

Govt. V.Y.T. PG. Autonomous College Durg (C.G.)



**SCHEME OF EXAMINATION
&
SYLLABUS
Of
Four Year Undergraduate Program
For
B.Sc. V, VI, VII, VIII Semester
(Information Technology)
For DSC and DSE**

Session – 2025-26

(Approved by Board of studies)

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
B.Sc.(IT)-V Semester

Course Code	Course Type	Course Name	Theory Marks	Internal Marks	Practical Marks	Total Marks		Teaching Load per Week			Credits
			Max. (A)	Max. (C)	Max. (E)	Max.	Min.	L	T	P	
BIT 501(L)	DSC	Programming in JAVA	80	20		100	40	3	1		3
BIT 502(P)		Lab1: Programming in JAVA			50	50	20			1x2	1
BIT 503 (L)	DSE	Digital Electronics and Microprocessor	80	20		100	40	3	1		4







GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
B.SC.-IT (V SEMESTER)
PROGRAMMING IN JAVA
COURSE CODE– BIT-501 (L)

PART A: INTRODUCTION

Program: B.Sc.		Class: B.Sc.-IT		SEMESTER : V	Session:2025 – 26
1	Course Code	BIT-501(L)			
2	Course Title	PROGRAMMING IN JAVA			
3	Course Type	DSC			
4	Course Objective	This course intends to provide in-depth knowledge of Object oriented programming using Java and to solve real-life problems through software development using Java.			
5	Course Outcomes (CO)	At the end of this course, the students will be able to: 1.Understand the concepts of basics of Java programming Language and get hands on with selection and iterative building blocks for coding. 2: Understand and implement the concept of Inheritance, Interface and packages in java. 3: Understand and implement the exception handling and multithreading mechanism using java. 4: Describe basics of input-output streams and JDBC programming in java 5: Describe fundamental of software development using the concept of Applet and AWT in java			
6	Credit Value	3Credits	3 credit =45 Hours – Learning and Observation		
7	Total Marks	Maximum Marks :100(Theory:80 + Internal:20)		Minimum Passing Marks:40	

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Part B – Topics	No. of Lecture
I	UNIT – I : Introduction History of java, C++ verses Java, features of java, data types, control structures: if else, switch case, looping statement: while, do while, for loop, new version of for loop, break, continue statement, arrays and its types , string and String Buffer class, Wrapper Classes, vectors.	9
II	UNIT – II: Basics of class and object, constructor and its types, methods and its types, method overloading, this keyword. Inheritance: Basics types, method Overriding, using abstract classes, uses of final keyword final classes, using super. Packages and Interfaces: Defined CLASSPATH, importing packages, implementing interface.	9
III	UNIT – III : Exception Handling: Basics of Exception handling, types of exception, using try and catch, throwing exceptions, user defined exceptions, finally, throw verses throws. Multithreaded Programming: Java thread model, thread life cycle. Various functions of Thread class and Runnable interface, creating threads, and thread priorities, synchronization. Inter thread communication.	9



IV	UNIT – IV: Input/Output: Basic of Streams, Byte and Character Stream, IO stream package, predefined streams, reading and writing from console and reading and writing from files. Networking: Networking Basics. TCP/IP client & server sockets, URL connection.	9
V	UNIT – V: Shell Programming Applets: Fundamentals, life cycle, overriding update, HTML APPLET tag, passing parameters. Developing single applets. Introduction to AWT: Window fundamentals, creating windowed, programs working with graphics, using AWT controls, menus. Delegation event model: handling mouse and keyboard events.	9

PART C -LEARNING RESOURCES

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

BOOKS RECOMMENDED:

1. JAVA COMPLETE REFERENCE - BY HERBERT SCHILDT
2. PROGRAMMING WITH JAVA - BY E. BALAGURUSAMY
3. JAVA PROGRAMMING - KHALID MUGHAL

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
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Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 2 x 10 = 20 Marks Question - C: Short answer type question 4 x 5 = 20 Marks Question -D: Long answer type question 8 x 5 = 40 Marks Total = 80 Marks
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Name and Signature of Convener & Members:

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

COURSE CURRICULUM 2025 – 26

B.SC.-IT (V SEMESTER)

COURSE CODE– BIT- 502 (P)

PROGRAMMING IN JAVA LAB

PART A: INTRODUCTION

Program:		Class: B.Sc. (IT)	Session:2025-2026
		Semester –V Semester	
1	Course Code	BIT-502 (P)	
2	Course Title	Programming in Java Lab	
3	Course Type	Lab Course	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • provide a foundational understanding of Java programming. • preparing students for more advanced topics and real-world application development.	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks: 50	Minimum Passing Marks: 20



PART B: CONTENT OF THE COURSE

S. No.	List of Experiments
	1. WAP that implements the Concept of Encapsulation. 2. WAP to demonstrate concept of Polymorphism (Overloading and Overriding) 3. WAP the use Boolean data type and print the Prime number Series up to 50. 4. WAP for matrix multiplication using input/output Stream. 5. WAP to add the elements of Vector as arguments of main method (Run time) and rearrange them, and copy it into an Array. 6. WAP to check that the given String is palindrome or not. 7. WAP to arrange the String in alphabetical order. 8. WAP for String Buffer class which perform the all methods of that class. 9. WAP to calculate Simple Interest using the Wrapper Class. 10. WAP to calculate Area of various geometrical figures using the abstract class. 11. WAP where Single class implements more than one interfaces and with help of interface reference variable user call the methods. 12. WAP that use the multiple catch statements within the try-catch mechanism. 13. WAP where user will create a self-Exception using the "throw" keyword. 14. WAP for multithread using the isAlive(), join() and synchronized() methods of Thread class. 15. WAP to create a package using command and one package will import the another package. 16. WAP for AWT to create Menu and Popup Menu for Frame. 17. WAP for Applet that handle the KeyBoard Events. 18. WAP, which support the TCP/IP protocol, where client gives the message and server will be, receive the message. 19. WAP to illustrate the use of all methods of URL class. 20. WAP for JDBC to insert the values into the existing table by using prepared Statement. 21. WAP for JDBC to display the records from the existing table. 22. WAP to demonstrate the Border Layout using applet. 23. WAP for Applet who generate the MouseMotionListener Event. 24. WAP for display the checkboxes, Labels and TextFields on an AWT. 25. WAP to calculate the Area of various geometrical figures using the abstract class. 26. WAP for creating a file and to store data into that file.(Using the FileWriterIOStream) 27. WAP to display your file in DOS console use the Input/Output Stream. 28. WAP to create an Applet using the HTML file, where Parameter Pass for font Size and Font type and Applet message will change to corresponding parameters.

PART C - LEARNING RESOURCES**Text Books, Reference Books, Other Resources****TEXT BOOKS Recommended:**

1. JAVA COMPLETE REFERENCE - BY HERBERT SCHILDT
2. PROGRAMMING WITH JAVA - BY E. BALAGURUSAMY
3. JAVA PROGRAMMING - KHALID MUGHAL

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION**Suggested Continuous Evaluation Methods:**

Maximum Marks: 50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)

Laboratory performance: As per Dept. (LOCF)



GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
PROGRAMMING IN JAVA LAB
COURSE CODE: BIT-503 (L)
DSE-DIGITAL ELECTRONICS AND MICROPROCESSOR

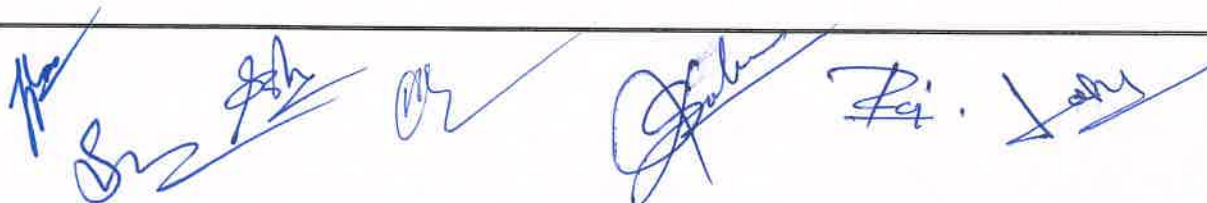
PART A: INTRODUCTION

Program: B.Sc.	Class: B.Sc.-IT	SEMESTER : V	Session: 2025 – 26
Course Code	BIT-503(L)		
Course Title	Digital Electronics and Microprocessor		
Course Type	DSE		
Course Objectives	The objective of this course is to impart a foundational understanding of Digital Electronics and Microprocessor Architecture.		
Course Outcomes	At the end of this course, the students will be able to: 1. Gain knowledge about essential logic families and acquire insights into the characteristics and advantages of Logic Gates. 2. Comprehend Computer Number Systems and Computer Codes. 3. Cultivate an understanding of Circuit design and simplification through Boolean logic and K-map. 4. Gasp the concepts of Combinational Logic and Sequential Logic circuits. Explore the internal architecture of microprocessors and understand their functions.		
Credit Value	4 Credits	4 Credit =60 Hours – Learning and Observation	
Total Marks	Maximum Marks :100(they:80 + Internal:20) Minimum marks – 40 marks		

