



-: પરિપત્ર :-

બી.સી.એ./ બી.એસસી. (કોમ્પ્યુટર સાયન્સ) તથા એમ.એસસી. (કોમ્પ્યુટર એપ્લીકેશન) તથા એમ.સી.એ.નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓને તથા ડીપાર્ટમેન્ટના વડાશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૧-૨૨ થી અમલમાં આવનાર B.C.A. (2nd Year), B.Sc.(Computer Science) દ્વિતિય વર્ષ, M.Sc.(C A) દ્વિતિય વર્ષ, M.C.A. દ્વિતિય વર્ષના અભ્યાસક્રમ અંગે તા.૦૭/૦૧/૨૦૨૧ની સભામાં નીમેલ પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ અભ્યાસસમિતિ તથા કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક:૨ અન્વયે સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા. ૨૧/૦૫/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક : ૦૨ અન્વયે મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસસમિતિ તથા કોમ્પ્યુટર સાયન્સ વિદ્યાશાખાની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૨

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસસમિતિની તા.૭/૦૧/૨૧ની સભામાં નીમેલ પેટાસમિતિએ તૈયાર કરેલ નીચે મુજબ નાં નવા અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

- (૧) B.C.A. (2nd Year) નો અભ્યાસક્રમ સબકમીટીએ તૈયાર કરેલ અભ્યાસક્રમને સ્વીકારી ફેકલ્ટીને ભલામણ કરવામાં આવે છે.
- (૨) B.Sc. (Computer Science) દ્વિતિય વર્ષનો અભ્યાસક્રમ સબકમીટીએ તૈયાર કરેલ અભ્યાસક્રમને સ્વીકારી ફેકલ્ટીને ભલામણ કરવામાં આવે છે.
- (૩) M.Sc. (CA) દ્વિતિય વર્ષનો અભ્યાસક્રમ સબકમીટીએ તૈયાર કરેલ અભ્યાસક્રમને સ્વીકારી ફેકલ્ટીને ભલામણ કરવામાં આવે છે.
- (૪) M.C.A. દ્વિતિય વર્ષના અભ્યાસક્રમ સબકમીટીએ તૈયાર કરેલ અભ્યાસક્રમને સ્વીકારી ફેકલ્ટીને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૨૧/૦૫/૨૦૨૧ની ઠરાવ ક્રમાંક:૦૨

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસસમિતિ તથા કોમ્પ્યુટર સાયન્સ વિદ્યાશાખાએ તેની તા. ૧૦/૦૫/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે સ્વીકારેલ નીચે મુજબનાં અભ્યાસક્રમો મંજૂર કરવામાં આવે છે.

- (૧) B.C.A. (2nd Year) નો અભ્યાસક્રમ
- (૨) B.Sc. (Computer Science) દ્વિતિય વર્ષનો અભ્યાસક્રમ
- (૩) M.Sc. (CA) દ્વિતિય વર્ષનો અભ્યાસક્રમ
- (૪) M.C.A. દ્વિતિય વર્ષના અભ્યાસક્રમ

બિડાણ: ઉપર મુજબ

ક્રમાંક : એક./પરિપત્ર/૭૦૧૫/૨૧
તા.૨૮/૦૫/૨૦૨૧

ઈ.ચા.કુલસચિવ

પ્રતિ,

- ૧) બી.સી.એ./ બી.એસસી. (કોમ્પ્યુટર સાયન્સ) તથા એમ.એસસી. (કોમ્પ્યુટર એપ્લીકેશન) નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટના વડાશ્રીઓ.
- ૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

Syllabus for S.Y. B.C.A. (Sem-III and Sem-IV)

To be implemented from
Academic Year: June, 2021

: Submitted By:

Syllabus Committee

- 1) Dr. Snehal K. Joshi (Chairman)
- 2) Dr. Ashok Solanki
- 3) Dr. Bharat Patel
- 4) Prof. Dhananjy Patel
- 5) Dr. Kavita Ahuja
- 6) Prof. Vaibhav Desai
- 7) Prof. Pratiksha Patel
- 8) Mr. Indravadan Sadhwani

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.
Duration:	3 Years (Regular)
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 companies at entry level and can also work independently.
Medium of Instruction:	English
Program Structure:	Semester-wise Breakup of the course is given as follows :

Program Structure: S.Y.B.C.A. (SEM – 3 and SEM – 4)
(w.e.f. Academic Year June, 2021 – 2022)
Bachelor of Computer Application (B.C.A.)

Program Structure	Semester-wise break up for the courses is given below:							
SEMESTER - 3								
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
301	Statistical Methods	2	0	2	3 Hrs	70	30	100
302	Software Engineering	3	0	3	3 Hrs	70	30	100
303	Database handling using Python	4	0	4	3 Hrs	70	30	100
304	OOPs and Data Structures	4	0	4	3 Hrs	70	30	100
305-01	Web Designing – 1	4	0	4	3 Hrs	70	30	100
305-02	Mobile Application Development – 1	4	0	4	3 Hrs	70	30	100
306	Practical	0	12	6	5 Hrs	140	60	200
	Foundation Elective (to be selected from NCC / NSS / Saptadhara)	0	2	2				
Total		17	14	25		490	210	700
<ul style="list-style-type: none"> • Colleges may offer any one subject from 305-01 and 305-02 to whole division. 								
For Practical:								
<ol style="list-style-type: none"> 1. Batch Size – 30 Maximum(desirable) 2. In case of more than 10 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. 								
SEMESTER – 4								
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
401	Information System	2	0	2	3 Hrs	70	30	100
402	Internet of Things (IoT)	3	0	3	3 Hrs	70	30	100
403	Java Programming	4	0	4	3 Hrs	70	30	100
404	.NET Programming	4	0	4	3 Hrs	70	30	100
405-01	Web Designing-2	4	0	4	3 Hrs	70	30	100
405-02	Mobile Application Development-2	4	0	4	3 Hrs	70	30	100
406	Practical	0	12	6	5 Hrs	140	60	200
	Foundation Elective (to be selected from NCC / NSS / Saptadhara)	0	2	2				
Total		17	14	25		490	210	700
<ul style="list-style-type: none"> • Any one subject out of 405-01 or 405-02 can be offered to the students by college per division. • To offer 405-01 paper, 305-01 is mandatory in sem-3. • To offer 405-02, 305-02 is mandatory in Sem-3. 								
For Practical:								
<ol style="list-style-type: none"> 1. Batch Size – 30 Maximum(desirable) 2. In case of more than 10 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. 								
Program Passing Rules	As per University rules.							

Consolidated Course Papers for S.Y.B.C.A. (SEM - III & SEM – IV)
Academic Year of Implementation: 2021-2022

Course: 301: Statistical Methods

Course Code	301
Course Title	Statistical Methods
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2021
Purpose of Course	To develop statistical problems solving abilities relevant to Computer Science.
Course Objective	<ol style="list-style-type: none"> 1. To make students understand various statistical methods. 2. To develop the ability to compute descriptive statistics including diagrammatic representation and interpretation. 3. To be able to carry out simple linear regression analysis.
Pre-requisite	None
Course Out come	Ability to use computers to analyze data.
Course Content	<p>Unit 1. Introduction and Presentation of statistical data Types of variables Univariate, bivariate and multivariate data Univariate and bivariate frequency distributions</p> <p>Unit 2. Measure of central tendency-mean, median and mode</p> <p>Unit 3. Measures of dispersion (absolute as well as relative) Mean deviation Standard deviation Coefficient of mean deviation and coefficient of variation</p> <p>Unit 4. Correlation Introduction Types of correlation and scatter diagrams Rank correlation coefficient</p> <p>Unit 5. Regression Concept of dependent and independent variables Introduction to liner regression Line of regression (with one independent variable)</p> <p>Methods should be explained conceptually and corresponding examples should be given. No proof should be given to any of the methods.</p>

Reference Book	<ol style="list-style-type: none"> 1. Introduction to mathematical statistics, Hogg R V & Craig A L - Tata McGraw Hill 2. An introduction to the theory of statistics, Yule U G & Kendall MG – C. Griffin & Co. 3. Statistical Methods, S. P. Gupta – Sultan Chand & Co
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>30% Internal assessment.</p> <p>70% External assessment.</p>

