carry Equal Weightage]
Reference Books	1. Computer Graphics - second edition, Donald Hearn & M. Pauline Baker – Tata McGraw Hill Pub. 2. Computer Graphics, Harrington S. -Tata McGraw Hill. 3. Computer Graphics, Desai A. A. –PHI. 4. Computer Graphics: Algorithms & Implementations, Mukherjee & Jana – PHI. 5. Interactive Computer Graphics, Giloi W. K. –Prentice Hall India. 6. Principles of Interactive Computer Graphics, New Man W. & Sproul P. F. –McGraw Hill 7. Procedural Elements for Computer Graphics, Rogers D. F. – McGraw Hill.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course 601-2: Fundamentals of Cloud Computing

Course Code	601-2
Course Title	Cloud Computing
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To provide fundamental knowledge and management of cloud computing system along with Big Data.
Course Objective	To provide comprehensive knowledge of cloud computing, its architecture, Management and security. This course will also provide the introductory knowledge of Big Data.
Pre-requisite	Basic concepts and understanding of operating system and computer network technologies.
Course Outcome	After learning the course, the student will be able: • To understand the cloud models such as software as a service and the other models Iaas and Paas as well as managing in a multi-cloud world, developing your cloud strategy such as integrating data in the cloud, promoting cloud security, and more. • To learn about Big data sets that are too large to be handled by traditional data-processing application software and about Data Lake.
Course Content	**Unit-1: Introduction to Cloud Computing** 1.1 Fundamentals of Cloud Computing 1.1.1 Concepts of cloud and cloud computing 1.1.2 Types of cloud based on deployment (Public, Private and Hybrid) 1.2 Cloud service models: 1.2.1 IaaS (Infrastructure as a Service), PaaS (Platform as a Service) 1.2.2 SaaS (Software as a Service) 1.2.3 Network as a Service, Database as a Service 1.3 Advantages and dis-advantages of Cloud computing **Unit-2: Architecture of Cloud Computing** 2.1 Basics of Planning and deployment of Cloud 2.1.1 Cloud Planning phases 2.1.1.1 Business Architecture Development 2.1.1.2 IT Architecture Development 2.1.1.3 Transformation Plan Development 2.1.2 Technologies behind the Cloud 2.1.2.1 Virtualization 2.1.2.2 Service oriented Architecture (SOA) 2.1.2.3 Utility Computing 2.2 Cloud Computing Architecture 2.3 Infrastructure components of Cloud **Unit-3: Cloud Management:** 3.1 Tasks of Cloud management 3.2 Cloud Storage Devices: (Block storage, File Storage) 3.3 Cloud Storage Classes: (Managed and Unmanaged) 3.3.1 Cloud Virtualization:

	3.3.1.1 Hypervisor 3.3.1.2 Types of Hardware Virtualization: (Full, Emulation, Para) **Unit-4: Cloud Securing, Operations and Applications:** 4.1 Security Boundaries 4.1.1 Cloud security Alliance (CSA) 4.1.2 Cloud operations and its management concepts 4.2 Cloud applications: 4.2.1 Business Applications 4.2.2 Data storage and backup applications **Unit-5: Concepts of Big Data and Data Lake:** 5.1 Concepts of Bigdata 5.1.1 Sources of Bigdata 5.1.2 Bigdata benefits over Traditional Database 5.1.3 Concepts of Data Warehouse 5.1.3.1 Concepts of data processing techniques: 5.1.3.1.1 OLTP (Online Transaction Processing) 5.1.3.1.2 OLAP (Online Analytical Processing) 5.2 Concepts of Data Lake: 5.2.1 Data lake concepts and its architecture 5.2.2 Significance of data lake 5.2.3 Comparison of Data Lake and Data Warehousing [All Units carry Equal Weightage]
Reference Books	1. Cloud Computing For Dummies 2nd Edition, by Judith S. Hurwitz, Daniel Kirsch, John Wiley & Sons Inc., ISBN: 978-1119546658 2. Cloud Computing: Concepts, Technology & Architecture, Ricardo Puttini, Thomas Erl, and Zaigham Mahmood, PHI, ISBN: 978-0133387520, 3. Cloud Computing: Principles and Paradigms - R. Buyya et al, Wiley 2010 4. Cloud Computing : Principles Systems and Application - L Gillam et al - Springer 2010 5.Cloud Computing Bible - Sosinsky - Wiley - India, 2011 6.Cloud Computing Second Edition Dr. Kumar Saurabh, Wiley - India, 2012 7.Service Oriented Architeture: Concepts , Technology and Design, Thomas Erl, Prentice Hall publication, 2005 8.Understanding Enterprise SOA - Enterprise Service Oriented Architecture, Eric Pulier, Hugh Taylor, Dreamtech Press 2008 9.Cloud Computing - Insight into New Era Infrastructure, Dr Kumar Saurabh, Wiley India 2012 10.Understanding SOA with Web Services - Sanjiva Weerawarana, Franscisco Cubera, Frank Leymann, Tony Storey, Donald F Ferguson, Eric Newcomer, Greg Lomow - Addision Wesely Publication, 2004 11.Enterprise Service Bus - Dave Chappelll - O'Reilly Publications 2004 12. Amazon Web Services For Dummies, Bernard Golden, ISBN:978-1118571835 13. Principles of Interactive Computer Graphics, New Man W. & Sproul P. F. –McGraw Hill 14. Procedural Elements for Computer Graphics, Rogers D. F. – McGraw Hill.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 602 – E-Commerce and Cyber Security