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)

Unit	Part B – Topics	No. of Lecture
I	Digital Electronics: Logic Families, Scale of Integration, RTL, DTL, TTL and its characteristics, Emitter Coupled Logic (ECL), CMOS Logic Family, NMOS and PMOS Logic, Comparison of Different Logic Families. Logic Gates Basics: AND Gate, OR Gate, NOT Gate, NOR Gate, NAND Gate, Exclusive-OR (XOR) Gate, Exclusive-NOR (XNOR) Gate, Truth Tables for Logic Gates, Truth Tables for Combinational Logic.	12
II	Data Representation: Decimal, Octal, Binary, Hexadecimal, Conversation from one number system to another number system, Binary Math: Binary Addition, Binary Subtraction, Binary Complements, One's & Two's Complement, Binary Subtraction using Two's Complement, Overflow and Underflow, Codes: ASCII code, EBCDIC codes, Grey codes, Excess-3, BCD codes, Error detection and Correcting codes	12



III	Boolean Algebra and Karnaugh Maps: Boolean algebra, Basic Boolean Law, Demorgan's theorem, Map Simplification minimizing technique, Sum of products, Product of sums, Converting SOP & POS to Truth Table & Truth Table to Expression, K Map, Minimization techniques of Boolean Expression using K-Maps, "Don't Care" Conditions	12
IV	Combinational and Sequential Circuit: Introduction to Combinational and Sequential Circuit, Adders: Half adder & Full adder, Subtractor, Seven-Segment Displays Circuits, Encoder, Decoders, Multiplexers, De-multiplexers, Flip-Flop, D Latch, RS Flip Flop, J-K Flip-Flop, Registers	12
V	Central Processing Unit: CPU Organization, Instruction, Addressing Modes, Interrupts and Exceptions, Microprocessors: 8085-architecture, operation, pin configuration and functions, bus organization, control signal generation for external operations- fetch, IO/M, read/write, machine cycles and bus timings. Addressing mode, instruction set, Overview/concept of peripheral interfacing devices-8251, 8253, 8255 and 8279, Intel 8086, Brief Description of Intel Microprocessor	12

PART C -LEARNING RESOURCES

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

1. Computer Fundamentals: Architecture and Organization, B Ram New Age International Pvt Ltd
2. 8085 Microprocessors Architecture Application and Programming", Ramesh S. Goankar, Penram International, 5th Edition
3. Modern Digital Electronics, R.P. Jain, TMH
4. Digital Principles & Application, Leach & Malvino, TMH
5. Digital Logic Design, Morris Mano, PHI
6. Digital Circuit & Design, S. Aligahanan, S. Aribazhagan, Bikas Publishing House.
7. Fundamentals of Digital Electronics & Microprocessor, Anokh Singh, A.K. Chhabra, S.Chand
8. Digital Circuits and Logic Design, Samuel Lee, PHI publication

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
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Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit	
	Question - A & B: (Compulsory)	
	Very short answer type (02 each)	2 x 10 = 20 Marks
	Question - C: Short answer type question	4 x 5 = 20 Marks
	Question -D: Long answer type question	8 x 5 = 40 Marks
		Total = 80 Marks

Name and Signature of Convener & Members:

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
B.Sc.(IT)-VI Semester

Course Code	Course Type	Course Name	Theory Marks	Internal Marks	Practical Marks	Total Marks		Teaching Load per Week			Credits
			Max.	Max.	Max.	Max.	Min.	L	T	P	
BIT 601(L)	DSC	PROGRAMMING IN .NET	80	20		100	40	3	1		3
BIT 602(P)		Lab1: PROGRAMMING IN .NET			50	50	20			1x2	1
BIT 603 (L)	DSE	DATA COMMUNICATION AND NETWORKING	80	20		100	40	3	1		4



GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
B.Sc.(IT)-VI Semester
PROGRAMMING IN .NET
COURSE CODE– BIT-601 (L)

Note: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice. Only Simple calculators allowed not scientific calculator.

PART A: INTRODUCTION			
Program: B.Sc.	Class: B.Sc.-IT	SEMESTER : VI	Session:2025 – 26
Course Code	BIT-601 (L)		
Course Title	PROGRAMMING IN .NET		
Course Type	DSC		
Course Objectives	The objective of the VB.NET framework is to provide a robust, scalable, and easy-to-use platform for developing modern, high-performance Windows applications and services.		
Course Outcome	On successful completion of the course, the student will be able to: 1. Study and use of .NET framework and object-oriented programming. 2. Develop the console and GUI applications using .Net programming. 3. Evaluate the .NET framework namespace contents. 4. Understand the procedures, File I/O, Error handling and Message queues.		
Credit Value	3Credits	3 credit =45 Hours – Learning and Observation	
Total Marks	Maximum Marks :100(theory:80 + Internal:20)		Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE- Total no. of Teaching/ Learning Periods = 45 Periods (45

Unit	Part B – Topics	No. of Lecture
I	UNIT – I : Introduction to .NET: Overview of .net framework, Features and architecture, Managed Execution process, CLR, Common language specification, JIT Compilation, MSIL, Namespace, Assemblies, Metadata common type, System, Visual development and event driven programming , Cross language, Interoperability, Garbage collection.	9
II	UNIT – II: Programming with .NET Framework: Windows form: working with Visual Studio IDE, Creating a .NET solution, MDI application, Components and controls, Data types, Variable, Type conversions, Operators, Methods and events, Scope and lifetime of variables, Creating Enumerations.	9
III	UNIT – III : Control Structures: Control Structures: conditional statement, Loops, Arrays, Types of methods, Method data, Creating Sub Procedures and Function, Introduction to exception handling try catch statement, finally statement, throw, user defined Exception.	9
IV	UNIT – IV: GUI Programming: GUI Programming with window forms, Showing & hiding, Textbox, RichText box, Label, Button, Listbox, Combobox, Checkbox, PictureBox, Radio button, Toggle button, Panel, Groupbox, Scrollbar, Timer, Dialog boxes, OpenFileDialog, Save File dialog, Print dialog, Front dialog, Color dialog, Designing menus and sub menus, MsgBox and Inputbox.	9
V	UNIT – V: Database Programming with ADO.net – ADO .Net Architecture, .Net data provider, dataset components, creating database application using Window forms (Database connectivity through ADO.Net), Accessing data using server explorer, Data Adapters and Data sets, Command & Data reader, Data bind controls, displaying data in data grid	9

Hours)

Part C -Learning Resources

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

1. Visual Basic .Net Complete- by BPB Publications , New Delhi
2. The Complete Reference VB.Net –by Jeffery R. Shapiro , Tata Mcgraw Hill. MSDN online – by Microsoft
3. Professional VB.Net 2003 – by Bill Evjen & others , Wiley Dreamtech India(P) Ltd. New Delhi
4. Bill Evjen, Jason Beres, et.al, Visual Basic .Net programming, Wiley Dreamtech India (p) Ltd.
5. Fergal Grimes, Microsoft .NET for programmers, Shroff Publishers & Distributors (P) Ltd.
6. Thuan Thai & Hoang Q.Lam, .NET Framework Essentials, Shroff Publishers & Distributors (P) Ltd.

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE): 20 Marks

Semester End Exam (SEE): 80 Marks

Internal Assessment:

Continuous Comprehensive Evaluation (CCE)

Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

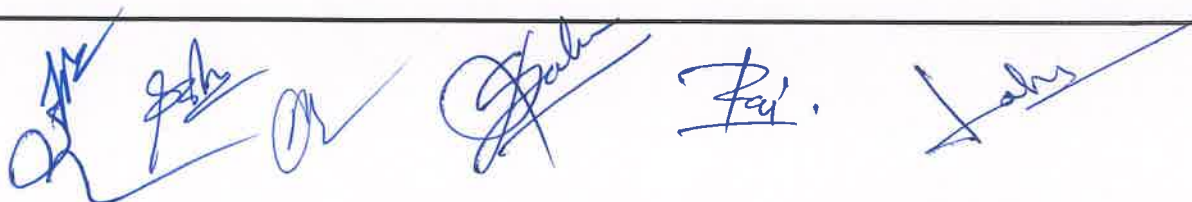
Question - A & B: (Compulsory) Very short answer type (02 each) 02x 10 = 20 Marks

Question - C: Short answer type question 05 x 5 = 25 Marks

Question -D: Long answer type question 07 x 5 = 35 Marks

Total = 80 Marks

Name & Signature of Members of Board of Studies



GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26
PROGRAMMING IN .NET LAB
COURSE CODE– BIT-602 (P)

PART A: INTRODUCTION

Program:		Class: B.Sc. (IT)	Session:2025-2026
		Semester -V Sem	
1	Course Code	BCS-602 (P)	
2	Course Title	Programming in .NET Lab	
3	Course Type	Lab Course	
4	Course Learning Outcome (CLO)	This Course will enable the students to: To learn the basic skill of .NET programming.	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks: 50	Minimum Passing Marks: 20

Note: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice. Only Simple calculators allowed not scientific calculator.