Course 302: Software Engineering

Course Code	302
Course Title	Software Engineering
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2021
Medium of Instruction	English
Purpose of Course	Computer software engineers apply the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and the systems that enable computers to perform their many applications.
Course Objective	<ol style="list-style-type: none"> 1. To make students understand how to engineer the software. 2. To make students understand various components of software process model and their working. 3. To make students understand various ways to test software.
Pre-requisite	Prior knowledge of types of software and their application areas.
Course Out come	After learning this subject, students are expected to get the knowledge about designing and testing of software.
Course Content	<p>Unit 1. Introduction</p> <ol style="list-style-type: none"> 1.1 Concepts of Software. 1.2 Software characteristics. 1.3 Software Engineering: definition. 1.4 Types of Software <p>Unit 2. Software Process Model</p> <ol style="list-style-type: none"> 2.1 Waterfall Model 2.2 Prototype Model 2.3 Incremental Model 2.4 Spiral Model <p>Unit 3. Requirement analysis</p> <ol style="list-style-type: none"> 3.1 Introduction. 3.2 Requirement gathering techniques & Fact Finding, Recording Outcome. 3.3 Effort distribution. 3.4 Importance of Requirement Specifications. 3.5 SRS Characteristics. 3.6 Software Requirement Specification Document. <p>Unit 4. System Design</p> <ol style="list-style-type: none"> 4.1 UML (Class Diagram, Use Case) 4.2 DFD, Data Dictionary and Process Specification. 4.3 Design model. 4.4 Principal and Concepts. 4.5 Functional Independence. 4.6 Effectiveness of Modular Design.

	<p>Unit 5. Software Testing</p> <p>5.1 Testing Fundamentals and principals.</p> <p>5.2 Types of Testing.</p> <p>5.2.1 Black Box & White Box</p> <p>5.2.2 Unit Testing</p> <p>5.2.3 Integration Testing</p> <p>5.2.4 System Testing</p> <p>5.3 Introduction to change Over</p> <p>5.3.1 Types of change over</p>
Reference Books	<ol style="list-style-type: none"> 1. Software Engineering - A Practitioners' approach, R. S. Pressman – McGraw Hill. 2. Software Engineering concepts, Richard Fairley – McGraw Hill. 3. An Integrated Approach to Software Engineering, Pankaj Jalota – Narosa. 4. Software Engineering a Concise Study, Kelkar – PHI. 5. Fundamentals of Software Engineering, 4th Edition, Rajib Mall – PHI. 6. Software Engineering, Ian Sommerville - Pearson Education. 7. System Analysis & Design in changing world, Satzinger, Jackson, Burd – Course Technology. 8. Object Oriented Modelling and Designing with UML, Michael R Blaha & James R Rumbaugh - Pearson 9. System Analysis & Design, Elias M – Galgotia Publications. 10. System Analysis & Design & Introduction to S/W Engineering, Prof. S. Parthasarthy & Prof. B. W. Khalkar
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 303: Database handling using Python

Course Code	303
Course Title	Database Handling using Python
Credit	4
Teaching per Week	4 Hrs
Minimum weeks/ Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June, 2021
Medium of Instruction	English
Purpose of Course	<ul style="list-style-type: none"> - The course is aimed to give knowledge about use of SQLite and handle the dataset using Python. Basic purpose of this course to impart knowledge about database handling, dumping and converting to csv and text file using Python. - It also aims to understand connecting dataset with Python and execute queries using Python.
Course Objective	<ol style="list-style-type: none"> 1. To make students understand working with SQLite. 2. To make students understand various components of database like Triggers. 3. To make students understand handling database and dumping the database to csv and text file as well as converting csv and text files to database. 4. To make students understand the importance of library functions to connect python with SQLite and handle the database using python. 5. To handle csv and excel files using python and use various statistical analysis using Numpy and Pandas library. 6. To make student understand and learn matplotlib functions to perform basic visualization of data.
Pre-requisite	<ul style="list-style-type: none"> - SQLite Installation, setup and configuration should be shown practically as part of the preparation. - DDL-Create, Alter, Drop table, Rename, Column, Vacuum - DML-Insert, Update ,Delete, Replace - Constraints : Keys (Primary, Unique, Foreign), Null, Check Constraint - Views (Create and Drop).
Course Out come	As an outcome of the subject, it is expected that the students will gain conceptual and practical knowledge about handling database, dump the database, restore database, database interaction with python, important python libraries, and perform basic statistical analysis and basic Data Visualization.
Course Content	<p>Unit-1: Introduction to SQLite:</p> <ol style="list-style-type: none"> 1.1 SQLite advantages, features and Fundamentals: <ol style="list-style-type: none"> 1.1.1 SQLite datatype : (Dynamic type, SQLite manifest typing & type affinity) (NULL, INTEGER, REAL, TEXT, BLOB) 1.1.2 Transaction, Rollback, Commit 1.2 Data Filtering and Triggers <ol style="list-style-type: none"> 1.2.1 Filtering: Distinct, where, between, in, like, Union,

intersect, Except, Limit, IS NULL

1.2.2 Having, Group by, Order by, Conditional Logic (CASE)

1.3 SQLite joins: Inner, left, cross, self, Full outer joins.

1.4 SQLite Trigger:

1.4.1 Concepts of Trigger, Before and After trigger (on Insert , Update, Delete)

1.4.2 Create, Drop trigger, Disable and Enable trigger

Unit-2: Database backup and CSV handling:

2.1 SQLite dump :

2.1.1 Dump specific table into file, Dump only table structure

2.1.2 Dump entire database into file

2.1.3 Dump data of one or more tables into a file

2.2 CSV files handling:

2.2.1 Import a CSV file into a table

2.2.2 Export a CSV file from table

Unit-3: Python interaction with SQLite:

3.1 Module: Concepts of module and Using modules in python.

3.1.1 Setting PYTHONPATH, Concepts of Namespace and Scope

3.1.2 Concepts of Packages in python

3.2 Importing sqlite3 module

3.2.1 connect () and execute() methods.

3.2.2 Single row and multi-row fetch (fetchone(), fetchall())

3.2.3 Select, Insert, update, delete using execute () method.

3.2.4 commit () method.

Unit-4: Python Interaction with text and CSV:

4.1 File handling (text and CSV files) using CSV module :

4.1.1 CSV module , File modes: Read , write, append

4.2 Important Classes and Functions of CSV modules:

4.2.1 Open(), reader(), writer(), writerows(), DictReader(), DictWriter()

4.3 Dataframe Handling using Panda and Numpy:

4.3.1 csv and excel file extract and write using Dataframe

4.3.2 Extracting specific attributes and rows from dataframe.

4.3.3 Central Tendency measures :

4.3.3.1 mean, median, mode, variance, Standard Deviation

4.3.4 Dataframe functions: head, tail, loc, iloc, value, to_numpy(), describe()

Unit-5: Data Visualization using dataframe:

5.1 importing matplotlib.pyplot and plotting: (only two dimensional Plots)

5.1.1 range() , subplot() , legend(), columns(), len() functions.

