

ST. JOSEPH'S COLLEGE (AUTONOMOUS)
BENGALURU-27
DEPARTMENT OF COMPUTER SCIENCE

**SYLLABUS FOR POST GRADUATION DIPLOMA IN ADVANCED COMPUTER
APPLICATION COURSE**



Re-accredited with 'A++' GRADE and 3.79/4 CGPA by NAAC

Recognized by UGC as College of Excellence

To be implemented from 2021 -22 Batch

Course Structure and Syllabus for

**POST GRADUATION
DIPLOMA IN ADVANCED
COMPUTER APPLICATION**

**(Six Semester Course) Proposed for
2021 batch onwards**

St. Joseph's College (Autonomous)

DEPARTMENT OVERVIEW

VISION STATEMENT

The vision of the department is to make possible for our students to have a deep and analytical understanding of the field and to enable them to use their immense potential to enhance the quality of human life.

MISSION STATEMENT

The mission of the department is to offer a high-quality science education in the science of computing, as well as to prepare students for career opportunities in this area requiring a high level of technical knowledge and skill. The department will continue to develop and administer programs which serve the needs of industrial computer scientists, researchers, and computer application specialists for whom the discipline of computing sciences provides indispensable tools.

INTRODUCTION TO PROGRAM

Bachelor of Computer Applications is a three year course which consists of six semesters. It is an undergraduate programme. The latest technology is facilitated for the swift learning and ability to adapt to the challenging circumstances of the present era. The infrastructure provides a best ambience for the student to excel in the field of computers. The enhancement of the teaching-learning process happens to the maximum level in the order.

PROGRAM OBJECTIVE

Prepare men and women who confidently face the challenging world and work in the most advanced stages of computers. Facilitates overall understanding of the requirements from the subject point of view. Prepare the students to provide professional solutions to real time problems.

SEMESTER WISE COURSE STRUCTURE

FIRST SEMESTER

Theory							
Sl.No.	Code	Course Title	Hrs / Week	Credits	IA	SE	Total
1	PGDCA101	Programming in Python	4	4	30	70	100
2	PGDCA102	Digital Image processing	4	4	30	70	100
3	PGDCA103	ADBMS Applications	4	4	30	70	100
4	PGDCA104	Machine Learning	4	4	30	70	100
5	PGDCA105	Web Technology	4	4	30	70	100

SECOND SEMESTER

Theory							
Sl.No.	Code	Course Title	Hrs / Week	Credits	IA	SE	Total
1	PGDCA201	Cyber Security	4	4	30	70	100
2	PGDCA202	Cloud Computing Project Implementation.	4	4	30	70	100
3	PGDCA203	Mobile Application	4	4	30	70	100
4	PGDCA204	Internet of Things	4	4	30	70	100
Practical							
1	PGDCA205	Project / Internship	4	4	30	70	100

PGDCA is completely application based course which includes more of practical. The students will gain hands on practical knowledge, which is more useful in the present IT sectors.

Marks Distribution

Class Internal Activity = 30 (Practical and Hands on Practice)

External Examination = 70 Mark

Question Paper Pattern (Online Examination) :

PART A

MCQ (Compulsory 10 questions) $1 \times 10 = 10$

PART B

Internal Choice Questions (Internal choice 5 questions) $5 \times 4 = 20$

PART C

Descriptive Questions (2 questions out of 3) $2 \times 10 = 20$

Course Outcomes and Course Content

Semester	I
Paper Code	21PGDCA101
Paper Title	PROGRAMMING IN PYTHON
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objective:

This paper will help the students in developing program using various objects. It is focus on structure and components of Python program. It emphasis on designing object-oriented program with Python classes.

UNIT I

Fundamentals Python:

a. Basics of Python program

4

Printing text, Printing the result of a calculation, Strings in Python, The Escape Character, Variables and Types, Numeric Data Types in Python, Numeric Operators, Expressions, Integer division, Operator Precedence. Programming examples for each concepts.

b. String and Slice

4

The String Data Type, Negative Indexing in Strings, Slicing, Slicing with Negative Numbers, Using a Step in a Slice, Slicing Backwards, String Operators, String Replacement Fields, String Formatting. Programming examples for each concepts.