1. Scheme of Examination:-

Practical examination will be of 3 hours duration. The distribution of practical marks will be as follows:

Programme 1 -	10
Programme 2 -	10
Programme 3-	10
Viva -	10

[Practical Copy + Internal Record] – 10

Total - 50

2 In every program there should be comment for each coded line or block of code

3 Practical file should contain printed programs with name of author, date, path of Program, unit no. and printed output.

4 All the following programs or a similar type of programs should be prepared

List of Programs

- 1) Write a program to addition, subtraction, multiplication and division of any two numbers.
- 2) Write a program to find the maximum between three numbers.
- 3) Write a program to check whether a number is negative, positive or zero.
- 4) Write a program to check whether a year is a leap year or not.
- 5) Percentage < 40%: Grade F
- 6) Design an application to input basic salary of an employee and calculate its Gross salary following:
 - a. Basic Salary <= 10000: HRA = 20%, DA = B0%
 - b. Basic Salary <n20000: HRA = 30%, DA = 90%
 - c. Basic Salary> 20000: HRA = 30%, DA = 95%
- 7) Design an application to input electricity unit charges and calculate the given condition:
 - a. For first 50 units Rs. 0.50/unit
 - b. For next 100 units Rs. 0.75/unit
 - c. For next 100 units Rs. 1.20/unit
 - d. For unit above 250 Rs. 1.50/unit
- 8) An additional surcharge of 20% is added to the bill
- 9) Write a program to convert decimal to binary number system using bitwise operators.
- 10) Write a program to swap two numbers using the bitwise operator.
- 11) Write a program to create Simple Calculator using a select case.
- 12) Write a program to find the sum of all natural numbers between 1 to n.
- 13) Write a program to enter any number and print its reverse.
- 14) Write a program to enter any number and check whether the number is palindrome or not.
- 15) Write a program to check whether a number is Armstrong number or not
- 16) Write a program to print Fibonacci series up to n terms.
- 17) Write a program to print Pascal triangles up to n rows.

- 18) Write a program to print all negative elements in an array.
- 19) Design a digital clock using timer control
- 20) Create an application that offers various food items to select from check boxes and a mode of payment using a radio button. It then displays the total amount payable.
- 21) Create an application to implement the working of Context menu on textbox
- 22) Write a program to illustrate all functionalities of list box and combo box.
- 23) Write a program for temperature conversion using a radio button.
- 24) Write a program to launch a rocket using Picture Box and Timer control
- 25) Write a program to change the back color of any control using a scroll box.
- 26) Write a program to search an element for a one dimensional array.
- 27) Design a menu such that it contains submenu such as Addition, Subtraction, Scalar Multiplication, Transpose of two metrics.
- 28) Write a program to find greatest among three given number using user define procedures
- 29) Write a program to check whether given number neon or not using user defined function
- 30) Write a program to check whether a given number is Niven or not using procedure.
- 31) Write a program to check whether a given number is duck number or not
- 32) Write a program to check whether a given number is a spy number or not.
- 33) Write a program to check whether a given number
- 34) Design the following application using radio button and checkbox:
- 35) Develop an application which is similar to notepad using menus.
- 36) Develop an application for facilitating purchasing order.
- 37) Develop an application for a billing system in a coffee shop.
- 38) Develop an application which is similar to login form.
- 39) Define structure student structure student has written member for storing name roll number name of three subjects and marks with member function to store and print data.
- 40) create a class circle with data member radius provide member function to calculate area driver class fare from class circle provide member function to calculate volume derived class cylinder from class is fair with additional data member for height and member function to calculate volume
- 41) Write a program that implements the concept of encapsulation.
- 42) Write a program to demonstrate the concept of function overloading.
- 43) Create a class student having a data member to store roll number name of the student name of three subject Max marks, Min marks, obtained marks. Declare an object of class. Provide facilities to input data in data members and display result of students
- 44) Create a class array having an array of integer having five elements at data member provide following facilities: a) constructor to get number in array element b) sort the elements
- 45) Create a table for employees and write a program using a data set to add, delete , edit and navigate records.
- 46) Write a program to access a database using ADO.NET and display key columns in the combo box or list box when an item is selected in it its corresponding records are shown in data grid control.
- 47) Write a program to calculate factorial of a number using user defined procedure.

Note: This is a tentative list; the teachers' concern can add more program as per requirement.

Name and Signatures

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM
COURSE CURRICULUM 2025 – 26

B.Sc.(IT)-VI Semester

DSE- DATA COMMUNICATION AND NETWORKING

COURSE CODE– BIT-603 (L)

Note: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice. Only Simple calculators allowed not scientific calculator.

PART A: INTRODUCTION			
Program: B.Sc.	Class: B.Sc.-IT	SEMESTER : VI	Session:2025-2026
Course Code	BIT-603(L)		
Course Title	DATA COMMUNICATION AND NETWORKING		
Course Type	DSE		
Course Objectives	To understand network architecture, protocols, and security, enabling efficient design, implementation, and management of robust computer networks.		
Course Outcome	On successful completion of the course, the student will be able to: ➤ Understand the fundamentals and functionalities of computer network, Data Communications System and its components. ➤ Analyze the different types of network topologies and protocols. ➤ Analyze various layers of OSI and TCP/IP models. ➤ Explore wireless and wired LANs		
Credit Value	4 Credits	4 Credits = 60 HOURS LEARNING AND OBSERVING	
Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)

Unit	Part B – Topics	No. of Lecture
I	UNIT – I : Introduction Introduction to Computer Network and Physical Layer: Fundamentals of Computer network, types of computer networks: LAN, MAN, WAN, Network topologies, Transmission modes, ISO-OSI reference model, TCP/IP model, Comparison of OSI and TCP/IP models	12
II	UNIT – II: Concept of Analog and Digital Signals, Bandwidth, Multiplexing: TDM, FDM, WDM, CDMA, Transmission Media -Guided, Unguided, switching techniques: Circuit Switching, Message Switching, Packet Switching.	12
III	UNIT – III: Data Link Layer: Functions of Data Link Layer, Framing, Error detection and correction codes: checksum, CRC, hamming code, Flow Control: Stop & Wait and Sliding Window Protocols, Error Control: Stop & wait ARQ, Go-back-n, Selective Repeat ARQ, Data link protocols: HDLC and PPP, Medium Access Sublayer: LLC Protocol, IEEE Project 802 series of network standard and CSMA/CD.	12
IV	UNIT – IV: Network Layer and Transport Layer: Functions of Network Layer, Routing Protocols & Algorithms, IPv4, IPv6, X.25, Networking & Internetworking devices, Functions of Transport Layer, Flow Control & Buffering, Transport Layer Protocols: TCP, UDP & SCTP, Network, Principles of Congestion Control.	12



V	UNIT – V: Common Network Architecture: Wireless LANs 802.11 standards, Overview of VSAT and VPN. Session Layer: Overview, functioning and protocol. Application Layer: BOOTP, DHCP, DNS, TELNET, World Wide Web (WWW), File Transfer Protocol (FTP), Hypertext Transfer Protocol (HTTP), Email Protocols: MIME & SMTP, POP, IMAP, Proxy Server.	12
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PART C -LEARNING RESOURCES

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

1. Andrew S. Tanenbaum, Computer Networks, PHI / Pearson Education Inc.
2. Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw-Hill.
3. William Stallings, Data and Computer Communication, Pearson Education.
4. Nader F. Mir, Computer and Communication Networks, Pearson Education, 2007. Black, Data & Computer Communication, PHI

Note: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice. Only Simple calculators allowed not scientific calculator.

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
	Total Marks - 20	

Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit	
	Question - A & B: (Compulsory)	
	Very short answer type (02 each)	2 x 10 = 20 Marks
	Question - C: Short answer type question	4 x 5 = 20 Marks
	Question -D: Long answer type question	8 x 5 = 40 Marks
	Total = 80 Marks	

Name and Signature of Convener & Members:



Course Structure for CBCS B.Sc. (IT)- VII Semester

Cours e code	Cour se Type	Course Name	Theory Marks	Internal ASS. Marks	Practical Marks	Total Marks		Credits
			Max.	Max.	Max. (E)	Max.	Min.	
BIT 701(L)	DSC	Programming in Python	60	15		75	30	3
BIT 702(P)		Lab1: Programming in Python			25	25	10	1
BIT 703 (L)	DSE1	Computer Graphics	60	15		75	30	3
BIT 704 (P)		Lab2: Computer Graphics			25	25	10	1
BIT 705 (L)	DSE2	Computer System Architecture	80	20		100	40	4
BIT 706(T)	DSE3	Software Engineering	80	20		100	40	4
BIT 707(L)	DSE4	Theory of Computation	80	20		100	40	4
		TOTAL				600	240	20



Program Outcomes (PO):

- Gain a complete exposure to the theories and practices of Information Technology.
- Get transformed into a skilled learner and active programmer, enabling the students to focus on their higher studies.
- Value IT professionals and programmers.
- Explore how the concepts and applications of Information technology lead to innovative thinking with a problem-solving attitude.