5.2 scatter plot: concept of Scatter plot, set title, xlabel and ylabel)

5.3 Line chart : concept of line plot: plot(), set_title(), legend()

5.4 histogram chart : Concepts of histogram hist(),set title,

	xlabel and ylabel 5.5 Bar Chart : Concepts of Bar chart, bar(),set title, xlabel and ylabel.
	[Practical implementation for this paper is not specific to any editor or UI.]
Reference Book	<ol style="list-style-type: none"> 1. Learning with Python, Author: Allen Downe Publisher: DreamTech Press, ISBN: 978-9351198147 2. Python: The Complete Reference, Author: by Martin C. Brown, McGraw Hill Education,ISBN:978-9387572942 3. Learning Python: Powerful Object-Oriented Programming: 5th Edition, Author: Lutz M, Publisher: Shroff, ISBN:978-9351102014 4. Python In - Depth, Author: Ahidjo Ayeva , Kamon Ayeva, Publisher: BPB Publication, ISBN:978-9389328424 5. 5. The SQLite Handbook, Author: by Rita Blackburn, Publisher: Emereo Publishing, ISBN:978-1489136459 6. Using SQLite, Author: Jay A. Kreibich, Publisher: O'Reily, ISBN:978-0596521189 7. Android SQLite Essentials, Author: Sunny Kumar Adity, Publisher: Packt Publishing:978-1783282951
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

**Course: 304: Object Oriented Programming and Data Structures
(OOPP & D.S.)**

Course Code:	304
Course Title:	Object Oriented Programming and Data Structures (OOP & D.S.)
Total Credits :	4 Credits
Nature of Subject :	Theory and Practical application
Teaching per Week:	4 Hours per week per Semester
Minimum weeks per Semester:	15 weeks (Including class work, examination, preparation etc.)
Review/Revision Year:	June, 2021
Purpose of Course :	<ul style="list-style-type: none"> - Understand Object Oriented Programming Concepts and skills necessary for developing programs using C++. And it is important for a computer programmer to understand the storage representation and implementation of various data structures used in a computer program. This helps a programmer to use various data structures efficiently which in turn makes the program efficient. This course introduces various data structures, their storage representation & implementation. - Data Structure concepts are important concepts to understand and implement. Purpose of the Data structure is to get basic ideas about how user defined data structures can be implemented. Implementation of Data Structure concept is not language specific.
Objective :	<ol style="list-style-type: none"> 1. This course has been designed for the beginners to help them understand basic to advanced concepts related to C++ Programming language. 2. To make students understand the importance of OOP methodology and techniques. 3. Basic concepts of data structures, role and importance of data structures in computer programming. 4. Distinguish the key difference between storage & implementation of various data structures. 5. Recognize the problem properties and determine the use of appropriate data structures in different scenarios.
Pre-requisite:	Knowledge of C programming Language
Course Outcome :	<ul style="list-style-type: none"> - Students will be able to formulate a computing problem to executable computer program using C++ language. - Understand concepts of class, objects, polymorphism, Inheritance and other important Object oriented concepts. - Understanding about user defined data structures and their importance. - Basic implementations of Stack and Queue. - Concepts of variables, literals, data types, conversions of data types, input and output data and processing of data, inbuilt functions, arrays, header files, conditional and iterative statements.
Course Content:	<p>Unit 1. Concepts of OOPS: (Max. 20% of Weightage)</p> <ol style="list-style-type: none"> 1.1 Difference between procedural programming and OOPS 1.2 Various library(header) files require for C++ 1.3 Data types in C++ 1.4 Concepts of String: <ol style="list-style-type: none"> 1.4.1 character Array 1.4.2 pointer to character array 1.4.3 Use of String.h and its important functions: (strcmp, strcat, strcpy, strlen, strcmp) 1.5 Concepts of Class and Objects. <p>Unit 2.Data Encapsulation and inheritance: (Max. 20% Weightage)</p> <ol style="list-style-type: none"> 2.1 Access controls concepts (Public, Private, Protected) and difference among

	<p>them.</p> <p>2.2 Declaring simple class, member variables and member functions.</p> <p>2.3 Concepts and use of enum.</p> <p>2.4 Concepts of Data hiding, abstraction and encapsulation with examples</p> <p>2.5 Concepts of Inheritance and Types of Inheritance</p> <p>2.6 Constructors and Destructors</p> <p>Unit 3.Polymorphism (Max. 20% Weightage)</p> <p>3.1 Concepts of Polymorphism</p> <p>3.2 Compile time and Run time Polymorphism</p> <p>3.3 Overloading and Overriding: Concepts, difference and application</p> <p>3.4 Concepts of friend function</p> <p>3.5 Concepts of virtual function and pure virtual function</p> <p>Unit 4.Data Structure (Max. 20% Weightage)</p> <p>4.1 Introduction of Data Structure and application areas.</p> <p>4.2 Recursion concepts</p> <p>4.3 Difference among Linear and Non-Linear Data Structure</p> <p>4.4 Stack</p> <ul style="list-style-type: none"> - Concepts of Stack(LIFO) - Pop, Push and Display(Peep) - Application areas of Stack (Infix to postfix, Infix to prefix) <p>Unit 5.Queue (Max. 20% Weightage)</p> <p>5.1 Concepts of Queue(FIFO)</p> <p>5.1.1 Concepts of Queues and its basic operations</p> <p>5.2 Implementation of Queue:</p> <p>5.2.1 Simple Queue: insert, delete and display</p> <p>5.2.2 Double ended Queue: insert, delete and display</p> <p>5.2.3 Circular queue: Insert, delete and display.</p>
Reference Books:	<ol style="list-style-type: none"> 1. Let us C++, Yaswant Kanitkar - TMH Publication 2. Programming with C++, E Balaguruswamy - BPB Publication 3. C++ and Object-Oriented Programming Paradigm, Jana - PHI 4. The Complete Reference C++, Herbert Schildt - TMH 5. The C++ Programming Language, Stroustrup – Addison Wesley 6. OOP in Turbo C++, Robert Lafore - Galgotia Publication 7. C++ Primer, Lippman – Addison Wesley 8. Object Oriented Programming Fundamentals & Applications, Probal Sengupta – PHI 9. An Introduction to Data Structures with applications, Trembley – Tata McGraw Hill. 10. Algorithms – Data structure programs, Wirth Niclaus - PHI. 11. Data structures – A Programming Approach with C, Dharmender Singh Kushwaha and Arun Kumar Misra – PHI. 12. Fundamentals of Data structures, Horwitz E. and Sahni – Computer Science Press 13. Schaum’s outline of Data Structure with C++, John R. H. - Tata McGraw Hill. 14. Expert Data Structure with C, R. B. Patel - Khanna Publication 15. Data structures - a Pseudocode approach with C++, Richard F. Gilberg and Behrouz A. Forouzan - Thomson books
Teaching Methodology:	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method:	30% internal assessment. 70% External assessment

Course: 305-1: Web Designing-1

Course Code	305
Course Title	Web Designing-1
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	June 2021
Purpose of Course	Design is the process of collecting ideas, and aesthetically arranging and implementing them, guided by certain principles for a specific purpose. Web design is a similar process of creation, with the intention of presenting the content on electronic web pages, which the end- users can access through the internet with the help of a web browser. This course deals with designing of websites.
Course Objective	To make students aware of web terminology and website designing tools. Student can understand and implement the real functions of website development.
Pre-requisite	Basic knowledge of Simple HTML and HTML-5 concepts, windows based applications. Some very basic acquaintance with computers and the www is assumed.
Course outcome	<ul style="list-style-type: none"> • Students will be able to create, organize and design websites. • Understand elements of design with regard to the web • Get to Grips with necessary functionalities elements
Course Content	<p>Unit 1. Working with HTML5 and CSS:</p> <p>1.1 concepts of CSS:</p> <p>1.1.1 Adding CSS (Inline,Internal,External)</p> <p>1.1.2 HTML Links and attribute.(_self, _blank, _parent, _top)</p> <p>1.1.3 Absolute URL and Relative URL in <href></p> <p>1.1.4 tag and its attributes (src, alt, style,width,height)</p> <p>1.2 HTML forms :</p> <p>1.2.1 form Elements and their attributes :</p> <p style="padding-left: 40px;">1.2.1.1 form (action, method, novalidate, autocomplete,target)</p> <p style="padding-left: 40px;">1.2.1.2 label, input (text, radio button, Checkboxes, submit/reset button)</p> <p style="padding-left: 40px;">1.2.1.3 select(id, name,<option>),</p> <p style="padding-left: 40px;">1.2.1.4 textarea (name, rows, cols),</p> <p style="padding-left: 40px;">1.2.1.5 button(type, onclick)</p> <p style="padding-left: 40px;">1.2.1.6 datalist</p> <p>1.2.2 Media : Video, Audio</p> <p>Unit 2. Design Web Sites Using Bootstrap4</p> <p>2.1 Bootstrap Introduction</p> <p>2.2 Grid Structure</p> <p>2.3 Table, Colours, Alerts, Form Controls</p> <p>2.4 Buttons and ButtonGroups</p> <p>2.5 Images, Media Objects</p> <p>2.6 Pagination</p> <p>2.7 Bootstrap Grids</p> <p>2.8 Bootstrap Themes</p> <p>Unit 3. Overview of Java Script</p> <p>3.1 Overview of Client & Server-SideScripting</p> <p>3.2 Structure of Java Script</p> <p>3.3 Data types and Variables</p>