UNIT II

Introduction to Blocks and Statements

a. conditional statement:

3

if Statements, elif, if, elif, and else in the Debugger, Using if with strings, Simple condition, Conditional Operators, Using and, or, in Conditions, Simplify Chained Comparison, Boolean Expression True and False, in and not in.

b. For Loop statement:

3

for loops, Stepping through a for loop, for loops Extracting Values from User Input, Extracting capitals, Iterating Over a Range, For loop, About Ranges, Nested for loops, continue, break, Initialising Variables and None,

c. while loops statement:

2

while loops, Break in a while loop, Continue, Binary Search, Augmented Assignment, augmented assignment in a loop, else in a loop

UNIT III

Introduction to Sequence Types

a. Lists concepts:

3

Lists, Immutable Objects, Mutable Objects, Binding Multiple Names to a List, Common Sequence Operations, Operations on Mutable Sequences, Appending to a List, Iterating Over a List, The enumerate Function, Adding items to lists, Removing Items from a List, Sorting Lists.

b. Additional operations on List

3

Built-in Functions, Sorting Things, Case-Insensitive Sorting, Creating Lists, Replacing a slice, Deleting Items from a List, Removing the High Values, Removing Items from a List Backwards, The Reversed Function, Processing Nested Lists.

c. Join and Tuple

2

The join Method, The split Method, Tuples, Tuples are Immutable, Unpacking a Tuple, Practical uses for Unpacking Tuples, Nested Tuples and Lists, Nested Indexing.

UNIT IV

Functions, Sets and Dictionaries and Object orientation in Python

a. Concepts of function in Python:

3

Defining a function, Program flow when calling a function, Parameters and arguments, Debugging with parameters, Functions calling functions, Returning values, Returning None, Handling invalid arguments, Default parameter values, Writing a Docstring, Defining different parameter types. Example for Dictionaries and sets.

b. Object-orientation program in Python:

5

Object-orientation programs features, Concept of class and objects, Private and Public access specifies, Types of inheritance, Magic Methods, Method overloading and operator overloading, Types of errors, Exception Handling with multiple exceptions and user- defined exceptions.

UNIT V

File Handling in Python and Database

a. Working file:

3

Syntax of open() function and modes, read(), write() and append. Dealing with different types of files and operations. Other operation of file Delete with example.

b. Database in Python:

5

Connection creation, database creation, insert options, read operation, update operation, delete operation, Recovery with roll back operation, handling error, filter query on SQL (CRUD operations)

REFERENCES:

1. “Python Programming: A Complete Guide for Beginners to Master, Python Programming Language” by Brian Draper
2. “Python Programming for Beginners: Python Programming Language Tutorial” by Joseph Joyner

BLUEPRINT

Code number: **21PGDCA101**

Title of the paper: **Programming in Python**

Chapter	Number of Hours	Total marks for which the question are to be asked (including bonus questions)
UNIT I	8	8
UNIT II	8	24
UNIT III	8	24
UNIT IV	8	18
UNIT V	8	18
TOTAL	40	92
Maximum marks for the paper (Excluding bonus questions) = 70		

Course Outcome

CO1	Knowledge	Have developed a good knowledge of the Python programs syntax and logics
CO2	Understand	Have developed a very good understanding of advanced feature used in object - oriented programs.
CO3	Apply	Be able to implement various class and functions of Python to solve the real world problems.
CO4	Analyze	Able to test and debug the codes .
CO5	Evaluate	Able to select best logic to obtain an optimal solutions for a given problems.
CO6	Create	Able to develop programs and associate with an interdisciplinary problem.

Semester	I
Paper Code	21PGDCA102
Paper Title	DIGITAL IMAGE PROCESSING
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objective:

To treat the 2D systems as an extension of 1D system design and implement techniques specific to 2D systems. This paper focuses on providing tools in processing digital images. The student can analysis various features of images and it quality.

UNIT – I

REVIEW OF DIGITAL IMAGE PROCESSING

a. Main components of digital images: 4

Components of image processing system, Sampling and Quantization. Sampling and Quantization. Color Models, Basic relationships: Neighbors, Connectivity, Distance Measures between pixels.

b. Approach in image processing: 4

Steps in digital image processing-Elements of visual perception- brightness adaptation, Mach band effect. Image enhancement in spatial and frequency domain, Histogram equalization.

UNIT – II

SEGMENTATION

a. Steps in segmentation and features: 3

Morphological operations, Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed. Texture feature based segmentation, Graph based segmentation, Wavelet based Segmentation - Applications of image segmentation.

b. Image Restoration

5

Noise models, Mean Filters, Order Statistics, Adaptive filters, Band reject Filters, Band pass Filters, Notch Filters, Optimum Notch Filtering, Inverse Filtering Wiener filtering Segmentation contour models.

