ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR

PART A: Introduction

Program: Diploma	Class: [redacted] BCA	Year: II Year	Session: 2022-23

Subject: Computer Application

1.	Course Code	S2 -BCAA1T	
2.	Course Title	**Data Communication and Computer Networks**	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Core**	
4.	Pre-Requisite (if any)	To study this course, a student must have the basic knowledge of Computers.	
5.	Course Learning Outcomes(CLO)	• Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing and Working of Networking Devices. • Demonstrate the Significance, Purpose and application of Networking Protocols and Standards. • Describe, compare and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM and Various Switching Techniques. • Explain the working of Layers and apply the various protocols of OSI & TCP/IP model. • Analyze the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies. • Design the Network Diagram and Solve the Networking Problems of the Organizations with Consideration of Human and Environment. Install and Configure the Networking Devices.	
6.	Credit Value	6 Credits	
7.	Total Marks	Max. Marks : 30+70	Min. Passing Marks:35

PART B: Content of the Course

Total No. of Lectures (in hours per week): 3 Hours per week

Total Lectures: 90 Hours

Unit	Topics	No. of Lectures
I	Network goals and application, Network structure, Network services, Example of networks and Network Standardization, Networking models: centralized, distributed and collaborative. Network Topologies: Bus, Star, Ring, Tree.	15
II	Theoretical Basis for Data communication, Transmission media, Twisted pair (UTP, STP), Coaxial Cable, Fiber optics: Selection and Evaluation factors. Line of Sight Transmission, Communication Satellites. Analog and Digital transmission. Transmission and switching, frequency division and time division multiplexing, Circuit switching, packet switching and message switching.	20
III	Brief Overview of LAN (Local Area Network) : Classification. Brief overview of Wide Area Network (WAN). Salient features and differences of LAN with emphasis on: Media, Topology, Speed of Transmission, Distance, Cost. Terminal Handling, Polling, Token passing, Contention. IEEE Standards: their need and developments.	20
IV	Open System: What is an Open System? Network Architectures, ISO-OSI Reference Model, Layers: Application, Presentation, Session, Transport, Network, Data Link & Physical. Physical Layer - Transmission, Bandwidth, Signaling devices used, media type. Data Link Layer - : Addressing, Media Access Methods, Logical link Control, Shortest path algorithms, protocols.	20
V	Network Layer: Routing: Fewest-Hops routing, Type of Service routing, Updating Gateway routing information. Brief overview of Gateways, Bridges and Routers, Gateway protocols, routing daemons. OSI and TCP/IP model. TCP/IP and Ethernet. The Internet: The structure of the Internet, the internet layers, Internetwork problems. Internet Standards.	15

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings:

1. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall,1983.

2. Black : Computer Networks : Protocols, standords and Interfaces, Prentice Hall International 1. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall,1983.

Suggested Web Links:

https://nptel.ac.in/courses/106/105/106105082/
http://cse.iitkgp.ac.in/~sandipc/courses/cs31006/slides/application_layer.pdf
https://onlinecourses.nptel.ac.in/noc22_ee61/preview
https://nptel.ac.in/course.html
https://pll.harvard.edu/subject/computer-networking

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100**
Continuous Comprehensive Evaluation (CCE): **30** Marks
University Exam (UE): **70** Marks

Attainment Expressions	PO Mapping	PSO mapping	Cognitive level
Students will be able to get the concepts of and the basic knowledge of computer networks (CO1, CO2)	PO1, PO2	PSO4	R, U
Students get the concepts of communication models. OSI and TCP/IP models comparison and concepts (CO3)	PO3	PSO5	U,AN,C
Able to understandType of Service routing, Updating Gateway routing information (CO4)	PO1, PO2	PSO4, PSO6	E,U