3.4 Operators (Arithmetic, Assignment, Comparison, Logical and Conditional Operator)

3.5 Control Structure

3.5.1 If...Else, switch..case

3.5.2 While, Do...While, For Loop

3.5.3 break, continue

3.6 Java Script String and Events

3.6.1 Javascript Strings types

3.6.2 String functions:

concat(), split(), indexOf(), lastIndexOf(), substring(), trim(), slice(), replace(), charAt()

3.6.3 Javascript Events :

3.6.3.1 Mouse Events : (click, mouseover, mouseremove, mouseout, mouseup)

3.6.3.2 keyboard Events : (keyup,keydown)

3.6.3.3 Form Event : (focus, submit, blur, change)

Unit-4: JavaScript Objects :

4.1 Creating object :

(By object literal, By creating instance of Object, By using an object constructor)

4.2 Date object :

4.2.1 Date constructor: Date(), Date(milliseconds), Date(dateString), Date(year, month, day, hours, minutes, seconds, milliseconds)

4.2.2 Date Methods: getDate(), getDay(),getMonth(), getHours(), setDate, setMonth(),setDay(), toString()

4.3 Document Object Model (DOM):

4.3.1 DOM concepts

4.3.2 DOM properties

4.3.3 DOM methods :

write(), writeln(),getElementById(),getElementsByName()

Unit-5: JavaScript Functions:

5.1 JavaScript Functions:

5.1.1 Defining function (with and without parameters)

5.1.2 calling function

5.1.3 return statement

5.1.4 Page redirection

5.2 Dialog boxes : Alert, confirm, prompt

5.3 Form validation :

5.3.1 Basic validation (All form details are filled)

5.3.2 Data format validation

(email, number, string, mobile number, name)

[All Units carry Equal Weightage]

Reference Books	<ol style="list-style-type: none"> 1. HTML & CSS: The Complete Reference - Thomas Powell - McGraw Hill Education 2. HTML Unleashed, Darnell Rick –Techmedia 3. HTML, XHTML, and CSS Bible - Steven M. Schafe - Wiley Publications 4. Cascading Style Sheets- The Definitive Guide, E. A Meyer –O’Reilly 5. Java Scripting Programming for Absolute Beginner, Harris -PHI 6. JavaScript Step by Step, Suehring -PHI 7. Bootstrap in 24 Hours, Sams Teach Yourself - JenniferKyrnin 8. Learning Bootstrap 4 - Matt Lambert – Packt Publishing 9. Bootstrap Responsive Web Development - Jake Spurlock - O’Reilly Media. 10. JavaScript and JQuery (Interactive Front-End Web Development) by Jon Duckett 11. JavaScript and JQuery (The missing manual) by David Sawyer MCFarland
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 305-02: Mobile Application Development - 1

Course Code	305-02
Course Title	Mobile Application Development – 1
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	June 2021
Purpose of Course	Mobile application development is the process of creating software applications that run on a mobile device, and a typical mobile application utilizes a network connection to work with remote computing resources. Mobile device is used for different purposes ranging from email to online shopping and multiple apps for different reasons. Hence, the mobile development process involves creating installable software bundles, implementing backend services such as data access with an API, and testing the application on target devices. Knowledge about mobile application development on Android platform and gradually on hybrid platform is need of the current era.
Course Objective	<ol style="list-style-type: none"> 1) To understand concepts of Mobile Technology 2) Understand the development process and have edge over mobile user interface (UI) design. 3) Understand various UI development tools, Application design interfaces and creating basic app on Android platform.
Pre-requisite	<p>Basic knowledge of Simple HTML, concept of Operating system and basics of coding.</p> <p>This course will be mandatory to pursue Paper-405-02 (Mobile Application Development -2) in Semester-4.</p>
Course outcome	<ul style="list-style-type: none"> - Students will be able to understand the concepts of Mobile technology - Students will have concepts of Android and Android frame work - Understand how data can be transferred using XML. - Understand setting up of Android environment. - Edge over Android widgets and development of basic Android based Apps.
Course Content	<p>Unit-1: Concepts of Mobile computing.</p> <p>1.1 Fundamentals of Mobile computing:</p> <ol style="list-style-type: none"> 1.1.1 Concepts of fixed and wireless network 1.1.2 Introduction of Multiplexing, Modulation 1.1.3 Fundamentals of spectrum, Bluetooth technology 1.1.4 Concepts of Wireless Application Protocol(WAP) 1.1.5 Concepts of Mobile Agents. <p>1.2 Introduction of Android</p> <ol style="list-style-type: none"> 1.2.1 History, concepts and Features of Android 1.2.2 Concepts of API framework <p>1.3 Intro. of Android Architecture (Software Stack)</p> <ol style="list-style-type: none"> 1.3.1 kernel Native Libraries 1.3.2 Concepts of Native Libraries and Android Runtime(Dalvik VM) 1.3.3 Application Framework 1.3.4 Application <p>Unit-2: Setting up Android Environment:</p> <p>2.1 Android Emulator</p> <ol style="list-style-type: none"> 2.1.1 Setting up JDK and Android Studio

	<p>2.1.2 Android SDK manager</p> <p>2.2 Creating Android Virtual Device (AVD)</p> <p>2.3 Creating first App:</p> <p>2.3.1 Activity</p> <p>2.3.2 Layout</p> <p>Unit-3: XML (Extensible Markup Language)</p> <p>3.1 Characteristic and Use of XML</p> <p>3.2 XML syntax (Declaration, Tags, elements)</p> <p>3.3 root element, case sensitivity</p> <p>3.4 XML document:</p> <p>3.4.1 Document Prolog Section</p> <p>3.4.2 Document element section</p> <p>3.5 XML declaration and rules of declaration.</p> <p>Unit-4:Creating basic App</p> <p>4.1 Basic App using Android studio</p> <p>4.1.1 Create new android project</p> <p>4.1.2 Write message and run</p> <p>4.1.3 Understanding different components.</p> <p>4.2 Dalvik Virtual Machine (DVM)</p> <p>4.3 Understanding AndroidManifest.xml</p> <p>Unit-5: Android Widgets(UI):</p> <p>5.1 Hiding Title bar</p> <p>5.2 screen Orientation (Portrait, Landscape)</p> <p>5.3 Form Widget Palette</p> <p>5.3.1 Placing text fields and Button</p> <p>5.3.2 Button onClick event</p> <p>5.4 Displaying Notification:</p> <p>5.4.1 Toast Class</p> <p>5.4.2 Displaying message on Toast</p> <p>5.5 ToggleButton:</p> <p>5.5.1 ToggleButton Attributes:(textOff, textOn)</p> <p>5.5.2 Event methods : getTextOff(), getTextOn(), setChecked()</p> <p>5.6 CheckBox:</p> <p>5.6.1 Event methods: isChecked(), setChecked()</p>
<p>Reference Books</p>	<p>1) Android Application Development (With Kitkat Support), Author: Pradeep Kothari, Publisher:DreamTech Press.,ISBN:978-9351194095</p> <p>2) Android Studio 3.0 Development Essentials: Android 8 Edition , Author: Neil Smyth, ISBN:978-1977540096</p> <p>3) Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Author: Alessandro Biessek, Packt Publishing House,ISBN:978-1788996082</p> <p>4) Beginning Flutter: A Hands On Guide to App Development, Author: Marco L. Napoli, Publisher: Wrox, ISBN:978-1119550822</p> <p>5) Android Programming for Beginners - Second Edition, Author:John Horton, Publisher: Image Short ISBN: 978-1789538502</p> <p>6) Android 9 Development Cookbook, Author: Rick Boyer, Publisher: Packet Publishing, ISBN:978-1788991216</p> <p>7) The Dart Programming Language, Author:Bracha, Publisher:Pearson Education India, ISBN:978-9332570368</p> <p>8) Google Flutter Mobile Development Quick Start Guide: Get up and running with iOS and Android mobile app development, Author: Prajyot Mainkar, Publication:Packt Publishing, ISBN:978-1789344967</p>