Course Code	602
Course Title	E-Commerce and Cyber Security
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To make students aware of e-Commerce, Cyber Security, Cyber Crime and Cyber Laws
Course Objective	To impart basic knowledge of e-Commerce, Cyber Security, Cyber Crime & Cyber Law
Pre-requisite	Fundamental Knowledge of Networking, Web Applications & Database
Course Outcome	The students will get the basic knowledge of e-Commerce, Cyber Security, Cyber Crime & Cyber Law and hence will help them in developing secured applications and will make them aware of various Cyber Laws
Content	**Unit 1:** Introduction to Electronic Commerce 1.1 Concepts of e-Commerce 1.2 Aims of e-Commerce 1.3 e-Commerce Framework 1.4 e-Commerce Consumer Applications 1.5 e-Commerce Organizational Applications 1.6 Introduction to m-Commerce **Unit 2:** Network Infrastructure of e-Com , Payment and Security: 2.1. Concepts of Information Way 2.2. Components of I-Way 2.2.1. Network Access Equipment 2.2.2. Local on-ramps 2.2.3. Global Information Distribution Network 2.3. Transaction Models 2.4 e-Commerce Payments and Security Issues 2.4.1. e-Commerce Payment Systems 2.4.2. Debit Card Based, Credit Card Based ,. Risks & EPS 2.4.3. e-Cash, e-Cheque, e-wallet 2.5. Security on Web, SSL **Unit-3:** Introduction to Cyber Crimes: 3.1 Category of Cyber Crimes 3.2 Technical Aspects of Cyber Crimes 3.2.1 Unauthorized access & Hacking 3.2.2 Trojan, Virus and Worm Attacks 3.2.3 E-Mail related Crimes: Spoofing, Spamming, Bombing 3.2.4 Denial of Service Attacks 3.2.5 Distributed Denial of Service Attack 3.3 Various crimes : 3.3.1 IPR Violations (Software piracy, Copyright Infringement, Trademarks Violations, Theft of Computer source code, Patent Violations) 3.3.2 Cyber Squatting, Cyber Smearing, Cyber Stacking 3.3.3 Financial Crimes: (Banking, credit card, Debit card related) **Unit-4:** 4.1 Concepts of Cyber Security:

	4.1.1 Types of Threats 4.1.2 Advantages of Cyber Security 4.2 Basic Terminologies: 4.2.1 IP Address, MAC Address 4.2.2 Domain name Server(DNS) 4.2.3 DHCP, Router, Bots 4.3 Common Types of Attacks: 4.3.1 Distributed Denial of Service 4.3.2 Man in the Middle, Email Attack 4.3.3 Password Attack, Malware 4.4 Hackers: 4.4.1 Various Vulnerabilities: 4.4.1.1 Injection attacks, Changes in security settings 4.4.1.2 Expouser of Sensitive Data 4.4.1.3 Breach in authentication protocol 4.4.2 Types of Hackers: White hat and Black hat **Unit-5:** 5.1 Ethical Hacker 5.1.1 Roles and Responsibilities 5.1.2 Benefit of Ethical Hacking 5.1.3 Skills require to become Ethical hacker 5.2 Penetration testing concepts 5.2.1 Phases of Ethical hacking 5.2.2 Areas of penetration testing 5.3 SQL Injection: 5.3.1 Concepts of SQL Injection 5.3.2 Types of SQL Injection 5.3.3 Case study of SQL Injection 5.4 Firewall: 5.4.1 Concepts of Firewall 5.4.2 Types of Firewall 5.4.3 Working, Advantages and Importance of Firewall [All Units carry Equal Weightage]
Reference Book	1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addition Wesley 2. Electronic Commerce: A Managerial Perspective, Efraim turban, Jae Lee, David King, H. Michel Chung, Addition Wesley 3. E-Commerce: An Indian Perspective, Joseph, PHI 4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. 5. e-Commerce Concept, Models Strategies, G.V.S. Murthy, Himalaya Publisher 6. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd 7. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd. 8. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation 9. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 603: Project