Internal Assessment: Continuous Comprehensive Evaluation (CCE):-30	Class Test Assignment/Presentation	**Total Marks: 30**
External Assessment: University Exam (UE) Time: 03.00 Hours	Section (A): Objective Question Section (B): Short Questions Section (C): Long Questions	**Total Marks: 70**

St. Aloysius' College (Autonomous), Jabalpur		
Part A – Introduction		
Session:	2022-23	
Subject	Computer Application	
Programme	Diploma	
Class	BCA IInd Year	
Course Code	S2-BCAA2T	
Course Type	CORE	
Course Title	**Database Management Systems Using PL/SQL**	
Pre–requisite	To study this course, a student must have the basic knowledge of Computers.	
Course Learning Outcome	After completion of this course, it is expected that the student shall be able CO1. Explain the features of database management systems and relational database. CO2. Design conceptual models of a database using ER modeling for real life applications and construct queries in relational algebra. CO3. Create and populate a RDBMS for a real-life application, with constraints and keys, using SQL. CO4. Retrieve any type of information from a database by formulating complex queries in SQL. CO5. Analyse the existing design of a database schema and apply concepts of normalization to design an optimal database.	
Credit Value	**4 credits (4-TH)**	
Total Marks	Max. Marks: 30+70	Min. Passing Marks:35
Part B – Course Content Total No. of Lectures-Tutorials-Practical (in hours per week): L-4		
Unit I	**Introduction to DBMS:** Why database? Characteristics of data in database, DBMS. What are advantages of DBMS? **Database Architecture and Modeling:** Conceptual, physical and logical database models, Role of DBA, Database design. **Entity Relationship (ER) Model:** Components of ER-model, ER modeling symbols, Relationships. **Enhanced Entity Relationship (EER) Model:** An introduction, Superclass and subclass entity types, Specialization, Generalization, Attribute inheritance, Categorization & Aggregation. ***Keywords:*** *DBMS, DBA, Entity Relationship (ER), EER, Superclass, Subclass, Specialization, Generalization, Categorization & Aggregation.*	

Unit II	**The Relational Data Model:** ***Fundamental Concepts:*** Relations, Null Values, Keys, Foreign Keys, Integrity Constraints - Entity Integrity & Relational Integrity. ***Normalization Process:*** First Normal Form, Functional Dependencies, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form (BCNF), Fourth Normal Form; Other Normal Forms - Fifth Normal Form & Domain/Key Normal Form. ***Transforming a Conceptual Model to a Relational model***: Transforming Objects Sets and Attributes, Transforming Models without External Keys, Transforming Specialization and Generalization Object Sets, Transforming *Relationships:* One-One Relationships, One-Many Relationships, Many-Many Relationships; Transforming Aggregated Object Sets, Transforming Recursive Relationships. ***Keywords:*** *Keys, Normalization, BCNF, Aggregated Object Sets, Recursive Relationships.*
Unit III	Relational **database** implementation (a) **Relational Algebra and Calculus** *Relational* Algebra: Union, Intersection, Difference, Product, Select, Project, Join - Natural, Theta & Outer Join, Divide, Assignment. *Relational Calculus:* Target list & Qualifying Statement, The Existential Quantifies, The Universal Quantifier. ***Keywords:*** *JOIN, Target list, Existential Quantifier, Universal Quantifier.*
Unit IV	**Relational database implementation (continued):** **(b) Relational Implementation with SQL** *Relational Implementations:* An Overview. *Schema and Table Definition:* Schema definition, Data types & domains, DefiningTables, Column Definition. *Data Manipulation:* Simple Queries (SELECT, FROM, WHERE), Multiple-Table Queries, Subqueries, Correlated Subqueries, EXISTS and NOT EXISTS operators, Built-In Functions (SUM, AVG, COUNT, MAX, and MIN), GROUP BY and HAVING clause, Built-In Functions with Subqueries. *Relational Algebra Operations:* UNION, INTERSECT, EXCEPT, JOIN. *Database Change Operations:* INSERT, UPDATE, DELETE. Using SQL with Data Processing Languages; View Definition, Restrictions on View Queries and Updates. ***Keywords:*** *Schema, SELECT, Data Manipulation, Database Change Operation, View.*
Unit V	**Physical Database Systems** Introduction, Physical Access of the Database. *Physical Storage Media.* Secondary Storage, Physical Storage Blocks. *Disk Performance Factors:* Access Motion Time, Head Activation Time, Rotational Delay, Data Transfer Rate, Data Transfer Time. *Data Storage Formats on Disk:* Track Format, Record Format—Fixed-Length Records& Variable-Length Records, Input/output Management. *File Organizing and Addressing Methods:* Sequential File Organization, Indexed- Sequential File Organization, Direct File Organization. ***Keywords:*** *Disk Performance Factors, Sequential File Organization, Indexed-Sequential File Organization, Direct File Organization.*