	9) Practical Flutter: Improve your Mobile Development with Google's Latest Open-Source SDK ,Author: Frank Zammetti, Publisher: Apress, ISBN:978-1484249710
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course-306: Practical

Course Code:	306
Course Title:	Practical
Total Credits :	06 Credits
Nature of Subject :	Practical only
Teaching per Week:	12 Hours per week per Semester
Minimum weeks per Semester:	15 weeks (Including class work, examination, preparation etc.)
Review/Revision Year:	June, 2021
Purpose of Course :	<ul style="list-style-type: none"> - Practical implementation of technologies covered as part of syllabus using required software and learning application areas. - Working with database using SQLite. - Understanding features of Python and its interaction with SQLite. - Understanding and learning programming concepts and various concepts of object oriented features using c++ programming language. - Understanding concepts of Data Structure and implementation of Stack (Pop, Push and Display) and Queue (Simple and Circular Queue) operations using any of the languages out of (C, C++ or Python). - Working with Web Design in direction of implementing various tools and scripts like HTML5, CSS, Bootstrap and JavaScript. - As an option to Web Design student can also opt Mobile computing and understand fundamentals of Android based technology, mobile application working and basic design concepts using Android studio.
Objective :	<p>Objective of this course is to</p> <p>(i) Understand some important features of Python programming language.</p> <p>(ii) Learn Database interaction with Python using SQLite database.</p> <p>(iii) Understand essentials of Object oriented concepts using C++.</p> <p>(iv) Concepts of Data Structure and its implementation</p> <p>(v) Students will select any one option out of Web Design or Mobile computing to excel their knowledge in direction of Web Designing or Mobile application development.</p>
Pre-requisite:	Knowledge of C programming, SQL, HTML, HTML5 and fundamentals of Python.
Course Outcome :	<ul style="list-style-type: none"> - At the end of this course, students will have hands on experience of writing and applying codes using Python and interact with SQLite. They will have concepts of taking data backups and dumping the database. - Students will have edge over concepts of object oriented programming, concepts of class, objects, encapsulation, polymorphism, Inheritance and implementation of it. - Students will also have an edge over concepts of data structures and their implementation (Stack and Queue concepts). Implementation of Data Structure will be open for the student to select any of the language out of C, C++ or Python. - Students can select any one option out of web design or mobile computing and gain edge over web designing using HTML5, CSS, Bootstrap and JavaScript or development of basic mobile app based on Android platform depending upon selected track.
Course Content:	<p>1. Codes and database interaction using Python and SQLite based on Paper-303 Version recommended : SQLite : ver. 2.8 or above, Python: 3.6 or above 303: - Database handling based on SQLite (Unit-1 and Unit-2).</p> <ul style="list-style-type: none"> - Python interaction with SQLite, csv, text files. Data Visualisation using dataframe obtained from multi-column cleaned labelled dataset (SQLite table, csv or txt file). <p>2. Practical implementation of OOPs concepts based on Course-Paper-304 (Unit-1,</p>

	<p>2 and 3).</p> <p>3. Practical implementation of Data Structure (Simple Stack operations (Push, Pop, Display) and Queue (Simple queue and circular queue)).</p> <p>4. Practical implementation based on Course-Paper-305-01 <u>or</u> 305-02. (No specific Editor / IDE are recommended).</p>
Teaching Methodology:	<ul style="list-style-type: none"> - Practical work - Lab sessions and hands on experience, Discussion, Self-Study - Students will create word document containing SQL based work including tables and queries and represent their work using presentation software at end of the semester.
Evaluation Method:	<p>30% Internal assessment. 70% External assessment.</p> <p>[For Internal and External Examination Suggested distribution of question weight will be as per following Weightage distribution] :</p> <p>(i) Python and SQLite : 30%</p> <p>(ii) C++ : 20%</p> <p>(iii) Data Structure : 20%</p> <p>(iv) Question on Paper-305-01 <u>or</u> Paper-305-02 : 30%</p>

SEMESTER - 4
Course: 401: Information System

Course Code	401
Course Title	Information System
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2021
Medium of Instruction	English
Purpose of Course	Make students aware and understand various types of Information Systems.
Course Objective	Learn the different types of Information Systems. To emphasize on the application of information to business management.
Pre-requisite	NIL
Course Out come	After completion of the course the students will understand and appreciate the basic concepts of Information System, importance of MIS for an organization and will be able to contribute effectively in the development and implementation of MIS in different types of organization.
Course Content	<p>Unit 1. Introduction</p> <ol style="list-style-type: none"> 1.1. Data & Information 1.2. Information need and benefits 1.3. Input, Processing, Output and feedback <p>Unit 2. Concepts of Systems</p> <ol style="list-style-type: none"> 2.1. Definition of system in an organization 2.2. Types of systems <ol style="list-style-type: none"> 2.2.1. Deterministic probabilistic systems 2.2.2. Open and close systems <p>Unit 3. Introduction to various Information Systems</p> <ol style="list-style-type: none"> 3.1. Business information Systems <ol style="list-style-type: none"> 3.1.1. Principal Function System in Business 3.1.2. Product flow and Information Flow 3.1.3. Principal Document Associated with Information Flow 3.2. ERP 3.3. Management Information Systems <ol style="list-style-type: none"> 3.3.1. Characteristics of MIS 3.3.2. Development process of MIS 3.4. Decision support systems <p>Unit 4. Transaction Processing Systems</p> <ol style="list-style-type: none"> 4.1. Overview of Transaction Processing System 4.2. Transaction Processing methods & objectives 4.3. Transaction Processing Activities <ol style="list-style-type: none"> 4.3.1. Data Collection 4.3.2. Data Editing 4.3.3. Data correction 4.3.4. Data Manipulation 4.3.5. Data Storage 4.3.6. Document Production and Reports 4.4. Traditional transaction processing Applications <ol style="list-style-type: none"> 4.4.1. Order Processing Systems 4.4.2. Purchase Systems 4.4.3. Accounting Systems <p>Unit 5. Case Studies Based on TPS</p> <ol style="list-style-type: none"> 5.1. Online Admission Process,

	5.2. Hospital Management and 5.3. Hotel Management.
Reference Book	<ol style="list-style-type: none"> 1. Principles of information system, Ralf M. Stair & George W. Reynolds - Thomson Learning Publisher. 2. Introduction to system analysis and Design, NCC – Galgotia Publications 3. Management information Systems – Text & Applications, CVS Murthy – HPH 4. Management information Systems – Organization and technology, K. C. Laudan & J.P. Laudan – Prentice Hall India. 5. Management information system, W. S. Jawadekar – Tata McGraw Hill. 6. E-Business and IS Solutions, J. Buffam – Addison Wesley. 7. Decision Support System and Intelligence Systems, Efraim Turban & Jay E. Aronson – Addison Wesley
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

402- IoT (Internet of Things)

Course Code	402
Course Title	IoT (Internet of Things)
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2021
Medium of Instruction	English
Purpose of Course	The purpose of this course is to provide basic understanding of IoT.
Course Objective	To understand the concepts and protocols related to Internet of Things. To get an idea where the application areas are available for the Internet of Things to be applied.
Pre-requisite	Basic Knowledge of Networking
Course Out come	On completion of this course, students will be able to: <ul style="list-style-type: none"> - Understand about IoT Technologies behind intelligent and smart devices - Learn about basics of IoT Hardware/Devices
Course Content	<p>Unit 1: Introduction to Internet of Things</p> <p>1.1 Definition & Characteristics of IoT 1.2 Introduction to IoT Architecture 1.3 Physical Design of IoT 1.3.1 Things in IoT 1.3.2 IoT Protocols (Ethernet , WIFI , WIMAX, LR-WPAN(Wireless personal area network), 2G/3G/4G Mobile Communication, IPV6,6LOWPAN,MQTT, WEB SOCKET)</p> <p>1.4 Logical Design of IoT 1.4.1 IoT Functional Blocks 1.4.2 IoT Communicational Models</p> <ul style="list-style-type: none"> - Request – Response - Publish –Subscribe - Push –Pull - Exclusive Pair <p>Unit 2. IoT and M2M</p> <p>2.1 Introduction M2M 2.2 Introduction to Sensor Technology 2.3 Difference between IoT and M2M, 2.4 Security for IoT 2.5 IoT Enabling Technologies 2.5.1 Wireless Sensor Networks 2.5.2 Big Data Analytics, 2.5.3 Embedded Systems.</p> <p>Unit 3.Sensors and Actuators in IoT</p> <p>3.1 Definition of Sensors 3.2 Types of sensors and its usage (Temperature, Humidity, Gas Detector, Ultrasonic, Fire detector, Light, Sound, IR, Water Level) 3.3 Introduction to Actuators 3.4 Types of Actuators 3.5 Difference between Sensors & Actuators</p>

