Shri Acharyaratna Deshbhooshan Shikshan Prasarak Mandal's Mahavir Mahavidyalaya, Kolhapur (Autonomous)
Affiliated to Shivaji University, Kolhapur

Accredited by NAAC with 'A' Grade

Syllabus for Choice Based Credit System (CBCS) Bachelor of Science (B.sc.) Programme

Part	III	Course	Computer Science

Under the Faculty of Science

(To be introduced from Academic Year 2023 – 24 onwards)

Subject to the revisions& modifications made from time to time

Mahavir Mahavidyalaya, Kolhapur (Autonomous)
Affiliated to Shivaji University, Kolhapur
(New syllabus under Autonomy to be introduced from June, 2023 onwards)

Year of Implementation: Revised Syllabus will be implemented from June 2023
Duration: Part- III shall be of one academic year consisting of two semesters.
Pattern : Semester Pattern

										SEMESTER V – DURATION : 6 MONTHS						
Sr.No.	Course	Teaching Scheme						Evaluation Scheme								
		No. of Lectures		Hours (Hrs.)		Credits		ESE Marks (A)	CIE Marks (B)	Minimum Marks for Passing (A) + (B)	Practical Marks (Max.)	Marks for Passing (MIN.)	Exam Duration (Hrs.)			
		T	P	T	P	T	P	THEORY(T)			PRACTICAL(P)		T	P		
1.	DSE H9	3	5	2.4	4	2	2	40	10	14+04=18	PRACTICAL EXAMINATION IS ANNUAL		2.0			
2.	DSE H10	3	5	2.4	4	2	2	40	10	14+04=18			2.0			
3.	DSE H11	3	5	2.4	4	2	2	40	10	14+04=18			2.0			
4.	DSE H12	3	5	2.4	4	2	2	40	10	14+04=18			2.0			
	Total	**12**	**20**	**--**	**--**	**8**	**8**	**160**	**40**	**--**						
5.	AECC III(Non CGPA)	4	--	3.2	0	2	0	40	10	14+04=18			2.0			

										SEMESTER VI – DURATION : 6 MONTHS						
Sr.No.	Course	Teaching Scheme						Evaluation Scheme								
		No. of Lectures		Hours(Hrs.)		Credits		ESE Marks (A)	CIE Marks(B)	Minimum Marks for Passing (A) + (B)	Practical Marks (Max.)	Marks for Passing(MIN.)	Exam Duration (Hrs.)			
		T	P	T	P	T	P	THEORY(T)			PRACTICAL(P)		T	P		
1.	DSE H13	3	5	2.4	4	2	2	40	10	14+04=18	100	35	2.0	4.0		
2.	DSE H14	3	5	2.4	4	2	2	40	10	14+04=18			2.0			
3.	DSE H15	3	5	2.4	4	2	2	40	10	14+04=18	100	35	2.0	4.0		
4.	DSE H16	3	5	2.4	4	2	2	40	10	14+04=18			2.0			
	Total	**12**	**20**	**--**	**--**	**8**	**8**	**160**	**40**	**--**	**200**					
5.	AECC IV(Non CGPA)	4	--	3.2	--	2	--	40	10	14+04=18	--	--	2.0			
	Total (Sem V +Sem VI)	**24**	**40**	**--**	**--**	**20**	**16**	**320**	**80**	**--**	**--**	**--**	**--**	**--**		

Student contact hours per week :32 Hours (Minimum)	Total Marks for B.Sc.-III (Excluding English) : 600
Theory and Practical Lectures: 48 Min. Each	Total Credits for B.Sc.-III (Semester V & VI) : 36
DSE- **Discipline Specific Elective.** A candidate shall select one course (subject) from the three Courses (Subjects) selected at B.Sc. – II namely : Physics, Chemistry, Mathematics, Statistics, Electronics, Computer Science	
AECC- Ability Enhancement Compulsory Course (III & IV): Compulsory English.This is Non-CGPA course.	
Practical Examination will be conducted annually for 200 Marks	
There shall be separate passing for theory and practical courses	