Program Specific Outcomes (PSO):

- Understand the basic IT knowledge and practical application in MS Office.
- Understanding the concept of programming and develop program in C++.
- Understanding the concept of data structure and implementation with C / C++.
- Understanding the concept of DBMS and implementation in MySQL / Oracle.
- Understanding the concept of Dot Net technology with practical implementation.
- Understanding the concept of OOPs and Java programming and develop program in Java.
- Understanding the concept of web technology and its implementation with HTML / CSS / DHTML / PHP.
- Understand the basic concept of internet and E-commerce.
- Understanding the basic concept of information and network security.
- Understanding the basic concept of Artificial Intelligence.

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TECHNOLOGY
COURSE CURRICULUM 2025-26

PART- A: Introduction			
Program: Bachelor in Science (IT) <i>(Certificate / Diploma / Degree/Honors)</i>		Semester - VII	Session: 2025-2026
1	Course Code	BIT-701(L)	
2	Course Title	Programming in Python	
3	Course Type	DSC (Discipline Specific Course)	
4	Prerequisite	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Determine the need for scraping websites and working with CSV, JSON and other file formats. • Interpret the concepts of Object-Oriented Programming as used in Python.	
6	Credit Value	3 Credits	3 Credit = 45 Hours - Learning & Observation
7	Total Marks	Max. Marks: 75	Min Passing Marks: 30
PART -B: Content of the Course			
Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Introduction to Python Programming: What is a Program, Formal and Natural Languages, Why use Python, Uses of python, Strengths & Drawbacks, The Python Interpreter, Running Python, The IDLE User Interface, The Interactive Prompt, Script Mode, Dynamic Typing , Debugging. Types, Operators, Expressions & Statements: Values and Types, Assignment Statement, Variable Names, Expressions & Statements, Order of Operations, String Operations, Comments.		10



II	Conditionals: Boolean Expressions, Logical operators, Conditional & Alternative Execution, Chained and Nested Conditions. Iterations: Reassignment, Updating Variables, The “for” and “while” statements, break. Strings: String is a sequence, len, Traversal with a for loop, String Slices, Searching, Looping and Counting, String Methods, the “in” operator, String Comparison.	10
III	Lists, Tuples, and Dictionaries; Basic list Operators, replacing, inserting, removing an element, searching and sorting lists, Accessing tuples, Operations, Working, Functions and Methods, dictionary literals, adding and removing keys, accessing and replacing values, Traversing Dictionaries.	10
IV	Function, Files and Exception: Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables, Files: Files & Persistence, Reading and Writing, Filenames and Paths. Graphics programming: Drawing with turtle graphics, using turtle module, moving the turtle with any direction, moving turtle to any location, the color, bgcolor, circle and speed method of turtle, drawing with colors, drawing basic shapes using iterations. Python Libraries: Exploring python libraries like Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy etc.	15
Keywords	List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- T. Budd, Exploring Python, TMH, 1st Ed, 2011
- Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth, Freely available online. 2012

Reference Books Recommended:

- Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
- Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition by O'Reilly, 2015
- Zed A. Shaw, Learn Python 3 the Hard Way (Addison-Wesley, 2016)

Online Resources:

- NPTEL URL link for Python Programming:
https://www.youtube.com/watch?v=eoPsX7MKfe8&list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO
- Complete NPTEL link for Basic Python Programming:

https://www.youtube.com/watch?v=Y3Ri2GdYfYg&list=PLqftY2uRk7oXvERQEGATSr-KzAh8WLW_D

- File Handling: https://www.w3schools.com/python/python_file_handling.asp
- NumPy: <https://www.w3schools.com/python/numpy/default.asp>
- Pandas: <https://www.w3schools.com/python/pandas/default.asp>
- SciPy: <https://www.w3schools.com/python/scipy/index.php>
- Django: <https://www.w3schools.com/django/index.php>
- Matplotlib: https://www.w3schools.com/python/matplotlib_intro.asp
- Machine Learning: https://www.w3schools.com/python/python_ml_getting_started.asp
- Python MySQL: https://www.w3schools.com/python/python_mysql_getstarted.asp
- Topics related Python from SWAYAM/NPTEL
<https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA>
<https://www.youtube.com/channel/UCJAgwlniUkaShdmA5aAZdQw>
- Topics related Python from Tutorials
<https://www.javatpoint.com/python-tutorial>
<http://docs.python.org/3/tutorial/index.html>
<http://interactivepython.org/courselib/static/pythonds>
<http://www.ibiblio.org/g2swap/byteofpython/read/>
- Python for Beginners:
https://www.w3schools.com/python/python_intro.asp
<https://www.python.org/about/gettingstarted/>
<https://www.javatpoint.com/python-tutorial>
<https://www.geeksforgeeks.org/python-programming-language/>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 60 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)

Internal Test / Quiz-(2): 15

Total Marks - 15

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks

Semester End Exam (SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

Question - A & B: (Compulsory)

Very short answer type (02 each)

2.5 x 4 = 10 Marks

Question - C: Short answer type question

5 x 4 = 20 Marks

Question -D: Long answer type question

6 x 5 = 30 Marks

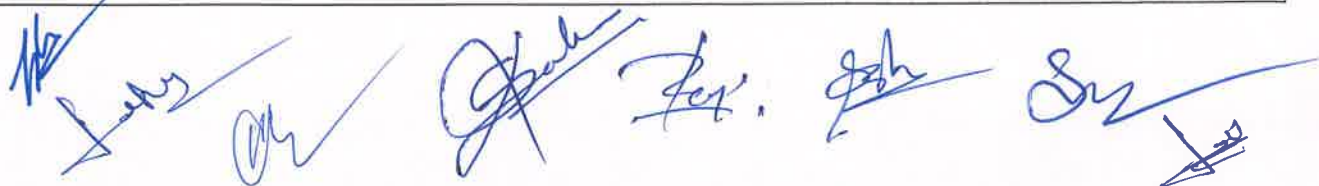
Total = 60 Marks

Name and Signature of Convener & Members:

(Handwritten signatures of Convener and Members)

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AND INFORMATION TECHNOLOGY
COURSE CURRICULUM 2025-26

PART- A: Introduction			
Program: Bachelor in Science (IT) <i>(Certificate / Diploma / Degree)</i>		Semester - VII	Session: 2025-2026
1	Course Code	BIT-702(P)	
2	Course Title	Lab 1: Programming in Python	
3	Course Type	Practical	
4	Prerequisite (if, any)	<i>As per program</i>	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Determine the need for scraping websites and working with CSV, JSON and other file formats. • Interpret the concepts of Object-Oriented Programming as used in Python.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field Learning/Training
7	Total Marks	Max. Marks: 25	Min Passing Marks: 10
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
List of Practical Experiments	Note: This is tentative list; the teachers concern can add more program as per requirement. 1. Python program to find the union of two lists. 2. Python program to find the intersection of two lists.		30



3. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
4. Using while loop, produce a table of sines, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of $\sin(x)$, $\cos(x)$ and $\tan(x)$.
5. Write a program that reads an integer value and prints —leap year or —not a leap year.
6. Write a program that takes a positive integer n and then produces n lines of output shown as follows.
For example, enter a size: 5

*

**

7. Write a function that takes an integer _n' as input and calculates the value of $1 + 1/1! + 1/2! + 1/3! + \dots + 1/n$
8. Write a function that takes an integer input and calculates the factorial of that number.
9. Write a function that takes a string input and checks if it's a palindrome or not.
10. Write a list function to convert a string into a list, as in list ('abc') gives [a, b, c].
11. Write a program to generate Fibonacci series.
12. Write a program to check whether the input number is even or odd.
13. Write a program to compare three numbers and print the largest one.
14. Write a program to print factors of a given number.
15. Write a method to calculate GCD of two numbers.
16. Write a program to create Stack Class and implement all its methods. (Use Lists).
17. Write a program to create Queue Class and implement all its methods. (Use Lists)
18. Write a program to implement linear and binary search on lists.
19. Write a program to sort a list using insertion sort and bubble sort.
20. Python program to remove the "i" th occurrence of the given word in a list where words repeat.
21. Python program to count the occurrences of each word in a given string sentence.
22. Python program to check if a substring is present in a given string.
23. Python program to map two lists into a dictionary.
24. Python program to count the frequency of words appearing in a string using a dictionary.
25. Python program to create a dictionary with key as first character and value as words starting with that character.
26. Python program to find the length of a list using recursion.
27. Python program to read a file and capitalize the first letter of every word in the file.