	<p>Unit 4. Introduction to Raspberry pi and Arduiano</p> <p>4.1 Introduction on IoT Devices</p> <p>4.2 Basic Building blocks of an IoT Device</p> <p>4.3 Introduction to Raspberry pi (Concepts, purpose, Application areas)</p> <p>4.4 Components of Raspberry pi</p> <p>4.5 Introduction to Arduiano (Concept, purpose and Application areas)</p> <p>4.6 Difference between Raspberry pi and Arduiano</p> <p>Unit 5. Case Study</p> <p>5.1 IoT for Smart city applications</p> <p>5.2 IoT for Smart Home</p> <p>5.3 IoT for Health & Lifestyle</p>
Reference Books	<ol style="list-style-type: none"> 1. Internet of Things , A Hands – On Approach, Arshdeep Bahga, Vijay Madiseti published by Arshdeep Bahga& Vijay Madiseti 2. Internet of Things architecture and Design Principles, Raj Kamal, McGrawhill Education private limited, 2017 3. Learning Internet of Things, Peter Waher, / Packt Publishing Limited, 2015 4. The Internet of Things, Hakima Chaouchi, Wiley,2017 5. Getting started with the Internet of Things: by CunoPfister, O'Reilly Media. 6. The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

403 - Java Programming Language

Course Code	403
Course Title	Java Programming Language
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2021
Medium of Instruction	English
Purpose of Course	To teach Object Oriented Programming (OOP) concepts through programming using Java as the programming language.
Course Objective	<ol style="list-style-type: none"> 1. To make students understand Object Oriented Programming (OOP). 2. To make students understand various inbuilt Java classes and their working. 3. To make students understand the importance of OOP methodology. 4. To make students understand various types of OOP techniques.
Pre-requisite	Prior Knowledge object oriented concepts.
Course Out come	<p>On completion of this course, students will be able to understand how OOP principles work and importance of various coding techniques of OOP.</p> <p>This course will also help students to appreciate the role of inbuilt classes. On successful completion of this course, students will be able to follow programming methodology and how to apply it in their application.</p>
Course Content	<p>Unit 1. Introduction to Java</p> <ol style="list-style-type: none"> 1.1 Properties of Java 1.2 Comparison of java with C++ 1.3 Java Compiler, Java Interpreter 1.4 Identifier, Literals, Operators, Variables, Keywords, Data Types 1.5 Branching: If – Else, Switch 1.6 Looping: While, Do-while, For 1.7 Type Casting <p>Unit 2. Classes and Objects</p> <ol style="list-style-type: none"> 2.1 Simple Class, Field 2.2 Access Controls, Object creation 2.3 Construction and Initialization 2.4 Inheritance and Polymorphism in Java <ol style="list-style-type: none"> 2.4.1 Data encapsulation, overriding and overloading methods 2.5 this and super keywords 2.6 Static members, static block, static class 2.7 Interfaces: <ol style="list-style-type: none"> 2.7.1 Introduction to Interfaces, Interface Declaration. 2.7.2 Inheriting and Hiding Concepts. 2.7.3 Inheriting, Overloading and Overriding Methods and constructors. 2.7.4 Interfaces Implementations. <p>Unit 3. Basic Concepts of Strings and Exceptions :</p> <ol style="list-style-type: none"> 3.1 Strings <ol style="list-style-type: none"> 3.1.1 Basic String operations, String Comparison 3.1.2 String methods (charAt(), concat(), equals(), indexOf(), isEmpty(), join(), lastIndexOf(), length(), split(), substring(), trim()) 3.1.3 StringBuffer class and its constructors. 3.1.4 StringBuffer methods : (append(), insert(), update(), delete(), reverse(), capacity())

	<p>3.2 Introduction to Exceptions:</p> <p>3.2.1 Exception Types, User defined Exception</p> <p>3.2.2 Throw, Throws</p> <p>3.2.3 Try, Catch and Finally</p> <p>Unit 4. Threads and Packages:</p> <p>4.1 Thread</p> <p>4.1.1 Introduction to Threads, Thread Model</p> <p>4.1.2 Priority of Threads</p> <p>4.2 Package Naming, Type Imports</p> <p>4.2.1 Package Access, Package Contents</p> <p>4.2.2 Package Object and Specification</p> <p>Unit 5. Data Structure Implementation and Applet Classes</p> <p>5.1 Implementation of Data Structure using Java Class:</p> <p>5.1.1 Concepts of singly and singly circular link-list</p> <p>5.1.2 Singly Link List : Create, traverse, insert, delete node</p> <p>5.1.3 Singly circular link list: create, traverse, insert, delete node</p> <p>5.2 Applet Basics, Applet Architecture:</p> <p>5.2.1 Applet skeleton, Applet Display Methods</p> <p>5.2.2 HTML APPLETTAG (<APPLET>), Applet Viewer</p> <p>5.2.3 Passing Parameters to Applets</p>
Reference Books	<ol style="list-style-type: none"> 1. Java Programming Language – Ken Arnold James Gosling, David Holmes: –Addison Wesley (Pearson Education) 2. Java – The complete reference, – Herbert Schildt: – Tata McGraw Hill 3. Java 2 From Scratch: – Steven Haines: –PHI. 4. Programming in Java – E-Balaguruswamy: – Tata McGraw Hill 5. Java: How to Program: – Deitel & Deitel: – PHI
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>30% Internal assessment.</p> <p>70% External assessment.</p>

Course: 404: .NET Programming

Course Code	404
Course Title	.NET PROGRAMMING
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation etc.)
Review / Revision	June 2018
Medium of Instruction	English
Purpose of Course	This syllabus has been prepared for the beginners to help them understand basic .Net programming. After completing this, students will get a moderate level of expertise in .Net programming from where - they can take themselves to next levels.
Course Objective	<ul style="list-style-type: none"> - To make students understand .Net as simple, modern, object-oriented computer programming language developed by Microsoft to combine the power of .NET Framework and the CLR with the productivity benefits. - To make students understand basic .Net programming and will also take through various advanced concepts related to .Net programming language.
Pre-requisite	Students are expected have concepts related to Programming techniques using Object Oriented.
Course Out come	<p>On completion of this course, students will be able to understand the basic concepts of .Net framework and importance of various coding techniques. This course will also help students understand the role of CLR</p> <p>. After successful completion students will be able to follow programming methodology and how to apply it for their application.</p>
Course Content	<p>Unit 1. Overview of Microsoft .NET Framework</p> <ol style="list-style-type: none"> 1.1. The .NET Framework <ol style="list-style-type: none"> 1.1.1. Managed Code MSIL, Metadata and JIT Compilation - Automatic Memory Management. 1.2. The Common Language Runtime (CLR) 1.3. The .NET Framework class Library <p>Unit 2. Programming in Visual basic .net</p> <ol style="list-style-type: none"> 2.1. IDE 2.2. Variables and Data Types <ol style="list-style-type: none"> 2.2.1. Boxing and Unboxing 2.2.2. Enumerations 2.2.3. Data Type Conversion Functions 2.2.4. Statements 2.3. String & Date Functions and Methods 2.4. Modules, Procedures and Functions <ol style="list-style-type: none"> 2.4.1. Passing variable number of arguments 2.4.2. Optional arguments 2.5. Using Arrays and Collections 2.6. Control Flow Statements <ol style="list-style-type: none"> 2.6.1. Conditional Statements 2.6.2. Loop Statements 2.6.3. MsgBox and InputBox <p>Unit 3. Introduction to Windows controls</p> <ol style="list-style-type: none"> 3.1. Working with Tool Box Controls <ol style="list-style-type: none"> 3.1.1. Common controls - Label, Text Box, Button, Check Box, Radio Button, Date Time Picker, List Box, Combo box, Picture Box, Rich Text Box, Tree View,