- **STRUCTURE OF COURSE:**

Sr. No.	Paper	Name of Paper	Marks
Computer Science (Semester V)			
1	DSE-H9	Core Java	50(40+10) 40 : ESE 10 : CIE
2	DSE-H10	C# Programming	50(40+10) 40 : ESE 10 : CIE
3	DSE-H11	Fundamentals of Networking	50(40+10) 40 : ESE 10 : CIE
4	DSE-H12	Python Part -I	50(40+10) 40 : ESE 10 : CIE
Computer Science (Semester VI)			
5	DSE-H13	Advance Java	50(40+10) 40 : ESE 10 : CIE
6	DSE-H14	ASP .NET	50(40+10) 40 : ESE 10 : CIE
7	DSE-H15	Cyber Security Essential-I	50(40+10) 40 : ESE 10 : CIE
8	DSE-H16	Python Part -II	50(40+10) 40 : ESE 10 : CIE
Practical (Annual)			
1	Practical Paper-IV	Computer Science Practical Paper Based onDSE-H9,H13,H10 and H14	50 (Practical)
2	Practical Paper-V	Computer Science Practical Paper Based on DSE-H11,H15,H12,H16	50 (Practical)
3	Practical Paper VI	Software Project and study tour	(80+20)=100

B.Sc. Part –III Computer Science Optional (Semester– V)
Course Code: DSE-H9 Computer Paper IX
Course Title: Core Java
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes:

• Understand structure of java program, JVM, type conversion

• Explain and implements programs in java using control statements, method overloading, constructors, keywords this and static

• Implement multithreading in object oriented programs. Understand concept of checked and unchecked exception and write exception handling programs.

Module	Content	Hours Allotted
I	• **Introduction to java And OOP's Concepts** **Introduction to Java** : History of java, Features of Java, structure of java program – compilation and execution of program, Comparison between C++ and java,JDK Tools, Java Virtual Machine(JVM), Automatic Garbage Collection, Data Types, Tokens ,Java Keywords, Type conversions -implicit and explicit conversion, Accepting input from console (Using scanner class and command line arguments), Operators - arithemetic, relational, logical, unary, ternary, bitwise, Branching and looping statement **OOP in Java :** Introductionto Class, Object and method, static keyword, Constructor, this keyword, constructor overloading Inheritance- Definition and its types - single, multilevel, hierarchical concepts of overloading and method overriding, super Keyword, Difference between Overloading and overriding, Abstract Classes and abstract methods, Defining and Implementing Interfaces	18
II	• **Package ,Exception Handling and Multithreading** **Package** : Defining package, System Packages –java, lang, awt, javax, swing, net, io, util., user defined packages-creating and accessing the package **Exception Handling**- Concept, types- Checked and unchecked, try and catch block, multiple catch, Try-catch –finally block, throw and throws clause, finally clause	18

| | Multithreading- What are threads?, difference between process and thread, Life cycle of thread, methods of thread class, creating thread using thread class and runnable interface, isAlive() and join() methods, Thread priorities , Running multiple threads ,Synchronization and interthread communication wait() , notify(), notifyAll() methods | |

Reference Books

1. Programming with JAVA, A Primer by E Balaguruswamy
2. Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill
3. Java Programming- Rajendra Salokhe (Aruta Pub)
4. *The Java Tutorials: http://docs.oracle.com/javase/tutorial/)*
5. The Java Tutorials of Sun Microsystems Inc

Practical Based on DSE-H9:

1. Java programs based on branching and looping statements.

2. Java programs based Type Casting

3. Java programs based on command line arguments

4. Java programs based on constructors

5. Java programs based on inheritance

6. Java programs based on method overloading

7. Java programs based on method overriding.

8. Java programs based on interfaces

9. Java programs based on packages

10. Java programs based on multithreading

11. Java programs based on exception handling

Course Code: DSE-H10: Computer Paper X
Course Title: C# Programming
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes:
This course will cover the practical aspects C#.NET framework. The goal of this course is to introduce the students to the basics of OOPs and windows application program.