UNIT III

FEATURE EXTRACTION

a. Edge detection operators

4

First and second order edge detection operators, Phase congruency, Localized feature extraction -detecting image curvature, shape features, Hough transform, shape skeletonization.

b. Detection of Discontinuities:

5

Edge Linking and Boundary detection – Region based segmentation-

UNIT – IV

REGISTRATION ,TRANSFORMATION AND RESAMPLING

a. Registration processing:

4

Preprocessing, Feature selection - points, lines, regions and templates, Point pattern matching, Line matching, Region matching, Template matching.

b. Transformation functions:

2

Similarity transformation and Affine Transformation.

c. Resampling

2

Nearest Neighbor and Cubic Splines.

UNIT V

IMAGE SAMPLES WITH CASE STUDY FOR BOUNDARY DETECTION

a. Object features

4

Boundary descriptors, Moments, Texture descriptors- Autocorrelation, Co-occurrence features, Run length features, Fractal model based features, Gabor filter, wavelet features.

3

b. Hands on practice: Samples for image restoration and analysis of the extracted features with example

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
2. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
3. John C. Russ, "The Image Processing Handbook", CRC Press, 2007.
4. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.
5. Rick S. Blum, Zheng Liu, "Multisensor image fusion and its Applications", Taylor & Francis, 2006.
6. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.

BLUEPRINT

Code number: **21PGDCA102**

Title of the paper: **Digital Image Processing**

Chapter	Number of Hours	Total marks for which the question are to be asked (including bonus questions)
UNIT I	8	8
UNIT II	8	24
UNIT III	8	24
UNIT IV	8	18
UNIT V	8	18
TOTAL	40	92
Maximum marks for the paper (Excluding bonus questions) = 70		

COURSE OUTCOMES:

CO1	Knowledge	Have developed a good knowledge of the image features and types
CO2	Understand	Have developed a very good understanding importance of image processing in the current situations.
CO3	Apply	Be able to implement various techniques to extract the features of digital images
CO4	Analyze	Able to detect and replace the distortions/ noises in the digital images
CO5	Evaluate	Able to compare the normal images with that of sample images.
CO6	Create	Able to create a data report about the images which can be the references.

Semester	I
Paper Code	21PGDCA103
Paper Title	Advanced Database Management Systems
Number of Teaching hours per week	04
Total number of teaching hours per semester	40
Number of credits	04

Objectives

This paper covers database design and SQL; it also provides an understanding of relational Database, Parallel Database and Data Warehouse. It emphasizes on a practical approach to design a Complete database for various entities.

UNIT I

Database Concepts:

a. Introduction to database

Characteristics of Database Approach, Functional Dependency, Normalization. 4

b. Query Processing and Optimization 2

Introduction, General Optimization, Strategies, Algebraic Manipulation-Algorithm for optimizing Relational Expressions.

c. Hands on practice

All SQL commands with certain entities. (Bank, Education Institution, Library Management System etc.) 2

UNIT II

Transaction Processing and Concurrency Control:

a. Introduction to transaction processing and concurrency control

4

Definition of Transaction and ACID properties, transaction Recovery, Concurrency

Control Techniques: Lock based Concurrency control -Optimistic Concurrency Control Timestamp based Concurrency Control, Deadlocks.

b. Database Security

Security Issues, Control Measures- Discretionary, mandatory and role based access control. 1

c. Database Recovery Techniques

Recovery Concepts- Deferred Update and Immediate Update techniques, Shadow Paging – ARIES. 2

d. Hands on practice

Implementing transaction recovery on a database. 1

UNIT III

PARALLEL DATABASES:

a. I/O Parallelism: 3

Inter and Intra Query Parallelism – Inter and Intra operation Parallelism Design of Parallel Systems.

b. Distributed Database Concepts: 3

Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing.

c. Case Study

Comparative study between inter and intra operation parallelism (Case Study) 2

UNIT IV

DATA WAREHOUSE FUNDAMENTALS:

a. Introduction to Data Warehouse 4

OLTP Systems, Differences between OLTP Systems and Data Warehouse, Characteristics of Data Warehouse, Functionality of Data Warehouse, Advantages and Applications of Data Warehouse.

b. Methodology 4

Top- Down and Bottom-Up Development Methodology, Tools for Data warehouse development, Data Warehouse Types.

UNIT V

Data Warehouse Architecture:	2
a. Introduction	
Components of Data warehouse Architecture, Dimensional Modeling- Introduction, E-R Modeling, E-R Modeling VS Dimensional Modeling.	
b. Data Warehouse Schemas	3
Star Schema, Inside Dimensional Table, Inside Fact Table, Fact Less Fact Table, Granularity, Star Schema Keys, Snowflake Schema, Fact Constellation Schema.	
c. Data Warehouse & OLAP	2
Introduction to OLAP, Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP, What is Multidimensional Data.	
d. OLAP Architectures	1
MOLAP, ROLAP, HOLAP, Data Warehouse and OLAP-Hypercube & Multi cubes.	