Part C – Suggested Readings			
S. No.	Author	Name of the Book	Publication
1.	Gary W. Hansen & James V. Hansen	Database Management and Design	Prentice Hall of India Pvt Ltd.
2.	Ramez Elmasri, Shamkant B. Navathe	Fundamentals of Database Systems	Pearson
3.	Raghu Ramakrishnan & Johannes Gehrke	Database Management Systems	McGraw Hill Education
4.	C.J. Date	An Introduction to Database System	Pearson
5.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan	Database System Concepts	Tata McGraw Hill

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Attainment Expressions	PO Mapping	PSO mapping	Cognitive level
Identifying basic problem of real world with abstract requirement (CO1, CO2)	PO2	PSO4	R, U
Applying advanced and basic queries on real databases (CO3, CO4,CO5)	PO2, PO3	PSO4, PSO7	AP

Part D-Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks : 100 Continuous Comprehensive Evaluation (CCE) : 30marks University Exam (UE) 70marks		
Internal Assessment : Continuous Comprehensive Evaluation (CCE):30	Class Test Assignment/Presentation	Total 30
External Assessment : University Exam Section: 70 Time : 03.00 Hours	**Section(A) :** Objective Questions **Section (B) :** Short Questions **Section (C) :** Lorg Questions	Total 70

PART A: **INTRODUCTION**			
Program: Diploma	Class: BCA	Year. II Yr	Session: w.e.f. **2022-23**
Subject: **Computer Applications**			

1.	Course Code	**S2-BCAA2P**
2.	Course Title	**DBMS Using PL/SQL Lab**
3.	Course Type	Core Course (Practicals)
4.	Pre-Requisite (if any)	To study this course, a student must have the basic knowledge of Computers.
5.	Course Learning Outcomes (CLO)	This lab is based on the theory course of DBMS. This lab course involves the development of the practical skills in DBMS using MS-Access/Visual-FoxPro/SQL-Server/etc. This course is an attempt to upgrade and enhance students' theoretical skills and provide the hands-on experience. After completing this lab course sessions, student will be able: • to create Databases & Views, • execute simple advance SQL queries, • use DBMS tools in the areas of database applications. Topics to be covered in the lab syllabus- • Introduction to MS-Access/Visual-FoxPro/SQL-Server/etc • Hands on practice on the application package used in the lab (i. e. on MS-Access/Visual-FoxPro/SQL-Server/etc) • Database creation using MS-Access/Visual-FoxPro/SQL-Server/etc • Simple SQL queries (Single table) • Use of Advanced SQL queries • Implementation of Views
6.	Credit Value	2 credits (2-PR)
7.	Total Marks	Max. Marks: 30 Int + 70 Ext | Min. Passing Marks: 35

PART B: **CONTENT OF THE COURSE**
Total No. of Lectures-Tutorials-Practicals (in hours per week): P - 2
Total timber of Practical: **02 Hours per Week**