Module	Content	Hours Allotted
I	**Introduction to .Net and C# basics** **.NET Framework Architecture**: An Overview, Components of .NET framework: CLR, CLS, Microsoft Intermediate Language ("MSIL" or "IL"), The Common Type System (CTS), Namespaces, Framework Base Classes, Visual studio IDE. **An Overview of C#** :History and Features of C#, Data Types: Value and Reference Types, Boxing and Unboxing□□□Entry point method , Command Line Arguments, □C# Program compilation and execution, Programming Examples using Console application , C# Flow Control: Branching, Switching and Looping Structure	18
II	**C# Object oriented Concepts and Introduction to Windows Form Application Using C#** **C# Object oriented Concepts:** Classes and Objects, Inheritance, Polymorphism, interface, Abstract Class, Partial Class, DLL and Exe. Exception Handling **Introduction to Windows Form Application Using C# :** Form Controls: Label, Button, Textbox, Checkbox, RadioButton, Timer, calendar, ListBox, Image and overview of remaining all common controls its properties and events	18

References:
1. C# 4.0 The Complete Reference Schildt Mc Graw Hill
2. Inside C# - By Tom Archer, Andrew Whitechapel (Microsoft Pub)
3. Programming in C#- E Balagurusamy

Practical Based on DSE-H10:

1. Program on command line argument.
2. Program on parameter passing mechanism.
3. Program on type casting.
4. Program on looping statements.
5. Program on control structure.
6. Program on DLL and EXE
7. Program on array.
8. Program on static and non-static methods.
9. Program on Inheritance.
10. Program on Interface.
11. Program on abstract class.
12. Program on partial class.
13. Program on exception handling

Course Code: DSE-H11: Computer Paper XI
Course Title: Fundamentals of Networking
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes

Students will be able to:

1. learn the basic Computer Network concepts.
2. learn technical concepts that serve as the bases for the design of classical and modern computer networks.

Module	Content	Hours Allotted
I	**Basic concepts of networking** Components of data communication, standards and organizations, Network Classification, Network Topologies, network protocol, layered network architecture, overview of OSI reference model, overview of TCP/IP protocol suite. **ISO/OSI Model:** Physical Layer: Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway. Data Link Layer: Framing techniques, Error Control, Flow Control Protocols, Shared media protocols - CSMA/CD and CSMA/CA. Network Layer: Virtual Circuits and Datagram approach, IP addressing methods – Subnetting, Routing Algorithms (adaptive and non-adaptive) Transport Layer: Transport services, Transport Layer protocol of TCP and UDP Application Layer: Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP.	18
II	**Introduction to Linux networking tools** Technical Summary of Linux Distributions, Managing Software Single-Host Administration: Managing Users and Groups, Booting and shutting down processes, File Systems, Core System Services, Process of configuring, compiling, Linux Kernel. Introduction to TCP/IP , Network Management Tools- Firewall , The write command ,The wall command	18

References:

1. Computer Network -AS Tannenbum
2. CompTIA NETWORK +STUDY GUIDE by Todd Lammle, Sybex

B.Sc. Part –III Computer Science Optional (Semester– V)
Course Code: DSE-H12: Computer Paper XII
Course Title: Python Part-I
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes:
1. To understand why Python is a useful scripting language for developers
2. To learn how to write loops and decision statements in Python
3. To learn how to use lists, tuples, and dictionaries in Python programs

Module	Contents	Hours Allotted
I	• **Introduction** History, Features, Structure of a Python Program (Python Shell Indentations, Comments), Python Interpreter, Writing and executing simple program, Variable and Data Types, Operators, Keywords, Type conversion, Input , output functions(Print(),Input(), raw_input()). • **Conditional statements** If, If- else, Nested if-else • **Looping Statements** For, While, Nested loops. • **Control Statements** Break, Continue, Pass • **String Manipulation** Declaring strings, Accessing Strings, escape sequences (\), Operations on String (Concatenation (+), Repetition (*), Slicing ([index]), Range Slicing([start:end] or [:end] or [start:], Member ship operator (in, not in)), String Functions and Methods	**18**
II	• **Lists :** Creating a list, Displaying list(print()), Basic Operations(Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list, List functions and methods. • **Tuples**: Creating tuples and Deleting tuple, empty tuple, Displaying(print()), Basic Operation(Length (len()), Concatenation(+), Repetition(*), Membership (in, not in), Iteration (for var in list), Slicing)), Tuple functions and mehods. • **Dictionaries** Concept of dictionary, Creating Dictionary ({Key:Value,…}), Properties of Dictionary keys, Basic Operation(Length (len()), Compare (cmp())), Dictionary Methods(Clear (dict.clear())), Existance of Key (dict.has_key()), List of dictionaries tuple pairs (dict.items()), List of keys (dict.keys()), Add dictionary (dict.update()), Dictionary Values (dict.values()))	**18**