REFERENCES:

- Jeffrey D. Ullman “Principles of Database Systems”, Third Edition, Galgotia Publication Pvt. Ltd.
- R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2008.
- .Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw Hill, 2011.
- C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
- Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
- Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

BLUEPRINT

Code number: **21PGDCA103**

Title of the paper: Advanced Database Management Systems

Chapter	Number of Hours	Total marks for which the question are to be asked (including bonus questions)
UNIT I	8	8
UNIT II	8	24
UNIT III	8	24
UNIT IV	8	18
UNIT V	8	18
TOTAL	40	92
Maximum marks for the paper (Excluding bonus questions) = 70		

Course Outcome

CO1	Knowledge	Have developed a good knowledge of the DBMS tools used to design Database
CO2	Understand	Have developed a very good understanding of advanced feature to modify the content of the database
CO3	Apply	Be able to implement various commands in manipulating and maintaining the Database for various entities
CO4	Analyze	Able to estimate the query based cost for an efficient and dynamic Database.
CO5	Evaluate	Able to select best tools required for the front end design along with database.
CO6	Create	Able to create complete Database and maintain without anomalies.

Semester	I
Paper Code	21PGDCA104
Paper Title	Machine Learning using Python
Number of Teaching hours per week	04
Total number of teaching hours per semester	40
Number of credits	04

Objectives

The purpose of this course is to focus on introduction to machine learning with Python. The student will be able explore several clustering, classification, and regression algorithms and evaluate to perform a variety of machine learning tasks. The students will be able to apply and generate predictions to perform segmentation on real-world data sets.

UNIT 1

Introduction to python

a. Overview:

3 Python variables and Data types, Control flow, List, tuples, sets, and dictionary, Loops, Functions and lambda functions, Modules, File handling

b. Introduction to Numpy

Introduction to Matplotlib and seaborn, Scatter plot (2D and 3D), Line plot, bar graphs 2
Pair plot, Histogram, and PDF

c. Introduction to Pandas

Series and DataFrame, Basic Data Frame operations (Values count, fill na, sort values, 3
sort index, drop duplicate, unique, isin, isnull, between, etc.)

UNIT II

Introduction to Statistics

a. Statistical Approaches:

4
Population vs Sample, Mean, variance, standard deviation, Median, percentile, quantiles
IQR, MAD, PDF, and CDF.

b. Exploratory data analysis

4
Box plot, Violin plot, Univariate, bivariate, and multivariate data analysis.

UNIT III

Project 1 - EDA

a. Data preprocessing

3

Missing values, OneHotEncoding, LabelEncoding, train test split, standard, and normal transformation

b. Regression

5

Linear regression, Polynomial regression, Support vector regression, Decision tree regression
Random forest regression, Model evaluation and accuracy score.

UNIT IV

Project 2 - Regression - Boston house price prediction

a. Classification

4

Logistic, K-NN, Support vector machine, Naive Bayes, Decision tree, Random forest, Model evaluation

b. Model selection and accuracy boosting

4

K-fold cross-validation, Grid search CV, XGBoost

UNIT V

Project 3 - Classification

a. Model deployment

5

Introduction to Streamlit, Creating a basic web page, deploying machine learning model on the cloud

b. Hand- on Practice integrating all the concepts

3

REFERENCES:

1. The Elements of Statistical Learning: Data Mining, Inference, and Prediction
Trevor Hastie, Robert Tibshirani, and Jerome Friedman

2. The Hundred-Page Machine Learning Book
Andriy Burkov

3. Machine Learning
Tom M. Mitchell

4. Python Machine Learning
Sebastian Raschka and Vahid Mirjalili

5. Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems
Aurélien Géron

BLUEPRINT

Code number: **21PGDCA104**

Title of the paper: **Machine Learning using Python**

Chapter	Number of Hours	Total marks for which the question are to be asked (including bonus questions)
UNIT I	8	8
UNIT II	8	24
UNIT III	8	24
UNIT IV	8	18
UNIT V	8	18
TOTAL	40	92
Maximum marks for the paper (Excluding bonus questions) = 70		

Course Outcome

CO1	Knowledge	Have developed a good knowledge statistical tools
CO2	Understand	Have developed a very good understanding of various approaches to relate the data
CO3	Apply	Be able to implement algorithms solve the numerical problems for a large data sets.
CO4	Analyze	Able to analyze the data and generate a report to a decision based on the result.
CO5	Evaluate	Able to select best tools required to compare and select the relevant data.
CO6	Create	Able to create finalize the quality of the data and its requirements.