Course Code	603
Course Title	Project
Credit	12
Teaching / Week	2 Hrs. / Week / 5 students (Reporting & Contact hours)
Minimum Weeks/Semester	15 (Including class work, examination, preparation etc.) 28 hours/week
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To make students get hands on experience of software development life cycle.
Course Objective	The main objective is to make students acquire knowledge of analyzing and solving real world problems and hands on experience of software development life cycle.
Pre-requisite	Knowledge of Operating System, Computer Networking, Software Engineering, Database, Application Development Tools, Web Designing Related Tools, Computer Languages.
Course Outcome	Students will understand the complete process of software development life cycle and will be able to produce good applications of real world problems.
Guidelines for Project	The project will be in-house. Duration of the Project Work should be minimum eight weeks. The project work will start with the beginning of the semester. All the students will have to submit following reports to their respective examination centers. 1. The Joining Report (Once). 2. Project Title Report (Once). 3. Progress Reports (Fortnightly) signed by the guide (internal faculty) & submitted to the Head/Project Coordinator in person. 4. Project Completion Certificate issued from the College. The student shall not be allowed to appear for the Final Examination if the student fails to submit the above-mentioned documents. Project Viva-voce will be conducted at the end of the semester. The project report in form of soft-copy can be accepted along with the required documents/reports in form of hardcopy.
Evaluation Method	30% Internal assessment. 70% External assessment. Internal Evaluation: Minimum two faculties (preferably senior most) should be nominated by the Head of the Department or the senior most faculty in absence of the Head to evaluate the performance of the students' presentation. External Evaluation: The evaluation should be as per the following break up: 1. Analysis: 25% weightage 2. Design: 25% weightage 3. Implementation: 25% weightage 4. Presentation: 15% weightage 5. Project Report: 10% weightage

Course: 604: Seminar on Information Technology Innovations & Trends

Course Code	604
Course Title	Seminar on Information Technology Innovations & Trends
Credit	3
Teaching / Week	3 hours / Week
Minimum Weeks/Semester	15 (Including class work, examination, preparation etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023
Purpose of Course (POC)	1. To improve the communication and presentation skills. 2. To let students, update knowledge on latest & forthcoming technologies. 3. Let students keep pace with new trends of Information Technology.
Course Outcome	Students will be able to develop their presentation skills and will keep themselves updated with latest trends in Information Technology.
Course Objective	Information Technology is a constantly changing field. The idea of introducing this subject is to let students keep pace with the changing scenario of I. T. During the lectures, faculty will help students to select the topic. The students will collect relevant information from various sources and prepare a presentation. During the class hours, students will present their presentation on the given topic. The faculty will access and help them to improve their presentation skills.
Pre-requisite	-
Guidelines for Seminar	Students will prepare a presentation using ICT Tools and submit hard copy of the presentation for Internal and External evaluation.
Evaluation Method	30% Internal assessment. 70% External assessment. Evaluation: External examiners appointed by the university will evaluate the Seminar Presentation. The external seminar exam will be scheduled simultaneously along with the project exams. For internal evaluation, Minimum two faculties (Preferably senior most) nominated by the Department Head or the Senior most faculty, in absence of the Department Head, will evaluate the performance of the student's presentation and will be treated as Internal Evaluation. The students will submit and produce the softcopy of the seminar report along with the hardcopy of the required certificates at the time of internal and external exams. The evaluation should be as per the following break up: 1. Selection of the Topic & Relevance: 20% weightage 2. Understanding of the topic: 35% weightage 3. Source of the topic: 10% weightage 4. Presentation: 35% weightage

Course: Foundation Elective (FND – 06)

Course Code	FND-05
Course Title	Foundation Elective
Credit	2
Teaching / Week	-
Minimum Weeks/Semester	-
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To enhance the student's capabilities in terms of extra curriculum activity or by gaining additional knowledge in any field including their core subjects.
Course Objective	Make students to participate and learn new technology or any multi-disciplinary subject by joining university approved 2 credit certificate course. Students are encouraged to participate in sports/NSS/NCC and contribute at University level or state level or National level.
Pre-requisite	No specific requirement.
Course Outcome	Students will be able to obtain additional 2 credits by active participation in field of NSS/NCC/Sports/Saptdhara/Certificate course.
Structure of the Course:	Students are required to select any one from the following and produce the evidence. Additional 2 credits will be granted to the students on recommendation by the principal on fulfilment of any of the following criteria during the semester. 1) Active participation in NSS/ NCC at University level / State level / National level and produce the certificate. 2) Active Participation in any one saptdhara/Sports activity and represent/participate at University level / State level / National level and produce the certificate. 3) Successful completion of any minimum two credit course recognized by the University from any university affiliated institution. The credits will be granted on producing the completion certificate. (Certification course fees will be paid separately by the student for which the student enrolled. It is an optional activity in lieu of NSS/NCC/Sports/Saptdhara.)
Evaluation Method:	On producing the supporting document as per the need described in "Structure of the Course" section.