List of Practical's

1. To draw ER Model and Relational Model for a given database. Show ER to Relational Model reduction.

2. Implementation of Database

- Creation of Database with proper constraints
- Insert into database using different types of insert statements
- Display

3. Data Definition (schema) Modification

4. Simple SQL queries (Single table retrieval)

- Make use of different operators (relational, logical etc.)
- Selection of rows and columns, renaming columns, use of distinct keyword
- String handling (%, etc.)
- Update statement, case update
- Delete, cascade delete (if possible)

5. Advanced SQL Queries-1

- Group by, having clause, aggregate functions
- Set operations like union, union all and use of order by clause
- Nested queries: in, not in, exists, not exists and any, all

6. Advanced SQL Queries -2

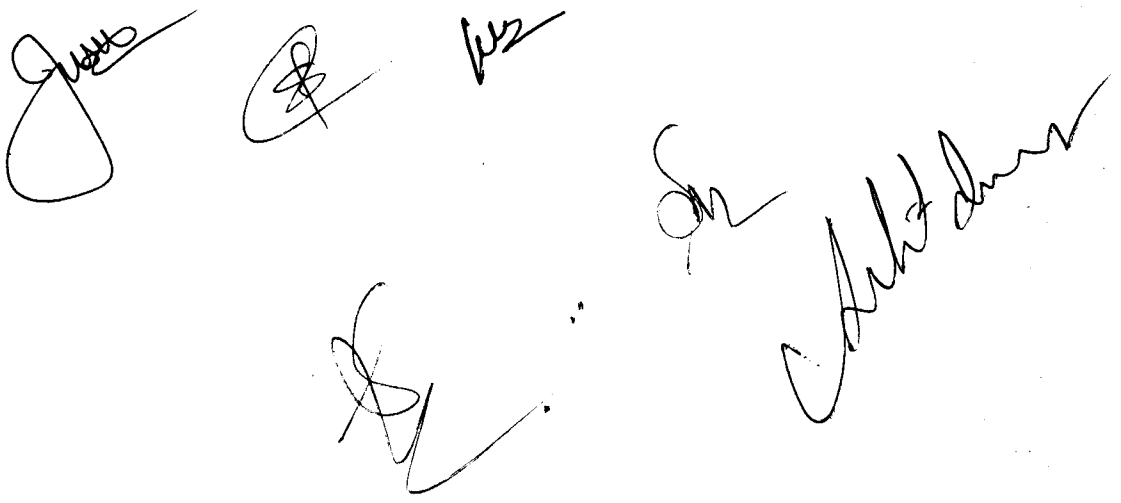
- Join (Inner & Outer)
- Exists & Union

7. Implementation of views

- Creation of views
- Usage of views
- Creation of views using views
- Drop views

PART C: LEARNING RESOURCES
Textbooks, Reference Books, Other Resources
Suggested Readings:
1. Dr Rajeev Chopra, —Database Management System (DBMS) A Practical Approachl, 2010, S Chand 2. Jitendra Patel, —DBMS Lab Manuall Kindle Edition, 2012 3. Books published by M.P. Hindi Granth Academy, Bhopal
Suggestive digitiil platform web finds
https:// •fec.kai.nic.in/i'aibag/FileHandler/270-101d6l 6b-255a-4add-8d9bdd e22fec7c1.pdf . https://nesitsoiith.pes.edu/pdf/2019/3u1v/CS/LM DBMS%20LAB.ndf http://www.mphindigranthacademy.org/
***Suggested** equivalent online courses*
Nil

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 30 **Marks**		**External Assessment**: University Exam (UE) : **70 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	5 Marks	Practical record file	30 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	10 Marks
Practical File	15 Marks	Answer script	20 Marks
Total	**30 Marks**	**Total**	**70 Marks**



ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR

PART A: Introduction

Program: Diploma	Class: **BCA**	Year: **II Year**	Session: **2022-23**

Subject: **Computer** Applications

1.	Course Code	S2-BCAB2T
2.	Course Title	**Internet Applications using Java Programming**
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	Core Course
4.	Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Object-Oriented Programming.
5.	Course Learning Outcomes (CLO)	After **the completion of this course, a successful student** will be able **to do the following:** CO1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. CO2. Read and make elementary modifications to Java programs that solve real-world problems. CO3. Validate input in a Java program. CO4. Design and use basic applet for web page
6.	Credit Value	Theory — 4 Credits Practical — 2 Credits
7.	Total Marks	Max. Marks : 30+70 / Min. Passing Marks: 35

PART B: Content of the Course

No. of Lectures (in hours per week): 2 hrs. peé week

Total No. of Lectures: 60 Hrs.

Module	Topics	No. of Lectures
I	The Java Environment: History and features ofjava, C++ Vs java,OOPs concept, how java works, the concept of PATH and CLASS PATH, A simple program, its compilation and execution, JAVA Program Structure, Java Virtual Machine concepts, java platform overview, Primitive data types, variables and constants, operators, expression,statement-branching,looping and jumping, labeled statements. Object Oriented Programming in Java: Classes, objects and methods: defining a class, adding variables and methods, creating objects, constructor, Instances, field and methods initialization by constructors,Copy constructor, memory allocation and garbage collection in java keywords, access methods Arrays, String and String buffer classes, Wrapper classes, using the JDK tools.	10

II	Inheritance: Inheritance basics, Super class, Sub-class, Method overloading, abstract classes **Interfaces:** defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces. Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread, Creating thread with the thread class and runnable interface, Thread synchronization, Thread scheduling, Basic idea of exception handling: The try, catch and throw, throws	14
III	Applet programming-Local and Remote Applets, Applet Vs Application, creating and executing java applets, inserting applets in a web page, java security, passing parameter to applets, Aligning the Display, HTML Tags & Applet Tag, Getting Input from User. The AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers-flow layout, Grid layout Border layout, Card layout.	12
IV	**The Java Event Handling Model:** Java's event delegation model ignoring the event, Self contained events, Delegating events, The event class hierarchy, The relationship between interface, methods called, parameters and event source; Adapter classes, Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Event, Mouse Event, Text Event, Window Event. Networking-basics, networking classes and interfaces, using java.net package, TCP/IP and datagram programming.	12
V	**Input/ Output:** Exploring Java i.o, Directories, stream classes The Byte Stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC:** JDBC-ODBC bridge, The connectivity model, The driver manager, Navigating the result set object contents, java.sql Package, The JDBC exception classes, Connecting to Remote database.	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

e Schildt java Complete Reference
TMH o Das Raslimikanta Core Java,
IE, Vikas
o Bansal Nitin, AjitKuinar,A Simplified approach to Java Programming , KALYANI
» Naughton&Schildt —The Complete Reference Java 2", Tata McGraw Hill

Suggestive digital platform web links

https://www.yoiitube.com/watch?v=CFD9EFcNZTO
littps://www.youtube.com/watch?m—7WhnYwoBY24
http://www.mphindigranthacademy.org/

Suggested equivalent online courses

S.No	Online Course	Duration	Platform

• Deitel —Java- How to Program:I Pearson Education, Asia

1	Programming in Java https://Youtu.be/I dl fJY90GY	12 weeks	NPTEL
2	The Complete Java Certification Course https://www.udemv.com/couise/master-niactical-jaya-developlnent/	Self paced	Udemy

- Horstmann& Cornell —Core Java 2‖ (Vol I & II), Sun Microsystems
- IvanBayross —Java 2.0‖ : BPB publications
- Ivor Horton's —Beginning Java 2, JDK 5 Ed., Wiley India.
- Book published by M.P. Granth Academy , Bhopal