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	28. Python program to read the contents of a file in reverse order. 29. Python program to create a class in which one method accepts a string from the user and another prints it. 30. Study and Implementation of Database, Structured Query Language and database connectivity.	
Keywords	List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- T. Budd, Exploring Python, TMH, 1st Ed, 2011
- Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth, Freely available online. 2012

Reference Books Recommended:

- Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
- Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition by O'Reilly, 2015
- Zed A. Shaw, Learn Python 3 the Hard Way (Addison-Wesley, 2016)

Online Resources:

- NPTEL URL link for Python Programming:
https://www.youtube.com/watch?v=eoPsX7MKfe8&list=PLldgECt554OVFKXRpo_kuI0XpUQKk0ycO
- Complete NPTEL link for Basic Python Programming:
https://www.youtube.com/watch?v=Y3Ri2GdYfYg&list=PLqftY2uRk7oXvERQEGATSr-KzAh8WLW_D
- File Handling: https://www.w3schools.com/python/python_file_handling.asp
- NumPy: <https://www.w3schools.com/python/numpy/default.asp>
- Pandas: <https://www.w3schools.com/python/pandas/default.asp>
- SciPy: <https://www.w3schools.com/python/scipy/index.php>
- Django: <https://www.w3schools.com/django/index.php>
- Matplotlib: https://www.w3schools.com/python/matplotlib_intro.asp
- Machine Learning: https://www.w3schools.com/python/python_ml_getting_started.asp
- Python MySQL: https://www.w3schools.com/python/python_mysql_getstarted.asp
- Topics related Python from SWAYAM/NPTEL
<https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA>
<https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw>
- Topics related Python from Tutorials
<https://www.javatpoint.com/python-tutorial>
<http://docs.python.org/3/tutorial/index.html>

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<http://interactivepython.org/courselib/static/pythonds>
<http://www.ibiblio.org/g2swap/byteofpython/read/>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 25 Marks

Continuous Internal Assessment (CIA):

(By Course Teacher)

Internal Test / Quiz-(2): **NIL**

End Semester Exam (ESE):

Laboratory / Field Skill Performance:

On spot Assessment

A. Performed the Task based on lab. work - 10 Marks

B. Spotting based on tools & technology (written) – 10 Marks

Viva-voce (based on principle/technology) - 5 Marks

Managed by Course teacher as per lab. status

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PART- A: Introduction			
Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester – VII	Session: 2025-2026
1	Course Code	BIT-703(L)	
2	Course Title	COMPUTER GRAPHICS	
3	Course Type	DSE (Discipline Specific Elective)	
4	Pre-requisite	<i>As per program</i>	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able: • Understand the basics of computer graphics, different graphics systems and applications of computer graphics. • Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. • Use of geometric transformations on graphics objects and their application in composite form. • Extract scene with different clipping methods and its transformation to graphics display device. • Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.	
6	Credit Value	3 Credits	3Credit = 45 Hours - Learning & Observation
7	Total Marks	Max. Marks: 75	Min Passing Marks: 30
PART -B: Content of the Course			
Total No. of Teaching-learning Periods(01 Hr. per period) – 60 Periods (60 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Basic elements of Computer Graphics: Applications of Computer Graphics, Input Devices: Keyboard, Mouse, Trackball & Space ball, Joystick, Data Glove, Digitizers, Image Scanners, Touch panels, Light Pens systems. Output display devices: Refresh CRT, Raster-Scan display and Random-scan display technique, Color display techniques-Beam penetration method and Shadow-mask method, Direct view storage tubes, Emissive & Non-emissive flat-panel, Displays-Plasma panels, LED and LCD monitor.		13
II	Fundamental Techniques in Graphics: Line-drawing algorithms, DDA algorithm and Bresenham's Line drawing Algorithm, Midpoint Algorithm for Circle and Ellipse Generation, Curve generation. Attributes for output primitives: Area-filling Algorithms - Scan-line Polygon-fill.		11
III	Geometrical Transformation: 2D Transformation (translation, rotation, scaling, reflection and shearing), Homogeneous Coordinates and Matrix Representation of 2D Transformations, Successive and composite 2D Transformations, the Window-to-		10

	Viewport Transformations, Introduction to 3D Transformations Matrix.	
IV	Curves & Surfaces: Polygon Surfaces and polygon meshes, Quadratic and super quadrics surfaces, Spline curve and representation Definition of Bezier curve and its properties, Algorithms for Bezier curves and surfaces, Hermite curve.	11
Keywords	CRT, LED, LCD, DDA, 2D, 3D.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & practice, 2000.
- D.J. Gibbs & D.C. Tschritz: Multimedia programming Object Environment & Frame work, 2000.

Reference Books Recommended:

- Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, Pearson, 2001
- D. Haran & Baker. Computer Graphics Prentice Hall of India, 1986.

Online Resources:

- NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs90
- https://mrcet.com/downloads/digital_notes/CSE/III%20Year/COMPUTER%20GRAPHICS%20NOTES.pdf
- <http://www.aagasc.edu.in/cs/COMPUTER%20GRAPHICS%20NOTES.pdf>
- [https://archive.mu.ac.in/myweb_test/S.Y.B.Sc.\(IT\)%20\(Sem%20%20III%20\)%20Computer%20Graphics.pdf](https://archive.mu.ac.in/myweb_test/S.Y.B.Sc.(IT)%20(Sem%20%20III%20)%20Computer%20Graphics.pdf)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 60 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Total Marks - 15	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit	
	Question - A & B: (Compulsory)	
	Very short answer type (02 each)	2.5 x 4 = 10 Marks
	Question - C: Short answer type question	5 x 4 = 20 Marks
	Question -D: Long answer type question	6 x 5 = 30 Marks

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Total = 60 Marks

Name and Signature of Convener & Members:

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COURSE CURRICULUM 2025-26

PART A: INTRODUCTION			
Program: BIT (UG)		Class: BIT	Semester – VII
		Session:2024-2025	
1	Course Code	BIT-704(P)	
2	Course Title	Computer Graphics Lab	
3	Course Type	Practical	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Using OpenGL for implementation of Computer Graphics concepts. • Implementation of the algorithms for 2D primitive object representations. • Implementation of algorithms for 2D modeling, transformations and animation. • To be able to discuss the application of computer graphics in graphic design applications like Adobe Photoshop, Macromedia Flash and Corel Draw.	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :25	Minimum Passing Marks:10

Part B

List of Program

1. Study of basic graphics functions defined in “graphics.h “.
2. Write a program to draw a Hut or other geometrical figures.
3. Write a program to draw a line using Bresenhem’s Algo.
4. Write a program to draw a line using DDA algorithm.
5. Write a program to draw a line using Mid-Point algorithm.
6. Write a program to draw a circle using mid-point algorithm.
7. Write a program to draw an Ellipse using Mid-Point algorithm.
8. Write a program to rotate a Circle around any arbitrary point or around the boundary of another circle
9. Generate and display a Bezier Curve using control points.

10. Modify control points to observe the effect on the curve shape.
11. Implement interactive manipulation of control points.
12. Construct and display a **B-Spline Curve** using a set of control points.
13. Experiment with different knot vectors and degree values.
14. Generate a **Hermite Curve** using position and tangent vectors at endpoints.
15. Experiment with different tangent values to modify the curve shape.
16. Write a menu driven program to rotate, scale and translate a line point, square, triangle about the origin.
17. Implement a Lagrange Interpolation algorithm to fit a curve through given data points.
18. Modify the number of points and observe changes in the curve.
19. Write a program to perform line clipping.
20. Write a program to implement reflection of a point, line.
21. Write a program to perform shearing on a line.
22. Write a program to implement polygon filling.
23. Write a program to implement transformations in three dimensions.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

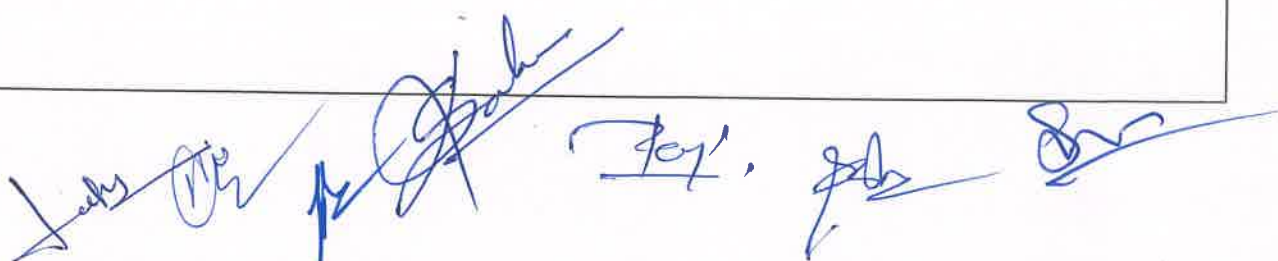
1. Donald Hearn & M. Pauline Baker, Computer Graphics C Version, Pearson Education
2. VanDam, Feiner & Hughes, Computer Graphics Principles & Practice, Pearson Education.
3. Steven Harrington, Computer Graphics, Tata McGraw Hill.
4. Schaum's Outline Computer Graphics, McGraw-Hill