Reference Books

1. Practical Programming: An introduction to Computer Science Using Python, secondedition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance
3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication
4. Introduction to Python for Computational Science and Engineering (A beginner's guide),Hans Fangohr
5. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice
6. Hall of India
7. R. Nageswara Rao, "Core Python Programming", Dreamtech

Practical Based on DSE-H12:

1. Program based on python simple concepts.
2. Program based on conditional constructs
3. Program based on loops.
4. Program based on control statements.
5. Program based on string
6. Program based on string functions and methods
7. Program based on list
8. Program based on List methods and functions
9. Program based on tuple
10. Program based on tuple methods and functions
11. Program based on dictionary
12. Program based on dictionary methods and functions

Course Code: DSE-H13 Computer Paper XIII
Course Title: Advanced Java
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes:
- On successful completion of the course, the students will be able to,
- Create a full set of UI Widgets using Abstract Windowing Toolkit (AWT) & Swings
- Learn to access database through Java programs, using Java Data Base Connectivity (JDBC).
- Create dynamic web pages using Servlets
- Create dynamic web pages using JSP.

Module	Content	Hours Allotted
I	**AWT And Swing** **Awt**-What is AWT ? classes hierarchy, windows fundamentals Frame Windows Event Classes: Mouse Event Class, Action Event Class, Window Event Class, Event Listner Interface: Mouse Listener, Action Listener, Window Listener and Key Listner **AWT Controls** : Labels, Text Field, Push buttons, Layout Managers (Flow Layout, Border Layout, Grid Layout, Card Layout) **Swing**- What is Swing? Difference between AWT and Swing., The MVC Architecture and Components – JFrame, JButton, JLabel, JText, JTextArea, JCheckBox and JRadioButton, JList, JComboBox, JMenu ,JtabbedPane , JScrollBar , Dialogs (Message, confirmation, input)	18
II	**JDBC, Servlet And JSP** **What is JDBC** ? Steps for connectivity between Java program and database. ,Type of drivers,Simple program - database operations like creating tables, CRUD(Create, Read, Update, Delete) operations using SQL **Introduction of servlet**: How servelet work, model diagram, Uses of servlet, Life cycle of servlet, Servlet API: packages- javax. servlet and javax. servlet.http, Session Tracking Mechanism- HttpSession, Cookies, URL-Rewriting, Hidden-Form Fields **Introductionto JSP :**LifeCycleof JSP , Jsp Directives- 1.page 2.include 3.taglib, Jsp Scripting Elements - 1.declaratives 2.scriptlets 3.expressions, Simple application using JSP, Difference between JSP and Servlet	18

Reference Books

1. Programming with JAVA, A Primer by E Balaguruswamy
2. Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill
3. Java Programming- Rajendra Salokhe (Aruta Pub)
4. Java 2 Black Book –(DreamTech)
5. *The Java Tutorials: http://docs.oracle.com/javase/tutorial/)*
6. The Java Tutorials of Sun Microsystems Inc

Practical Based on DSE-H12:

1. Program on Swing

2. Simple program using servlet

3. Simple program using JSP

4. Program on Database Connection.

5. Develop a java application to store image in a database as well as retrieve image from database

6. Create EMP table in Database and perform insert, update, and delete operation on EMP table usingJSP.

Course Code: DSE-H14: Computer Paper XIV
Course Title: ASP.NET
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes:

This course will cover the practical aspects of multi-tier web based application development using the .NET framework. The goal of this course is to introduce the students to the basics of distributed Web application development.