Attainment Expressions	**PO Mapping**	**PSO mapping**
Understand concept of Object Oriented Programming. (CO1, CO2)	PO1, PO2	PSO4
Applying Oops on basic real-world problems like: inheritance and interface(CO2,CO3)	PO3	PSO5
Applying java in internet programming using Applets and design GUI. (CO4)	PO7	PSO5,PSO7
Applying Event Handling in AWT controls. (CO5)	PO7	PSO5,PSO7
Applying java in file handling, and also design a desktop application with JDBC concepts.(CO6)	PO9	PSO9

PART A: Introduction				
Program: Certificate		Class: B.C.A.	Year: **II** Year	Session: **2022-23**
Subject: Computer Applications				
1.	Course Code	S2-BCAB2P		
2.	Course Title	**Java Programming** Lab		
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	Core Course		
4.	Pie-Requisite (if any)	To study this course, a student must have basic logical and analytical skills.		
5.	Course Learning Outcomes(CLO)	After the completion of this course, a successful student will be able to do the following: 1. Develop simple applications of java. 2. Implementation and use of conditional statement. 3. Learn to formulate iterative solutions and array processing algorithms for problems. 4. Learn to implement method Overloading and Overriding. S. Implementation of inheritance and interface in java. 6. Develop a small applet program using awt.		
6.	Credit Value	Practical — 2 Credits		
7.	Total Marks	Max. Marks : **30+70**	Min. Passing Marks: 35	

PART B: Content of the Course

No. of Lab Practicals (in hours per week): 2 hours per week

Total No. of Lab.: 30 (each lab of 2 hours)

	Suggestive list of Practicals	No. of Labs.
	Given the problem statement, students are required to write code in Java, execute and test it. Students should be given assignments on following : 1. Write a program to print numbers in words using Nested if and Switch Case. 2. Write a program called PassFail which prints "PASS" if the int variable "mark" is more than _ or equal to 50; or prints "FAIL" otherwise. 3. Write a program called OddEven which prints "Odd Number" if the int variable -number! is odd, or -Even Number! otherwise. 4. Write a Program to find sum & average of 10 no. using arrays, Write a program to display reverse of a digit no. using array. 5. Write a program to display grade according to the marks obtained by the student. 6. Find the factorial of number if number is given by user using command line argument.	30

		7. Write a program to print Fibonacci series. 8. Write a program to display tables from 2 to10. 9. Write a program to take an input from user and check given number is prime or not. 10. Write a program to implement method overriding. 11. Write a program to convert given string into. Uppercase and lowercase 12. and get the length of string,Using array 13. Write a program to overload volume method to find out volume of cube and cuboid. 14. Write a program to design a class using abstract Methods and Classes. 15. Write a program to implement multiple inheritance by using Interface. 16. Write a program to create a package of your name and use that package in a class 17. Write a program to implement parameterized constructor with default argument. 18. Define an exception called –Marks out of Bound! exception that is thrown if the entered marks are greater than 100. 19. Develop a simple real life application to illustrate the use of multithreading. 20. Design an applet that takes three numerical values as input from the user and then displays the largest of those three numbers on the screen.	

PART C: Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings
Laughton & Sehildt —The Complete Reference Java 2l, Tata McGraw Hill • Java EE 6 for Begirlnels, Shalanain Shah, Vaisliali Shah, Slur off Publishers and Distributors **Reference Books:** • Java EE Project using EJB 3, GPA and struts 2 for beginners, Smah, SPD • .lava Progi ainrning A practical Approach, C Xavier, McGraw Hill • Java Servei Faces A practical Approach for beginners, B M Harwaiii, Eastern Economy Edition (PHI). • Advanced Java Technology, Savaliya, Di eaintech.
Suggestive digital platform web links
https://www.youtube.com/watch?v=CFD9EFcNZTO https://www.Youtube.com/watch?v=7WhnYwoBY24
Suggested equivalent online courses