Reference Books:

1. Donald Hearn & M. Pauline Baker, Computer Graphics, Prentice Hall of India.
2. Zhigang Xiang, Roy Plasterock, Schaum's Outlines, Computer Graphics, Second Edition, Tata McGraw Hill.
3. David F Rogers, Procedural Elements for Computer Graphics, Tata McGraw Hill,
4. Govil Shalin, Principles of Computer Graphics, PAI, Springer.
5. Steven Harrington, Computer Graphics, Tata McGraw Hill.
6. Amrendra N Sinha and Arun D Udai, "Computer Graphics", TMH

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. <https://www.javatpoint.com/computer-graphics-tutorial>
2. https://www.tutorialspoint.com/computer_graphics/index.htm
3. <https://www.geeksforgeeks.org/computer-graphics-2/>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks:****25 Marks****Continuous Internal
Assessment (CIA):****(By Course Teacher)**Internal Test / Quiz-(2): **NIL****End Semester Exam
(ESE):****Laboratory / Field Skill Performance:****On spot Assessment****A. Performed the Task based on lab. work - 10
Marks****B. Spotting based on tools & technology (written) – 10
Marks****Viva-voce (based on principle/technology) - 05
Marks****TOTAL-25 MARKS****Managed by
Course teacher
as per lab.
Status****Name and Signature of Convener & Members:**

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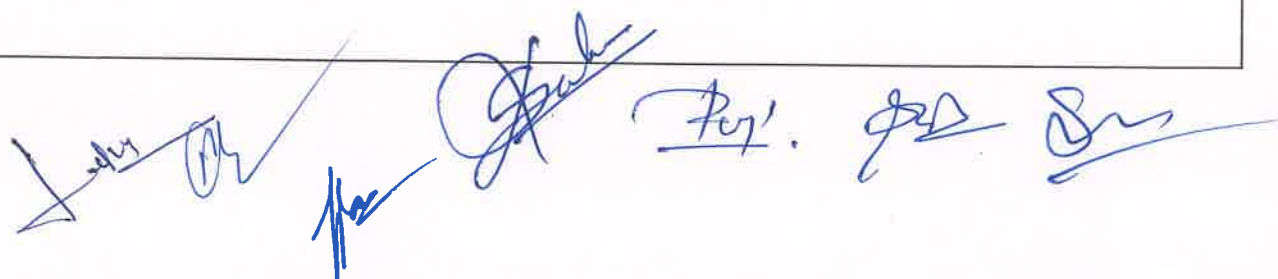
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester - VII	Session: 2025-2026
1	Course Code	BIT-705(L)	
2	Course Title	Computer System Architecture	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the architecture and functioning of computer systems at the hardware level. • Analyze the Instruction Set Architecture (ISA) • Understand design, Implementation and Analysis of data path for instruction execution. • Understand the functioning of the CPU. • Understand the concept of parallel processing with their applications. • Understand the communication between the peripheral devices and CPU. • Explore the concepts of Memory Organization. • Understand the concept of multiprocessing. • Design the basic computer system Architecture.	
6	Credit Value	4 Credits	4 Credit = 60 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

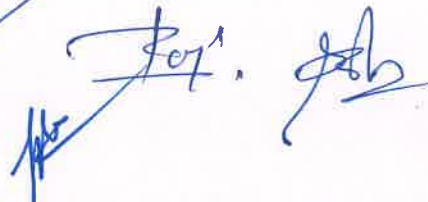
Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Fundamentals Of Basic Computer Organization And Design: Introduction of digital components, register and its types(DR,AR,AC,IR,PC,TR,INPR,OUTR), register transfer and register transfer language, microoperations and its types, common bus system for register and memory organization, computer instruction, basic format of instruction, types of instruction according addressing field (zero, one, two, three addressing), types of instruction (MRI,NMRI), addressing modes, instruction cycle and its flowchart, types of control	15



	unit(hardwired and microprogrammed control unit), design of control unit in basic computer.	
II	Central Processing Unit and Parallel Processing Techniques: Introduction to CPU, general register organization, stack organization (register stack, memory stack), application of stack organizations, CPU instructions (data transfer instruction, data manipulation instruction, program control instructions), RISC and CISC instructions, interrupts and its types, interrupt cycle. Flynn's classification of computers, Parallel processing techniques (pipeline processing, vector processing, array processing), pipeline processing concept, types of pipelines and its application, speedup ratio of a pipeline, vector processing concept and its applications, concept of array processing and its applications.	15
III	Input – Output Organization: Introduction to peripheral devices, input-output interface and its designing, Modes of data transfer (synchronous and asynchronous data transfer), controls in asynchronous data transfer (strobe control and handshaking control), modes of data transfer (programmed i/o, interrupt-initiated i/o and direct memory access), input-output processor.	15
IV	Memory Organization and Multiprocessor Architecture: Memory hierarchy, main memory and its organization (RAM and ROM Chips, memory address map, memory connections to CPU), auxiliary memory, associative memory, concept of cache memory, cache memory mapping techniques (associative mapping, direct mapping, set-associative mapping), cache coherence problem and its solution, introduction to multiprocessors, interconnection structures of multiprocessor-based systems, inter-processor communication and synchronization.	15
Keywords	Registers, micro-operation, instruction, control unit, instruction cycle, interrupt cycle, CPU, stack, parallel processing, pipeline processing, vector processing, array processing, asynchronous data transfer, DMA, RAM, ROM, cache memory, IOP, multiprocessor.	
Name and Signature of Convener & Members:		






PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- M. Morris Mano, Computer System Architecture, 3e, Pearson Education.
- B. Ram Sanjay Kumar, Computer Fundamentals Architecture and Organization , 5e, New Age International Publishers.

Reference Books Recommended:

- William Stalling, Computer Organization & Architecture, 11e, Pearson.
- Jyotsna Sengupta, Fundamentals of Computer Organization and Architecture, Deep & Deep Publications.
- Amit Kumar Mishra, A Textbook of Computer Architecture, Katson Books.

Online Resources:

- NPTEL YouTube Channel: Online Lecture Series on Computer Architecture
<https://youtube.com/playlist?list=PL59E5B57A04EAE09C&si=WUP8O10Y6Zrleu-i>
<https://youtube.com/playlist?list=PL1A5A6AE8AFC187B7&si=JmlOO3rT9NGSMkmN>
<https://youtube.com/playlist?list=PLgHucKw979AvcnTpPNZMZyORdL5HvTr9m&si=PqOMY-sh6tCuzPXA>
- NPTEL Portal : Online Lecture Computer Architecture and Organization
[NPTEL :: Computer Science and Engineering – NOC :Computer architecture and organization](#)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
	Total Marks - 20	

Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks



	Total = 80 Marks
Name and Signature of Convener & Members:	

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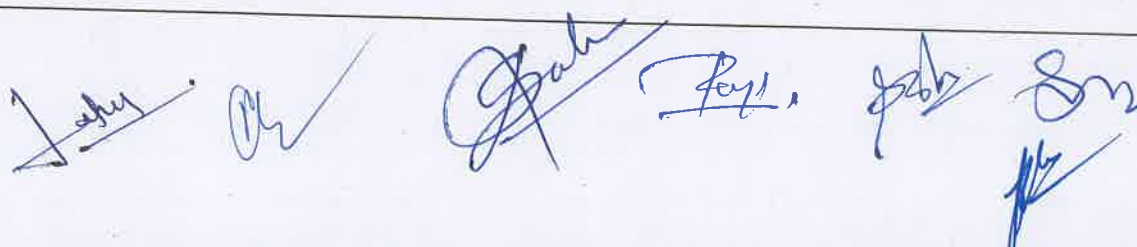
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)			Semester -VII	Session: 2025-2026
1	Course Code	BIT-706(L)		
2	Course Title	Software Engineering		
3	Course Type	DSE (Discipline Specific Elective)		
4	Pre-requisite	As per program		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able: • Understand the fundamentals of software Engineering. • Identify and analyze the requirement of system. • Understand the design of existing System and Design the proposed System. • Understand the fundamentals of Software project management. • Create the test-cases and perform System testing. • Apply the concepts of software engineering for new system development.		
6	Credit Value	4 Credits	4Credit = 60 Hours - Learning & Observation	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Software Engineering & Models: The evolving role of software, changing nature of software, Evolution of Software Engineering, Characteristics of software. SDLC Introduction, Software Process Models: Waterfall Model, V-model, Prototype model, RAD model, Incremental development model, Spiral Model, Evolutionary Model, RAD Model, Agile model.	15
II	2 Requirements engineering process: Requirement Gathering and Analysis, Feasibility studies, requirements validation, requirements management. Functional and Non-Functional Requirements, User requirements, System Requirements, SRS documents. Design Engineering: Software design concepts, design process, design methodology, Function-oriented software design, Structured analysis, Structured Chart, DFD, Concept of Modularity, Cohesion and Coupling, OOAD (Object oriented analysis and design) Concept, UML diagram, different view of software using UML diagrams, Class diagram, Object diagram, Activity diagram, Interaction diagram, State chart diagram.	15
III	Software Project Management: Need of Software project management, Software project managements complexities, Types of management in SPM, Project Planning, Software project scheduling, Project size estimation: LOC, Function Point. Project estimation techniques: Empirical, Analytical and Heuristic technique, COCOMO models.	15
IV	Testing Strategies and Quality Management: Testing Strategies for software, black-box	15



and white-box testing, Verification and Validation, Unit-testing, Integration and system testing, Debugging approach.