	<p>Tool Tip, Progress bar, Masked Text box, Notify Icon, Link Label, Checked List box</p> <p>3.1.2. Container Controls</p> <p>3.1.3. Data - Data Set, Data Grid</p> <p>3.1.4. Component - Image list, error provider, Help provider, Timer</p> <p>3.2. Working with Menus and Dialogue Boxes</p> <p>3.3. Exception Handling</p> <p>3.3.1. Structured Error Handling</p> <p>3.3.2. Unstructured Error Handling</p> <p>Unit 4. Object Oriented Programming</p> <p>4.1. Creating Classes, Object Construction & Destruction</p> <p>4.1.1. Properties, Methods, Events</p> <p>4.1.2. Access Specifiers: Public, Private, Protected, Protected Friend</p> <p>4.1.3. Me, MyBase and MyClass keywords</p> <p>4.2. Abstraction, Encapsulation & Polymorphism</p> <p>4.3. Interfaces & Inheritance</p> <p>Unit 5. Database access using ADO.NET</p> <p>5.1. Visual Database Tools</p> <p>5.2. ADO .NET Object Model</p> <p>5.3. ADO .NET Programming</p>
Reference Book	<ol style="list-style-type: none"> 1. Visual Basic .NET Programming (Black Book) - By Steven Son Holzner, DreamTech Publication 2. Mastering Visual Basic.NET by Evangelos Petroustos BPB Publication 3. Moving to VB.NET: Strategies, Concepts, and Code - by Dan Appleman – Apress Publication 4. Microsoft Visual Basic .NET Step by Step - by Michael Halvorson, PHI Publication 5. Database Programming with Visual Basic.NET and ADO.NET - by F. Scott Barker – Sams Publication 6. Beginning .NET Web Services Using Visual Basic .NET - by Joe Bustos and Karlli Watson, Wrox Publication 7. .NET – Complete Development Cycle - by G. Lenz, T. Moeller, Pearson Education 8. Professional VB.NET, 2nd Edition - by Fred Barwell, et al – Wrox Publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 405-01: Web Designing-2

Course Code	405-01
Course Title	Web Designing-2
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	June 2021
Purpose of Course	Web Design requires designers to create graphics, typography as well as images which are used only on the World Wide Web. While creating any design, web designers need to maintain balance between creating a good design as well as the speed and efficiency for the webpage/ website. This course deals with server-side communication.
Course Objective	To make students aware of web terminology and website designing tools. Student can understand and implement the real functions of website development.
Pre-requisite	305-01: Web Designing -1 course of Semester-3.
Course outcome	<ul style="list-style-type: none"> • Students will be able to create, organize and design websites. • Students gain formal understanding of XML-based technologies which are used in Web-service. • Students will be able to make dynamic changes to a web pages as well as respond to user and browser events through JQuery • Students will be able to learn cross-browser supports via Ajax and Jason • Students will be able to write asynchronous code using various techniques through node.js
Course Content	<p>Unit-1 : Introduction of XML:</p> <p>1.1 Characteristic and Use of XML 1.2 XML syntax (Declaration, Tags, elements) 1.3 root element, case sensitivity 1.4 XML document: 1.4.1 Document Prolog Section 1.4.2 Document element section 1.5 XML declaration and rules of declaration.</p> <p>Unit-2: jQuery Fundamentals:</p> <p>2.1 Introduction and basics: 2.1.1 Advantage of jQuery and Syntax 2.1.2 jQuery Selectors: 2.1.3 jQuery Events (ready(),click(), keypress(),focus(),blur(),change()) 2.2 jQuery Effects: Show/Hide, Fade, Slide, Stop, Chaining, Callback 2.3 jQuery Manipulation methods: 2.3.1 Get/Set methods (text(), attr(), html(), val()) 2.3.2 Inert methods: (append(), prepend(),text(), before(), after(), wrap()) 2.3.3 Remove element methods : (remove(),empty(),unwrap()) 2.3.4 jQuery Get and Set CSS properties using css() method.</p> <p>Unit-3: JSON: (JavaScript Object Notation)</p> <p>3.2 Concept and Features of JSON 3.3 Similarities and difference among JSON and XML</p>

	<p>3.4 JSON objects(with string and Numbers))</p> <p>3.5 JSON Arrays and their examples :</p> <p>3.5.1 Array of string, Array of Numbers, Array of Booleans</p> <p>3.5.2 Array of objects, Multi-Dimensional Arrays</p> <p>3.5.3 JSON comments</p> <p>Unit-4: AJAX (Asynchronous JavaScript and XML):</p> <p>4.1 Fundamentals of AJAX technology:</p> <p>4.1.1 Difference between Synchronous and Asynchronous web application</p> <p>4.1.2 XMLHttpRequest technology</p> <p>4.2 XMLHttpRequest</p> <p>4.2.1 Properties :(onReadyStateChange, readyState, responseText, responseXML)</p> <p>4.2.2 XMLHttpRequest Methods : (Open(), send(), setRequestHeader())</p> <p>4.3 Working of AJAX and its architecture</p> <p>Unit-5: Node.js :</p> <p>5.1 Concepts, working and Features</p> <p>5.1.1 Downloading Node.js</p> <p>5.2 Setting up Node.js server(HTTP server)</p> <p>5.2.1 Installing on window</p> <p>5.2.2 Components</p> <p>5.2.2.1 Required modules, Create Server(http.createServer())</p> <p>5.2.2.2 Request and response</p> <p>5.3 Built-in Modules</p> <p>5.3.1 require() function</p> <p>5.3.2 User defined module: create and include</p> <p>5.3.3 HTTP module</p> <p>5.4 Node.js as Web-server:</p> <p>5.4.1 createServer() , writeHead() method</p> <p>5.4.2 Reading Query String, Split Query String</p> <p>5.5 File System Module:</p> <p>5.5.1 Read Files (readFile())</p> <p>5.5.2 Create Files(appendFile(),open(),writeFile())</p> <p>5.5.3 Update Files(appendFile(),writeFile())</p> <p>5.5.4 Delete Files(unlink())</p> <p>5.5.5 Rename Files(rename())</p>
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. JavaScript and JQuery (Interactive Front-End Web Development) by Jon Duckett 2. JavaScript and JQuery (The missing manual) by David Sawyer MCFarland 3. Essential ASP.NET Web Forms Development Full Stack Programming with C#, SQL, Ajax, and JavaScript Robert E. Beasley, Publisher: Apress 4 Foundations of Ajax, Ryan Asleson, Schutla, Publisher: Apres 5 Ajax: The Complete Reference By Thomas Powell, ISBN: 978-0-07-149216-4 6 Head First Ajax , Author: Rebecca M.Riordan, publisher: O'Reilly 7 Practical Node.js, Author: Azat Mardan,ISBN:978-1-4842-3038-1, Publisher: Apress 8 Node.JS Guidebook, BPB Publication, ISBN: 9789387284432, Author: Dhruvi Shah 9 JavaScript for Modern Web Development, ISBN: 9789389328721, eISBN: 9789389328738, Authors: Abhilasha Sinha, Ranjit Battewad, Alok Ranjan 10 Mastering HTML, CSS & Javascript Web Publishing, Authors:by Laura Lemay,Rafe Colburn, BPB Publication

	11 JavaScript by Example, Author: Elitle Quigley,Publication: Prentice Hall, ISBN: 9780137054893, 9780137054893. 12 XML in easy steps, Publication: Tata McGrawHill 13 XML crash course, Publisher: Tata McGraw Hill, ISBN: 9780071815161, 9780071815161 14 Beginning jQuery: From the Basics of jQuery to Writing your Own Plugins, by Jack Franklin Russ Ferguson,978-1484230268
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 405-02: Mobile Application Development - 2