Suggested equivalent online courses			
S.No	Online Course	Duration	PlaWorm
1	Programming in Java https://yoiitu.be/I d1fJy90G Y	12 weeks	NPTEL
2	The Complete Java Certification Course htt as://www.udeiny.con/coui se/inastei -practical-iava-develonlnent/	Self paced	Udemy

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 30 **Marks**		**External Assessment**: University Exam (UE) : **70 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	5 Marks	Practical record file	30 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	10 Marks
Practical File	15 Marks	Answer script	20 Marks
Total	**30 Marks**	**Total**	**70 Marks**

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR PART A: Introduction			
Program: Diploma	Class: BCA	Year: II Year	Session: **2022-23**
		Subject: **Computer Application (BCA)**	
1.	Course Code	S2-BCAC1G	
2.	Course Title	**Internet of Things (IOTs)**	
3.	Course Type (Core Course/ Elective/ Generic Elective/ Vocational	Generic Elective	
4.	Pre-Requisite(ifany)	Student must have basic Computer Knowledge	
5.	Course Learning Outcomes (CLO)	**After completing this course student will be able to:** CO1. To understand the basics of Internet of Things CO2. To get an idea of some of the application areas where Internet of Things can be applied CO3. To understand the middleware for Internet of Things and the concepts of Web of Things CO4. To understand the concepts of Cloud of Things with emphasis on Mobile cloud computing CO5. To understand the IOT protocols	
6.	Credit Value	**Theory**—4 Credits Practical— 2 Credits	
7.	Total Marks	Max. Marks: **30+70**	Min. Passing Marks: 35

PART B: Content of the Course		
No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours): **60 Hrs.**		
Module	**Topics**	No. of Lectures
I	**Introduction** Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.	8
II	Machine-to-machine (M2M), SDN (software defined networking) and NFV (network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.	14
III	**Design Principles for Web Connectivity:** Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based	14

	communication, IP addressing in IOT, Media Access control.	
IV	Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.	)2
V	IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view. IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- Rajkamal,‖Internet of Things—, Tata McGraw Hill publication.
- HakimaChaouchi—The Internet of Things: Connecting Objects‖, Wiley publication.
- Francis dacosta-Rethinking the Internet of things: A scalable Approach to connecting everything‖, 1st edition, Apress publications2013.
- Donald Norris—The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black—, McGraw Hillpublication.

Reference books:

1. Philip Levis, -TinyOS Programming‖
2. D. Norris, —The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi, and Beagle Bone Black‖, McGraw-Hill Education, New Delhi.
3. Raj Kamal, -Internet of Things: Architecture and Design‖, Tata McGraw Hill publication.
4. A. Pajankar and A. Kakkar, —Raspberry Pi by Example‖, Packt Publishing Ltd, Birmingham, UK.
5. Books published by M.P. Hindi Granth Academy, Bhopal

Suggestive digital platform web links

- https://www.iotforall.com/introduction-rot-applications-in-education
- https://onlinecourses.swayam2.ac.in/arp19_ap52/preview
- http://www.mphindigranthacademy.org