Unit	Content	Hours Allotted
I	• **Introduction to ASP.Net**: Web browser, web server, HTTP request response structure, HTML form elements, GET/POST method, Client side and Server side programming, Web form life cycle, page events, • **Asp.Net Controls :** • **Server Controls:** Textbox, Listcontrols, FileUpload, Linkbutton, Imagemap, Image, Imagebutton, Calender, Literal control, Radiobutton, Checkbox • Cross page postback property of button, Response.Redirect, Server.transfer, Response.Write • Validation Controls • Navigation controls- Menu, TreeView, SiteMapPath • Master Page	18
II	**Asp.Net State Management and ADO.Net** • Asp.Net State Management Client Side: Hiddenfield control, View State, Cookies Server Side: Session, Application, Global.asax. • Data controls : Gridview, Listview, FormView, DetailsView, Repeater • Sql Server Database. • Introduction to ADO.Net • ADO.NET Architecture- Connection, command, data reader, data adapter, data set • Understanding connected layer of ADO.NET and disconnectedlayer of ADO.NET • Basics of Crystal reports	18

Reference Books:

1. Beginning ASP.NET 4.5 in C# and VB, Wrox, 2012, ISBN-10: 1118311809

2. Beginning ASP.NET 4.5 in C#, Apress, 2012, ISBN-10: 1430242515

3. Pro C# with .NET 3.0, Andrew Troelsen, Apress, 2007, ISBN 978-1-59059-823-8

Practical Based on DSE-H14:

- Program on server controls
- Program on Validation Controls
- Program on Navigation Controls.
- Program on SqlDataSource.
- Program on data controls
- Program on ADO.Net connected architecture.
- Program on ADO.Net disconnected architecture
- Program on Response.Redirect.
- Program on cross page posting.
- Program on client side state management.
- Program on server side state management.
- Program to design master page for College website.

Course Code: DSE-H15: Computer Paper XV
Course Title: Cyber Security Essential-1
Total Contact Hours: 36 Hrs. (45 Lectures of 48 Min.)
Teaching Scheme: Theory – 03 Lect. / Week

Credits: 02   **Total Marks: 40**

Course Outcomes

Students will be able to:

1. Understand concept of information security management.
2. Learn different access controls methods.
3. Understand wireless network security.
4. Learn cyber security laws and importance of security audit.

Unit	Content	Hours Allotted
I	• **Information Security Management** Information Security Overview: Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols,Computer Forensics, Steganography. Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.	18
II	• **Network Security, Access Controls , Cyber Security and Cyber Laws** **Wireless Network Security**- Components of wireless networks, Security issues in wireless, Wi-FiSecurity, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall. **Access Controls**: Overview of Authentication and Authorization, Overview of Intrusion , Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems. **Cyber Security**: Email security: PGP and SMIME, Web Security: web authentication, SSL and SET, Database Security. **Cyber Security Laws:** Security Assurance, Security Laws, Intellectual Property Rights, International Standards, Security Audit- Need, Importance.	18

• **References:**
    1. Computer Network -AS Tannenbum
    2. Cyber Security for Beginners: Everything you need to know about it (Cyber security, Cyber war, Hacking) - Harry Colvin.
    3. How NOT To Use Your Smartphone - Rodney D Cambridge.
    4. Online Safety: Scams, SPAM, Viruses and Clouds (Cyber Security Community Book -A.M. Perry.
    5. Cyber Security Essentials- James Graham, Richard Howard, Ryon Olson (E-book)

- **Practical Based on DSE-H11 and H15:**

    1. Study of different types of Network cables and practically implement the cross wired cable and straight through cable using clamping tool.
    2. Study of Network Devices in Detail (Switch, Hub, Router etc.)
    3. Study of Network IP.
    4. Connect the computers in Local Area Network.
    5. Practical based on basic network commands and Network configuration.
    6. Practical based on network topology.
    7. Practical based on printer sharing configuration in workgroup.
    8. Practical based on antivirus installation and update.
    9. Practical based on backup and restore system.
    10. Practical based on use access permission.
    11. Practical based on operating system security and application.(set password etc.)
    12. Practical based on wireless mode(change admin password, MAC ddressing,bluetooth)
    13. Practical based on email security
    14. Practical based on web security
    15. Practical based on browser security
    16. Practical based on database security

Credits: 02   **Total Marks: 40**

Course Outcomes:
1. To learn how to write functions and pass arguments in Python
2. To learn how to build and package Python modules for reusability
3. To learn how to use exception handling in Python applications for error handling
4. To learn OOP concepts in python.