Semester	I
Paper Code	21PGDCA105
Paper Title	Advanced Web Technologies.
Number of Teaching hours per week	04
Total number of teaching hours per semester	40
Number of credits	04

Objectives

This paper provides an insight to develop a website using essential tools of Angular and an integration of ASP .NET for an interactive web pages. This paper also focuses on back end support in building queries and introduction of Firebase.

UNIT I

Basic elements of HTML and JavaScript

a. HTML

3

Basic syntax, Standard structure, Basic text markup, Images, Hyper Links. Lists, Tables, Forms, Frames (attributes for all HTML elements).

b. Cascading Style Sheets

2 Introduction,

Style syntax ,Types of style sheets, , Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and <div> tags.

c. The Basics of JavaScript

3

Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, data types, operators and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Strings, Functions(built-in and user defined), Constructors, DOM, Events and Event Handling.

UNIT II

ES6, TypeScript, Angular-CLI and Angular Components

a. ES6

1

Module system-Classes-Variable declaration-Arrow Functions-Template Strings.

b. TypeScript

2

Type safety, inference and intellisense-Interfaces-Decorators.

c. Angular	2
CLI & project structure-Creating a new project-Project settings, bootstrapping-Building and serving-Component-based architecture-Angular building blocks overview-Generating project elements-Root	
d. Angular Components	2
Angular Components-Component definition-Component types-Template syntax-Data, property and event	
Binding- Using directives and pipes-Inputs-Outputs (events)-Component style	
e. Advanced Components	1
Data projection, building a wrapper component-Querying view and children	
Dynamic components	

UNIT III

Providers, Dependency Injection, Observables	2
a. Providers and Dependency Injection-Understanding the role of the Provider-Understanding the injector tree-Creating and using a class provider (service)-Other provider strategies-Configuring providers.	
b. Observables and RxJS	2
Subscription- RxJS Operators-Creating Subjects and Observables	
c. Http Client	2
Http requests (GET, PUT, and POST)	
Configuring headers-Interceptors-Progress events	
d. Angular Router	2
Setting up the router-Navigation-Child routes-Routing params-Lazy loading-Guards and hooks	

UNIT IV

Angular Modules, directives and Pipes	
a. Angular Modules and Directives	2
Root Module vs. Feature Module-Module definition-Module configuration	
Types of directives-Built-in directives-Writing your own directives	
b. Pipes-Sync and async Pipes	2
Built-in Pipes-Writing your own pipes, Angular Forms	
c. Template-driven forms-Reactive forms	2
Form Builder, Form validation, Custom validators and Async validators	
d. State management with ngRx	2
Understanding Redux architecture-ngRx Store-Actions & Reducers-Middleware-Effects and Facades-Action Splitters	

UNIT V

ASP.NET Core and API Fundamentals

a. Building an API with ASP.NET Core

3

Introduction to REST and HTTP-Designing the API & URI

Using Status Codes-Using Get for Collections

b. Using Query Strings

2

Modifying Data-Implementing POST, PUT & DELETE. Integration of front end and back end.

c. Fire Base

3

Overview, Environment Setup, Data, Arrays, write Data, Write List Data, Write

Transactional Data, Read Data, Event Types, Detaching Callbacks and Queries.

REFERENCES:

- M. Srinivasan: Web Technology Theory and Practice, Pearson Education, 2012.
- Jeffrey C. Jackson: Web Technologies- A Computer Science Perspective, Pearson Education, Eleventh Impression, 2012.
- Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
- Internet Technology and Web Design, Instructional Software Research and Development (ISRD) Group, Tata McGraw Hill, 2011.

BLUEPRINT

Code number:21PGDCA105

Title of the paper: Advanced Web Technologies

Chapter	Number of Hours	Total marks for which the question are to be asked (including bonus questions)
UNIT I	8	8
UNIT II	8	24
UNIT III	8	24
UNIT IV	8	18
UNIT V	8	18
TOTAL	40	92
Maximum marks for the paper (Excluding bonus questions) = 70		

Course Outcome

CO1	Knowledge	Have developed a good knowledge of the tools (Angular) used to design web page
CO2	Understand	Have developed a very good understanding of advanced techniques to develop and test the web pages.
CO3	Apply	Be able to implement the techniques to build projects in web based applications.
CO4	Analyze	Able to test and debug the codes in developing an effective web sites
CO5	Evaluate	Able to compare and implement better codes to reduce the complexity of the web design process.
CO6	Create	Able to create and host the web site with domain knowledge.