Part D-Assessment and Evaluation

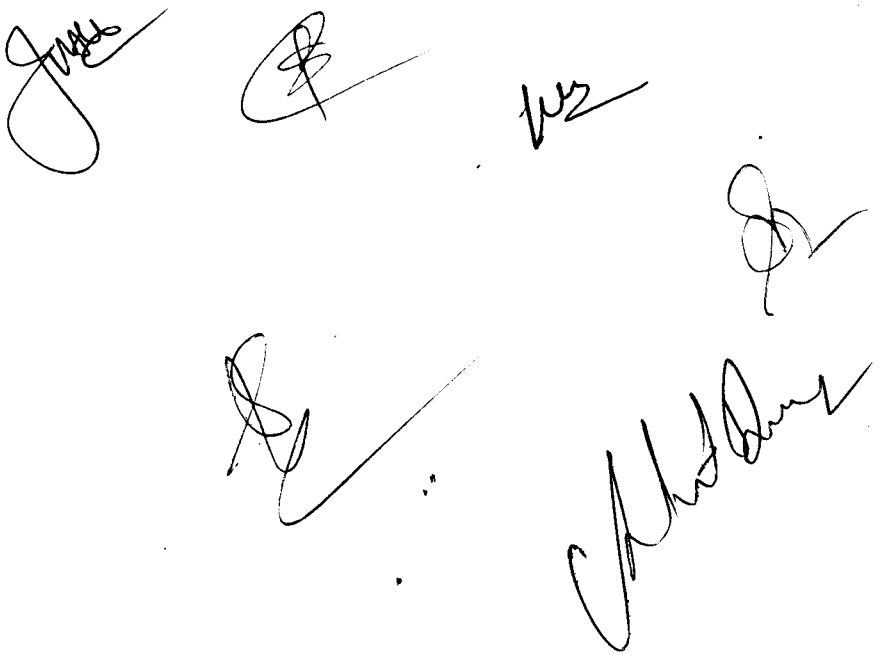
Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 30marks University Exam (UE) 70marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):30	Class Test Assignment/Presentation	Total 30
External Assessment : University Exam Section: 70 Time : 03.00 Hours	**Section(A)** :Objective Questions **Section (B)** : Short Questions **Section (C)** : Long Questions	Total 70

PART A: Introduction			
Program: Diploma	Class: BCA	Year: H Year	Session: 2022-23
	Subject: Internet of Things(IOTs)Practicals/Lab		
1.	Course Code	S2-BCAC1R	
2.	Course Title	Internet of Things (IOTs) tab	
3.	Course Type(Core Course/ Elective/ Generic Elective/ Vocational	Elective	
4.	Pre-Requisite (if any)	Open for all	
5.	Course Learning Outcomes (CLO)	After completing this lab course, students will be able to: 1. Arduino/Raspberry Concept. 2. Knowledge of Digital Sensor. 3. Uses of DHT11 Sensors. 4. Knowledge of Bluetooth interface.	
6.	Credit Value	Practical — 2 Credits	
7.	Total Marks	Max. Marks: 30+70	Min. Passing Marks: 35



PART B: Content of the Course	
No. of Lab. Practical (in hours per week): 1 Hr. per week	
Total No. of Labs: 16 Hrs.	
Suggestive List of Practical	No. of Labs.
1. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds. 2. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection. 3. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings. 4. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed. 5. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it. 6. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth. 7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' isreceived from smartphone using Bluetooth. 8. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud. 9. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud. 10. To install MySQLdatabaseon Raspberry Piand perform basic SQLqueries.	8 Hrs.
PART C: Learning Resources	
Textbooks, Reference Books, Other Resources	
Suggested Readings	
• VijayMadisettiand ArshdeepBahga,—Internet ofthings(AHand-on-Approach)‖ 1st Ed ,UniversalPress . • HakimaChaouchi—TheInternetofThings:ConnectingObjects‖, Wiley publication. • Charless Bell -MySQL for the Internet of things‖, Apress publications. • Francisdacosta—RethinkingtheInternetofthings:Ascalable Approachtoconnectingeveryt edition, Apress publications2013. • Book published by M.P. Granth Academy, Bhopal **Reference books:** • https://www.lniniit.ac.in/Department/ECE/uploaded files/Internet of Things Lab m	

Suggestive digital platform web links	
https://www.cotnino.com/in-building-networks/woildwide/en/home/knowledge-center/rot.html	
Suggested equivalent online courses	
https://onlinecourses.nptel.ac.in/noc21 csl7/preview	
http://www.mphindigranthacademy.org/	

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 30 **Marks**		**External Assessment**: University Exam (UE) : **70 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	5 Marks	Practical record file	30 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	10 Marks
Practical File	15 Marks	Answer script	20 Marks
Total	**30 Marks**	**Total**	**70 Marks**