Unit	Content	Hours Allotted
I	**Functions** Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Scope of variables(Global and local variables) **Modules** Importing module, creating and exploring module, Math module, Random module, Time Module, Packages. **Input-Output** Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing to files.	18
II	**Exception Handling** Exception, Exception Handling, Except clause, Try , finally clause, User Defined Exceptions **Object Oriented Programming Concepts** **Classes and Objects** : Python Classes, Objects, Specifying attributes and behaviors, instance methods, instance attributes, static methods, constructor, types of constructors(default, parameterized), constructor overloading , method overloading **Inheritance and Polymorphism:** Inheritance in Python (Syntax, Advantages,), Access Modifiers in Python, Types of Inheritance (single, multiple, multilevel, hierarchical and hybrid), Polymorphism-Method Overriding, magic methods and Operator Overloading.	18

Reference Books:
1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance
3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication
4. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr
5. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
6. R. Nageswara Rao, "Core Python Programming", Dreamtech

Practical Based on DSE-H16:
1. Program based on simple Python function.
2. Program based on function arguments.
3. Program based on module.
4. Program that importing math module.
5. Program to demonstrate read and write operations on file.
6. Program to demonstrate to open and close file
7. Program to handle simple runtime error
8. Program to handle multiple errors with one except statement
9. Program to create user-defined exception
10. Write a program to demonstrate the use of class
11. Write a Python program to demonstrate inheritance
12. Write a Python program to demonstrate overloading

- **NATURE OF QUESTION PAPER AND SCHEME OF MARKING:**

The practical Paper – IV is based on DSE-H9, H13, H10 and H14.

The practical Paper – V is based on DSE-H11, H15, H12, H16.

The practical Paper – VI is of Major Project work done by the student.

- **NATURE OF PRACTICAL QUESTION PAPER:**

1. The practical question paper IV and V for B.Sc.-III (computer science) will be of maximum 50 marks each.

2. The practical paper IV having four questions out of which two questions are based on Paper –IX (Sem.-V) Paper-XIII (Sem.-VI) and two questions are based on Paper X (Sem.V),Paper-XIV (Sem.-VI)

3. The practical paper V having four questions out of which two questions are based on Paper – XI (Sem.-V), Paper XV (Sem.-VI) and two questions are based on Paper-XII(Sem.-V), Paper-XVI (Sem.- VI)

4. The Student has to attempt any TWO questions out of FOUR questions. Each question carries 20 marks.

5. 10 marks are for Viva and certified Journal.

6. The student appearing for the practical examination is expected to write paper work for TWO questions. Paper work is compulsory and it includes problem analysis, Algorithm, source code, output and tracing.

7. It is expected to complete the paper work within 120 minutes. The student has to complete his/her actual practical experiment on machine within 90 minutes. The practical based viva will be of 30 minutes duration.

8. The duration of practical will be 4 hours.

9. Practical Paper VI is Project work of 100 marks.

- **Practical Paper VI: Project work - 100 marks Project work Guidelines:**

1. Institute is expected to conduct Industrial visit to any computerized industry and students are supposed to submit the report based on same.

2. Software development project is to be carried out by the candidate in actual consumer environment taking some real life problem.

3. The candidates submit the project work according to norms of software engineering i.e. the project document should contain Introduction, detailed design, sample testing and conclusion.

4. Project will have internal guide to supervise and monitor the progress of the project. The internal guide may assign the project to the student or within the group of student (maximum 2 candidates in group) depending upon the complexity of the problem preferably using MySQL /MSSQL/Oracle as a back end and C#.NET/ASP with C#/PHP/ Java as a front end.

5. There will be online demonstration of project work in the presence of the external examiner and it will be considered for the evaluation.

6. The mark distribution for Practical paper VI will be as follows:

Project documentation:	30 marks
On-line Presentation:	20 marks
Project Based Viva:	30 marks
Industrial Visit Report:	20 marks
Total Marks:	**100marks**