Course Outcomes and Course Content

Semester	II
Paper Code	21PGDCA201
Paper Title	Network and cyber Security
Number of teaching hours per week	04
Total number of teaching hours per semester	40
Number of credits	04

Objective of the Paper:

This course deals with how to protect information and information infrastructure in cyberspace, build capabilities to prevent and respond to cyber threats, reduce vulnerabilities and minimize damage from cyber incidents through a combination of institutional structures and cyber laws.

UNIT-I

Cryptography

- a. Introduction to Cryptography: 6
 Symmetric key Cryptography, Asymmetric key Cryptography ,Convention Encryption Model, Classical Encryption Techniques, Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength Of DES, Differential And Linear Cryptanalysis Block Cipher.
- b. Design Principles: 2
 Block Cipher Modes Of Operations, Conventional Encryption Algorithms, Public Key Encryption.

UNIT-2

Network Security

Introduction to Security: 4
 Security Approaches, Principles Of Security, Types Of Attacks, Intruders, (IDS and IPS)Intrusion Detection And Prevention System, Message Authentication, Digital Signatures, Applications of Cryptography.

Overview of Firewalls: 4

Types of Firewalls, User Management, VPN Security Security Protocols: - security at the

Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

UNIT- 3

Introduction to Cyber Security

Overview of Cyber Security:

4

Security Fundamentals-:Authentication Authorization Accountability, Social Media, Social Networking and Cyber Security. Cyber Attack and Cyber Services, Computer Virus – Computer Worms – Trojan horse. Vulnerabilities - Phishing - Online Attacks – Pharming - Phishing

Cyber Attacks:

4

Cyber Threats - Zombie- stuxnet - Denial of Service Vulnerabilities - Server Hardening-TCP/IP attack-SYN Flood.

UNIT-4

Cyberspace and the Law

Introduction to Cyber law:

4

Cyber Security Regulations, Roles of International Law, the state and Private Sectors.

Cyberspace Standards:

4

Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

UNIT-5

Introduction to Cyber Forensics

Cyber Forensics:

4

Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding.

Protecting email:

4

Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.

REFERENCES:

1. Thomas R, Justin Peltier, John, Information Security Fundamentals, Auerbach Publications.
2. AtulKahate, Cryptography and Network Security 2nd Edition, Tata McGrawHill.
3. Stallings, "Cryptography & Network Security - Principles & Practice", Prentice Hall, 3rd Edition 2002.

4, Nina Godbole, Sunit Belapure, Cyber Security, Wiley India 1st Edition 2011

5. Dan Shoemaker and Wm. Arthur Conklin, Cyber security: The Essential Body Of Knowledge, Delmar Cengage Learning; 1 edition

BLUEPRINT

Code number: 21PGDCA201

Title of the paper: **Network and Cyber Security**

Chapter	Number of Hours	Total marks for which the questions are to be asked (including bonus questions)
Unit I	8	19
Unit II	8	24
Unit III	8	19
Unit IV	8	19
Unit V	8	15
TOTAL	40	96
Maximum marks for the paper (Excluding bonus question)= 70		

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Have developed a good knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
CO2	Understanding	Have developed a very good understanding on key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft.
CO3	Apply	Be able to Interpret and forensically investigate security incidents
CO4	Analyze	Be able to analyse and resolve security issues in networks and computer systems to secure an IT infrastructure.
CO5	Evaluate	Be able to design, develop, test and evaluate secure software.
CO6	Create	Be able to develop policies and procedures to manage enterprise security risks

Course Outcomes and Course Content

Semester	II
Paper Code	21PGDCA202
Paper Title	CLOUD COMPUTING
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objective of the Paper:

Molding candidates to Skilled System/Cloud Engineer with Information Security knowledge to maintain the Systems, Networks and cloud infrastructure in today's scenario. molding candidates to Skilled System/Cloud Engineer with Information Security knowledge to maintain the Systems, Networks and cloud infrastructure in today's scenario..

UNIT – I

INTRODUCTION

a. Overview of Computing Paradigm:

4

Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing.

b. Introduction to Cloud Computing:

4

Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics & Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing ,Role of Open Standards

UNIT – II

CLOUD ENABLING TECHNOLOGIES

a. Architecture:

4

Service Oriented Architecture REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures.

b. Tools:

4

Tools and Mechanisms – Virtualization of CPU –Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT – III

CLOUD COMPUTING ARCHITECTURE

8

Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services.