Course Code	405-02
Course Title	Mobile Application Development – 2
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	June 2021
Purpose of Course	Mobile application development is the process of creating software applications that run on a mobile device, and a typical mobile application utilizes a network connection to work with remote computing resources. Mobile device is used for different purposes ranging from email to online shopping and multiple apps for different reasons. Hence, the mobile development process involves creating installable software bundles, implementing backend services such as data access with an API, and testing the application on target devices. Knowledge about mobile application development on Android platform and gradually on hybrid platform is need of the current era.
Course Objective	<ol style="list-style-type: none"> 1) To understand concepts of Mobile Technology 2) Understand the development process and have edge over mobile user interface (UI) design. 3) Understand various UI development tools, Application design interfaces and creating basic app on Android platform. 4) Concepts of DART and introduction of FLUTTER.
Pre-requisite	Paper-305-02 (Mobile Application Development -1) in Semester-3.
Course outcome	<ul style="list-style-type: none"> - Students will be able to understand the internal concepts of Android. - Students will have concepts of important Android Widgets(UI) - Concepts of DART. - Working concepts of Flutter. - Edge over Basic Flutter Widgets.
Course Content	<p>Unit-1: Project structure of Mobile Application:</p> <p>1.1 Internal details of Android Application:</p> <p>1.1.1 Dalvik VM, Screen Orientation</p> <p>1.1.2 AndroidManifest, R.java</p> <p>1.2 Android Widgets (UI)</p> <p>1.2.1 Default and Custom Checkbox</p> <p>1.2.2 Dynamic and Custom RadioButton</p> <p>1.2.3 Spinner, AlertDialog</p> <p>Unit-2 : Basic Attributes and Events of Important Android Widgets(UI)</p> <p>2.1 ListView, Custom ListView</p> <p>2.2 DatePicker, TimePicker, ProgressBar</p> <p>2.3 Horizontal and Vertical ScrollView</p> <p>2.4 AutoCompleteTextView, TextWatcher to EditText</p> <p>2.5 ImageSlider, ImageSwitcher, SearchView</p> <p>2.6 TAbLayout and FrameLayout</p> <p>Unit-3: Working with DART:</p>

	<p>3.1 DART overview, concept, features and installation</p> <p>3.2 Online editor DartPad and dart2js tool</p> <p>3.3 Executing Dart basic code using Command line, DartPad and IDE</p> <p>3.3 Understanding DART syntax:</p> <p>3.3.1 Identifiers, Datatypes, variables, comments</p> <p>3.3.2 Decision making (if, if..else, if..else if..., switch..case)</p> <p>3.3.3 Iterative statements (for, for...in loop, while, do..while)</p> <p>3.3.4 break, continue, label</p> <p>3.4 DART function :</p> <p>3.4.1 Calling function, deleting function</p> <p>3.4.2 Passing arguments to function, lexical scoping.</p> <p>Unit-4: Introduction of Flutter:</p> <p>4.1 Fundamentals of Flutter:</p> <p>4.1.1 Installation and Architecture of Flutter</p> <p>4.1.2 Features of Flutter</p> <p>4.1.3 Creating basic flutter project using Android Studio</p> <p>4.2 Flutter Widget:</p> <p>4.2.1 Types of flutter widget:</p> <p> 4.2.1.1 Visible and Invisible</p> <p> 4.2.1.2 StatelessWidget, StatefulWidget</p> <p> 4.2.1.3 Single child widget and Multiple child widget</p> <p>4.2.2 Visible widget(Constructor and Properties):</p> <p> Text, Image, Button, Icon</p> <p>4.3.3 Invisible widget(Constructor and Properties):</p> <p> column, row, center, padding, scaffold, stack</p> <p>Unit-5: Basic Flutter widget (Constructor, attributes and Properties)</p> <p>5.1 Text, TextField, Buttons, Slider</p> <p>5.2 Checkbox, Radio Button, Progress Bar, Lists</p> <p>5.3 Stack, Forms, AlertDialog, Tooltip</p> <p>5.4 Toast, Switch, Charts, Flutter Form.</p>
<p>Reference Books</p>	<p>1) Android Application Development (With Kitkat Support), Author: Pradeep Kothari, Publisher: DreamTech Press.,ISBN:978-9351194095</p> <p>2) Android Studio 3.0 Development Essentials: Android 8 Edition , Author: Neil Smyth, ISBN:978-1977540096</p> <p>3) Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Author: Alessandro Biessek, Packt Publishing House,ISBN:978-1788996082</p> <p>4) Beginning Flutter: A Hands On Guide to App Development, Author: Marco L. Napoli, Publisher: Wrox, ISBN:978-1119550822</p> <p>5) Android Programming for Beginners - Second Edition, Author:John Horton, Publisher: Image Short ISBN: 978-1789538502</p> <p>6) Android 9 Development Cookbook, Author: Rick Boyer, Publisher: Packet Publishing, ISBN:978-1788991216</p> <p>7) The Dart Programming Language, Author:Bracha, Publisher:Pearson Education India, ISBN:978-9332570368</p> <p>8) Google Flutter Mobile Development Quick Start Guide: Get up and running with iOS and Android mobile app development, Author: Prajyot Mainkar, Publication:Packt Publishing, ISBN:978-1789344967</p> <p>9) Practical Flutter: Improve your Mobile Development with Google’s Latest Open-Source SDK ,Author: Frank Zammetti, Publisher: Apress,</p>

	ISBN:978-1484249710
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course-406: Practical

Course Code:	406
Course Title:	Practical
Total Credits :	06 Credits
Nature of Subject :	Practical only
Teaching per Week:	12 Hours per week per Semester
Minimum weeks per Semester:	15 weeks (Including class work, examination, preparation etc.)
Review/Revision Year:	June, 2021
Purpose of Course :	<ul style="list-style-type: none"> - Practical implementation of technologies covered as part of syllabus using required software and learning application areas. - Understanding and learning concepts like Java programming and its Object and class concepts. - Various important concepts of Core Java like interface, package, threads. Also basic concepts related to Applet and Applet life cycle. - Basic concepts of .Net technology and implementation of different components of .Net Technology. - Students who selected Android Application will learn fundamental application development concepts including DART and Flutter. - Students who will select Web Design Development course will learn fundamentals of various important scripts and languages like XML, JSON, jQuery, AJAX and Node.js. It will give them a concept of using server side and client-side interaction.
Objective :	<ul style="list-style-type: none"> - Fundamental knowledge about platform independent object oriented Programming language like Java. - Various features of Core Java like interface, Packages, Garbage Collection, Exception handling, Threads and Applet. - To learn and enhance knowledge about .NET Technology to develop UI applications using different components and event driven codes. - Advance features of Web-designing and important tools and scripts at Client-end, middleware or server-end like XML, JSON, AJAX, Node.js, jQuery for those students who opt the 405-01 paper. - Android based application development advance features and fundamental knowledge about DART and Flutter for those students who opt for 405-02 paper.
Pre-requisite:	Object oriented concepts, knowledge of SQL, PL/SQL, Python, C, C++, Web Design Concepts (HTML5, CSS, Bootstrap, Java Script)
Course Outcome :	<ul style="list-style-type: none"> - At the end of this course, students will have hands on experience of writing and applying codes using Java programming Language. Object oriented concepts of Java , threads and Applet. - Students will understand concepts of .Net technology. - Students will have edge over concepts Programming skills and clear idea about using conditional and iterative statements, use of library functions and creating user defined functions. - Students who select web-designing-II as elective paper will learn advanced Web-Design concepts like JQuery, JSON, Node.js, AJAX. - Students who select Mobile Application Development-II course as elective will be able to work on advanced concepts on Android based mobile application development by learning DART, Flutter and advanced Android features.
Course Content:	<ol style="list-style-type: none"> 1. Practical implementation of Paper-403 by writing codes and execution of tasks based on Unit-1 to Unit-3 and Unit-5. 2. Practical implementation of Paper-404.

	<p>3. Practical implementation of Paper-405-01 or Paper-405-02.</p> <p>4. A Minor Project based on Course Paper-405 is recommended during semester however not mandatory.</p>
Teaching Methodology:	- Practical work, Lab sessions and hands on experience, Discussion, Self-Study
Evaluation Method:	<p>30% Internal assessment. 70% External assessment.</p> <p>[For Internal and External Examination Suggested distribution of question weight will be as per following Weightage distribution] :</p> <p>(i) Paper-403 : 30%</p> <p>(ii) Paper-404 : 30%</p> <p>(iii) Paper-405-01 OR Paper-405-02 : 40%</p>