UNIT IV

CLOUD COMPUTING SERVICES AND STORAGE

8

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture Service Models (XaaS) : Infrastructure as a Service(IaaS), Platform as a Service(PaaS),Software as a Service(SaaS) Deployment Models: Public cloud,Private cloud, Hybrid cloud,Community cloud. Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT – V

RESOURCE MANAGEMENT , SECURITY IN CLOUD AND CLOUD TECHNOLOGIES

a. Resource Management

3

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources

b. Security Overview

5

Cloud Security Challenges –Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM –Security Standards. adoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, –Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O’Reilly, 2009.
4. *Cloud Computing Bible*, Barrie Sosinsky, Wiley-India, 2010
5. *Cloud Computing: Principles and Paradigms*, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
6. *Cloud Computing: Principles, Systems and Applications*, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
7. *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

BLUEPRINT

Code number: 21PGDCA202

Title of the paper: **Cloud Computing**

Chapter	Number of Hours	Total marks for which the questions are to be asked (including bonus questions)
Unit I	8	19
Unit II	8	24
Unit III	8	19
Unit IV	8	19
Unit V	8	15
TOTAL	40	96
Maximum marks for the paper (Excluding bonus question)= 70		

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Have developed a good knowledge about cloud storage and its features
CO2	Understanding	Have developed a very good understanding the requirement of cloud storage in the managing large volume of data.
CO3	Apply	Be able to apply various resources that can improve the speed of access in using cloud storage
CO4	Analyze	Be able to analyse various advantages and limitations of cloud computing in various fields.
CO5	Evaluate	Be able compare the security level in using cloud storage.
CO6	Create	Be able to create web based services that can support the projects in handling structured and unstructured data.

Course Outcomes and Course Content

Semester	II
Paper Code	21PGDCA203
Paper Title	Mobile Applications
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objectives:

This course will help student to improve the speed by writing apps for Android devices. Ability in Implementing layout management and multi-layout definition techniques to create adaptable user interfaces for mobile applications that share a common data model. Manage user data and multimedia on a mobile device via the Android framework libraries and Publish Apps to the Google Play Store.

UNIT 1

ANDROID OVERVIEW AND ARCHITECTURE

a. Android History:

4

Android versions, various Android devices on the market , applications , Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs)

b. Android Architecture:

4

Overview and Creating an Example Android Application: The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik

VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework.

UNIT 2

ANDROID SOFTWARE DEVELOPMENT PLATFORM

a. Introduction to Android Project:

4

Creating a New Android Project Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD.

b. Activity and its features:

4

Activity and Activity Life cycle, Reviewing the Layout and Resource Files, Understanding Java SE and the Dalvik Virtual Machine , The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder, Leveraging Android XML, Screen Sizes , Launching Your Application: The AndroidManifest.xml File , Creating Your First Android Application

UNIT 3

ANDROID FRAMEWORK OVERVIEW AND VIEWS

a. Android Application Components:

4

Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components Android Manifest XML: Declaring Your Components.

b. Understanding Android Views:

4

Views, View Groups and Layouts. Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool.

UNIT 4

GRAPHICAL USER INTERFACE SCREEN, PICTURES AND MULTIMEDIA

a. UI and Properties:

4

Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using

Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using views.

b. Images and feature: 2

Displaying PicturesGallery, ImageSwitcher, GridView, and ImageView views to display images, Creating Animation.

c. Multimedia: 2

Audio, Video, Camera, Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.

UNIT 5

FILES, DATABASES, INTENT, ANDROID THREADS AND THREAD HANDLERS

a. Database: 4

Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers

b. Multiple Activity: 2

Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application.

c. An Overview of Threads: 2

The Application Main Thread, Thread Handlers, basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler

REFERENCES

1. Professional Android 4, Recto Meier and Ian Lake., 4th Edition. (TEXT BOOK)
2. Android, A programmer's Guide, Jerome (J.F) DiMarzio.
2. Android Programming for Beginners, John Horton, 2015
3. Android Programming, The Big Nerd Ranch Guide, Second edition.
4. Android Development, Mark L Murphy, 4th Edition.

BLUEPRINT

Code number: 21PGDCA203

Title of the paper: **Mobile Application**

Chapter	Number of Hours	Total marks for which the questions are to be asked (including bonus questions)
Unit I	8	19
Unit II	8	24
Unit III	8	19
Unit IV	8	19
Unit V	8	15
TOTAL	40	96
Maximum marks for the paper (Excluding bonus question)= 70		

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Able to develop a working knowledge of mobile app development tool.
CO2	Understanding	Have developed a very good understanding to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.
CO3	Apply	Be able to Produce apps for mobile devices (iPhone/iPad/iPod Touch) and Gain a basic understanding of Android Architecture .
CO4	Analyze	Be able to analyze various components and improve the coding knowledge to develop various mobile apps
CO5	Evaluate	Able to test and Debug the code to make the apps more efficient and effective.
CO6	Create	Able to create and deploy apps in the devices and able to make apps compactible to different devices.

Course Outcomes and Course Content

Semester	II
Paper Code	21PGDCA204
Paper Title	Internet of Things
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objectives:

This paper Internet of Things (IoT) focuses on interconnection and integration of the physical world and the cyber space. It helps the student to relate the trends of future networking and leads the third wave of the IT industry revolution. In this paper, first introduces some background and related technologies of IoT. Later the challenges and key scientific problems involved in IoT development are implemented for future research directions.

UNIT I

Internet of Things overview

4

a. History of IoT:

Evolution of Internet, IoT for the general world, IoT for technology professionals, Tools and techniques needed for IoT, Embedded Systems, Manufacturing 4.0(IIoT), Application of IoT: Agriculture, Smart City and Automobile.

4

b. Open source and hardware

Different open source and hardware, Arduino, Raspberry Pi, Beaglebone, Intel Galileo, ESP8266

UNIT II

Setting up first Raspberry Pi and Communication Protocols

6

a. Setting of IoT Hands on Practice:

Installing Raspbian in SD card, Making essential connections, Booting up the Raspberry Pi Running simple programs, Programming and Interfacing LED with Raspberry Pi, Interfacing Sensor with Raspberry Pi and analyzing the data

b. Overview of Communication protocols used in IoT:

2

Bluetooth, WiFi, Zigbee, Xbee, NFC, LoRaWAN

UNIT III

Advance technologies and application layer protocols: 2

a. Technologies used to build IoT:

IPv6, Sensor networks, Cloud computing, M2M, Wearables, Complex Event Processing (CEP)

b. Application layer protocols for IoT (Overview and detailed discussion on MQTT) 2

HTTP, MQTT, HTTP v/s MQTT, Quality of Service, Retain Flag, CoAP, XMPP, AMQP

c. Hands on Practice:

Writing a Python Code for MQTT Publishing Client 4
Publishing sensor data from Raspberry Pi using MQTT analyzing data on Smartphone
Writing a Python Code for MQTT Subscribing Client
Controlling devices/appliances connected to Raspberry Pi over MQTT from Smartphone

UNIT IV

IoT Cloud Services

a. AWS IoT :

Understanding AWS IoT Architecture and components, AWS IoT Device registry, policy and security certificates 4
Hands on Practice- registering a device, creating security certificates and building policy for device

b. Hands on Practice on Sensors:

Connecting Raspberry Pi to Publish sensor data to AWS IoT 4
IBM Watson IoT Overview
Microsoft Azure IoT Overview
Integrating different services of AWS to our existing module.
Applying Rule based SQL Query to sensor based data to trigger another service on AWS

UNIT V

Security in IoT

a. Hardware Security:

Challenges in maintaining sensor devices, monitoring and upgrading the resources. 3
System enhancement with new features.

b. Software and Data Security:

Security level in preserving data, Maintaining and monitoring the data. Enhancement of data size and sorting the data required. 3

c. Project Guideline:

Project Plan and approach for IoT projects. 2

REFERENCES:

1. The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World

2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

BLUEPRINT

Code number: 21PGDCA204

Title of the paper: **Internet of Things**

Chapter	Number of Hours	Total marks for which the questions are to be asked (including bonus questions)
Unit I	8	19
Unit II	8	24
Unit III	8	19
Unit IV	8	19
Unit V	8	15
TOTAL	40	96
Maximum marks for the paper (Excluding bonus question)= 70		

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Able to gain a knowledge about hardware and software requirement in developing IoT projects
CO2	Understanding	Have developed a very good understanding to use various tools and techniques to implement in IoT based projects
CO3	Apply	Be able to Produce different techniques based on the requirement of real world problems.
CO4	Analyze	Be able to analyze various components that supports the IoT Projects.
CO5	Evaluate	Able to test and Debug the projects that has been development to increase durability

CO6	Create	Able to create and deploy IoT project.
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Semester	II
Paper Code	21PGDCA205
Paper Title	Project work / Internships
Number of teaching hours per week	4
Total number of teaching hours per semester	40
Number of credits	4

Objective: The project task for the student will help to get collaborated with organizations to get experience in project work and project ethics.

Note: Week bases project evaluation to know the students' progress and their understanding

BLUEPRINT

Code number: 21PGDCA205

Title of the paper: **Project work / internship**

Chapter	Number of Hours	Total marks for which project work is evaluated week bases
WEEK1	8	20
WEEK2	8	20
WEEK3	8	20
WEEK4	8	20
WEEK5	8	20
TOTAL	40	100
Last week will be viva exam WEEK 5		