Software Reliability & Quality Management: Software Reliability, Quality concepts, software quality assurance, software reviews, formal technical reviews, software configuration management, software reliability, the ISO 9000 quality standards, Capability Maturity Model, Risk Management.

Keywords *Software, software Engineering, Models, Requirement engineering, Software Designing Tools, Testing.*

Signature of Convener & Members :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Rajib Mall, Fundamentals of Software Engineering, 5th ed, PHI publication.
- Roger S. Pressman, Software Engineering, A practitioner's Approach, 6th edition, McGraw Hill International Edition.

Reference Books Recommended:

- Sommerville, Software Engineering, 7th edition, Pearson Education.
- James Rumbaugh, Ivar Jacobson, The unified modelling language user guide Grady Booch, Pearson Education.

Online Resources:

- NPTEL YouTube Channel: Software Engineering Lectures by Prof Rajib Mall, IIT Kharagpur
<https://youtube.com/playlist?list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&si=tTBITZUdivHpNz1H>
- NPTEL YouTube Channel: Software Engineering Lecture Series
https://youtube.com/playlist?list=PL8751DA481F0F0D17&si=07IfYV7GP8_oc1xZ

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)

Internal Test / Quiz-(2): 20

Total Marks - 20

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks

Semester End Exam (SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks

Question - C: Short answer type question

05 x 5 = 25 Marks

Question -D: Long answer type question

07 x 5 = 35 Marks

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Total = 80 Marks

Name and Signature of Convener & Members:

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

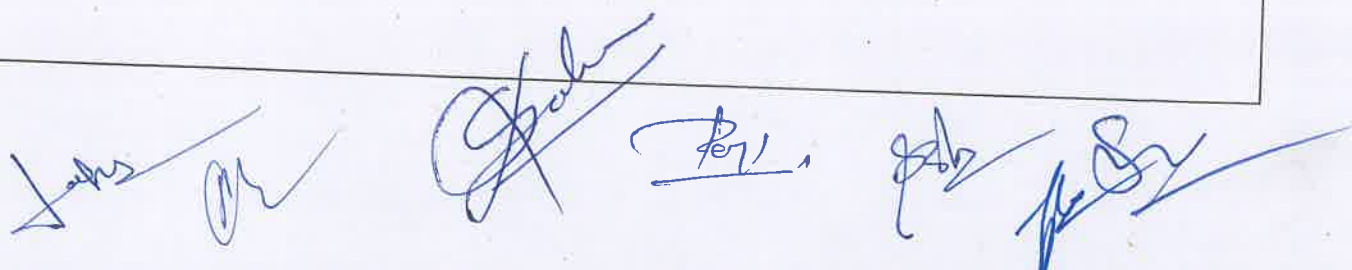
**Continuous
Internal
Assessment (CIA):**
(By Course Teacher)

Internal Test / Quiz-(2): 20
Total Marks - 20

Better marks out of the two Test / Quiz
+ obtained marks in Assignment shall be
considered against 20 Marks

**End Semester
Exam (ESE):**

Name and Signature of Convener & Members:



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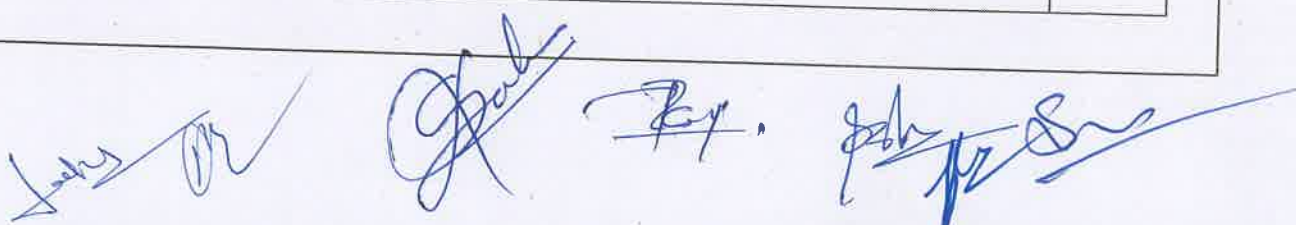
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester -VII	Session: 2025-2026
1	Course Code	BIT-707(L)	
2	Course Title	Theory of Computation	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understanding of the core concepts in automata theory and formal languages. • Understanding and analyzing the fundamentals of compiler designing. • Design grammars and automata (recognizers) for different language classes. • Design the pushdown automata. • Design the Turing machine.	
6	Credit Value	4 Credits	4 Credit = 60 Hours - Learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching-Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction to automata: Definition and types of automata; Finite Automata, Pushdown Automata, Turing Machine, introduction to Grammar and languages according to the types of automata. Finite Automata: Introduction to Finite State Automata (FSA): Formal definition, simpler notations (state transition diagram, transition table). Types of FSA: Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Finite Automata with Epsilon Transitions, Elimination of Epsilon transitions, Conversion of NFA to DFA, Equivalence of NFA and DFA. Applications of Finite Automata, Minimization of Deterministic Finite Automata. Mealy machine, Moore machine.	15



II	REGULAR EXPRESSIONS (RE): Introduction to RE, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. REGULAR GRAMMARS: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.	15
III	CONTEXT FREE GRAMMAR (CFG): Introduction to CFG's, Properties of CFG's, Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG, Minimization of CFG, Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma for CFLs. PUSHDOWN AUTOMATA: Introduction of PDA and its model, types of PDA, Languages accepted by the PDA, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.	15
IV	TURING MACHINES (TM): Formal definition and model of Turing Machine, Types of TMs, Languages of a TM, TM as acceptors, Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA).	15
Keywords	Finite Automata, Regular Expression, Regular Grammar, Context Free Grammar, Turing Machine.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory, Languages and Computation, 3rd edition, Pearson Education, India.
- K. L. P Mishra, N. Chandrasekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.

Reference Books Recommended:

- A.M. Padma Reddy, Finite Automata and Formal languages, Pearson Education India
- Michael Sipser, Third Edition, Introduction to the Theory of Computation, Cengage Learning.

Online Resources:

- NPTEL YouTube Channel: Lectures on Theory of Computation
https://youtube.com/playlist?list=PLbMVogVj5nJSd25WnSU144ZyGmsqjuKr3&si=EvuSjnO_THjn
- NPTEL YouTube Channel: Lectures on Theory of Automata, Formal Languages and Computation
<https://youtube.com/playlist?list=PL85CF9F4A047C7BF7&si=SBm-glkmkjOBDscB>
- NPTEL YouTube Channel: Lectures on Theory of Computation and Automata
<https://youtube.com/playlist?list=PL3-wYxht4yCgBHUpwXDTLos3JStccGIax&si=TbYH91>

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- SWAYAM YouTube Channel: Introduction to Automata, Languages and Computations
https://youtube.com/playlist?list=PLbRMhDVUMngcwWkzVTm_kFH6JW4JCtAUM&si=RbTG3Z0Jf6Zx_pu

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)

Internal Test / Quiz-(2): 20

Total Marks -

20

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks

Semester End Exam (SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks

Question - C: Short answer type question

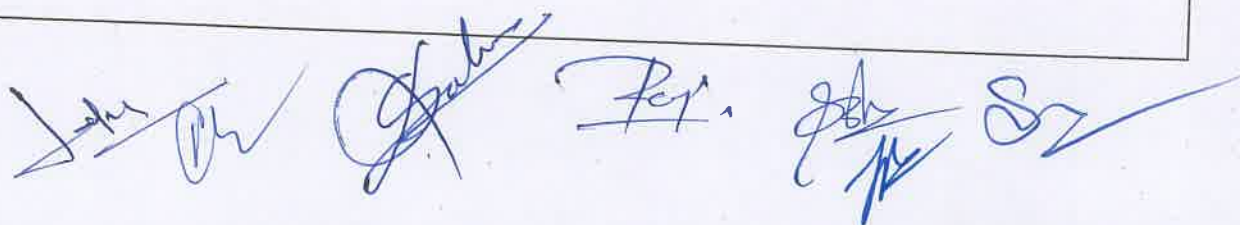
05 x 5 = 25 Marks

Question -D: Long answer type question

07 x 5 = 35 Marks

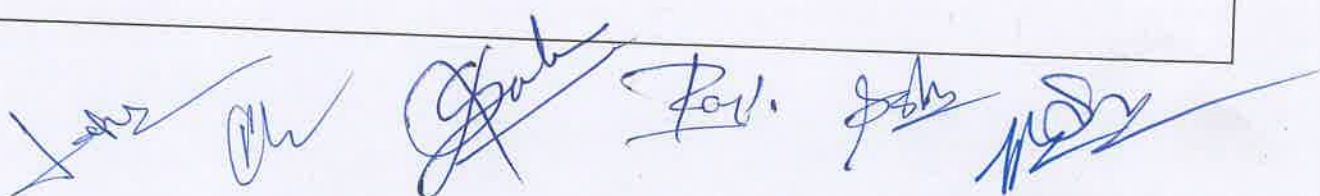
Total = 80 Marks

Name and Signature of Convener & Members:



Course Structure for CBCS B.Sc. (IT)- VIII Semester

Course code	Course Type	Course Name	Theory Marks	Internal ASS. Marks	Practical Marks	Total Marks		Credits
			Max.	Max.	Max. (E)	Max.	Min.	
BIT 801(L)	DSC	Fundamentals of IoT and Applications	60	15		75	30	3
BIT 802(P)		Lab 1: Fundamentals of IoT and Applications			25	25	10	1
BIT 803 (L)	DSE1	Soft Computing	60	15		75	30	3
BIT 804 (P)		Lab 2: Soft Computing			25	25	10	1
BIT 805 (L)	DSE2	Advanced Concept in Operating System	80	20		100	40	4
BIT 806(L)	DSE3	Digital Image Processing	80	20		100	40	4
BIT 807(L)	DSE4	Cloud Computing	80	20		100	40	4
		TOTAL				600	240	20



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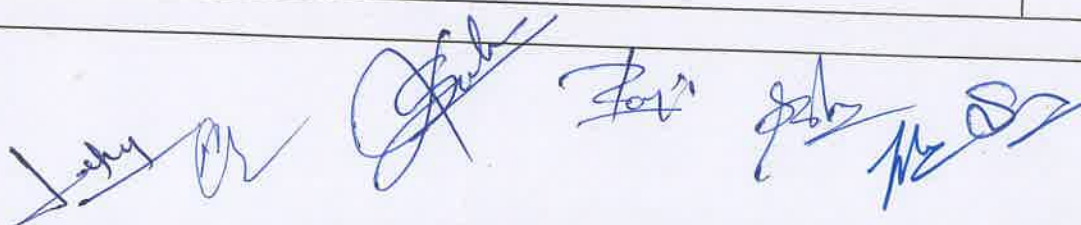
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester - VIII	Session: 2025-2026
1	Course Code	BIT-801(L)	
2	Course Title	Fundamentals of IoT and Applications	
3	Course Type	DSC (Discipline Specific Course)	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand IoT value chain structure (device, data cloud), application areas and technologies involved. • Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules • Market forecast for IoT devices with a focus on sensors • Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.	
6	Credit Value	3 Credits	3Credit =45 Hours - learning & Observation
7	Total Marks	Max. Marks: 75	Min Passing Marks: 30

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.	13



II	IoT Physical Devices - Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C). Controlling Hardware - Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors.	11
III	Sensors - Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor.	10
IV	Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.	11
Keywords	Internet of Things, IOT Sensors, IOT Actuators, Arduino, Raspberry Pi.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
- Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

Reference Books Recommended:

- Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
- Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
- N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

Online Resources:

- Swayam/NPTEL: https://www.youtube.com/channel/UC6ZY_csXZc7YZZm2W8HcQ6A
- Javatpoint: <https://www.javatpoint.com/iot-internet-of-things>
- Tutorialspoint: https://www.tutorialspoint.com/internet_of_things/index.htm
- Topics Related to IOT from data-flair: <https://data-flair.training/blogs/iot-tutorial/>
- Topics Related to IOT from edureka: <https://www.edureka.co/blog/iot-tutorial/>
- https://www.lnmiit.ac.in/Department/ECE/uploaded_files/Internet_of_Things_Lab_manual.pdf
- https://www.iare.ac.in/sites/default/files/lab1/IARE_IOT%20LAB%20MANUAL.pdf
- https://www.amirajcollege.in/wp-content/uploads/2020/06/2180709-iot_manual.pdf
- <https://peer.asee.org/internet-of-things-iot-laboratory.pdf>
- <https://www.teachmint.com/tfile/studymaterial/class->

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- <https://www.slideshare.net/RadheyShyam18/iot-lab-manual-new>
- <https://www.psgrkcw.ac.in/wp-content/uploads/2021/08/IoT-Applications-Lab-Manual-IT.pdf>
- <https://www.coursehero.com/file/37028140/IoT-Lab-Manualpdf/>
- <https://www.scribd.com/document/408744059/IoT-Lab-Manual>
- https://mrcet.com/CSE_downloads.html
- <http://iotmumbai.bharativedyapeeth.edu/index.php/lab-manuals#computer-technology>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 60 Marks

Continuous Internal
Assessment (CIA): (By
Course Teacher)

Internal Test / Quiz-(2): 15

Total Marks -

15

Better marks out of the two Test /
Quiz + obtained marks in Assignment
shall be considered against 15 Marks

Semester End Exam
(SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

Question - A & B: (Compulsory)

Very short answer type (02 each)

2.5 x 4 = 10 Marks

Question - C: Short answer type question

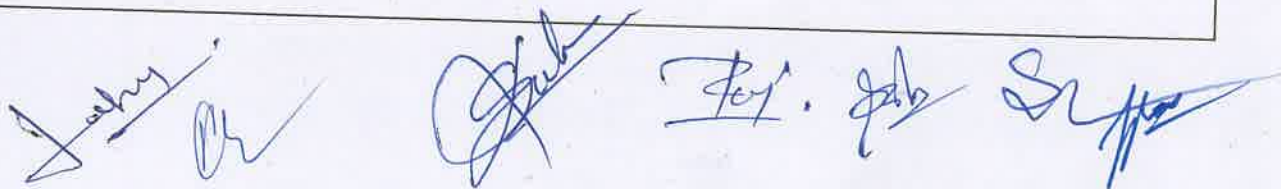
5 x 4 = 20 Marks

Question -D: Long answer type question

6 x 5 = 30 Marks

Total = 60 Marks

Name and Signature of Convener & Members:



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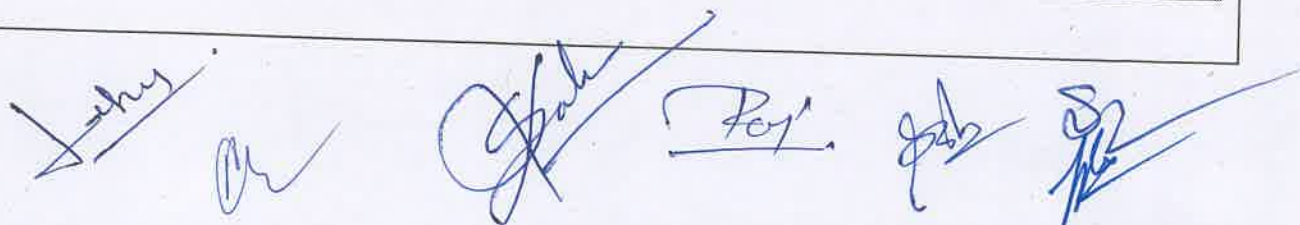
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree)		Semester - VIII	Session: 2025-2026
1	Course Code	BIT-802(P)	
2	Course Title	Lab 8: Fundamentals of IoT and Applications	
3	Course Type	Practical	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand IoT value chain structure (device, data cloud), application areas and technologies involved. • Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules • Market forecast for IoT devices with a focus on sensors • Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field Learning/Training
7	Total Marks	Max. Marks: 25	Min Passing Marks: 10

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
List of Practical Experiment	1. Data acquisition using Multimeter and oscillographic recorder 2. Connect an LED to GPIO pin 25 and control it through the command line. 3. Connect an LED to GPIO pin 24 and a Switch to GPIO 25 and control the LED with the switch. 4. The state of LED should toggle with every press of the switch Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds 5. Use joystick and display the direction on the screen	30



6. Use Light Dependent Resistor (LDR) and control an LED that should switch-on/off depending on the light.
7. Create a traffic light signal with three colored lights (Red, Orange and Green) with a duty cycle of 5-2-10 seconds.
8. Switch on and switch of a DC motor based on the position of a switch.
9. Convert an analog voltage to digital value and show it on the screen.
10. Create a door lock application using a reed switch and magnet and give a beep when the door is opened.
11. Control a 230V device (Bulb) with Raspberry Pi using a relay.
12. Control a 230V device using a threshold temperature, using a temperature sensor.
13. Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, Green On, White On) for each clap (use sound sensor).
14. Create a web application for the above applications wherever possible with suitable modifications to get input and to send output.

Note: Concerned teacher can add additional practical exercises as per requirement

Keywords

Internet of Things, IOT Sensors, IOT Actuators, Arduino, Raspberry Pi.

Name and Signature of Convener & Members:

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
- Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

Reference Books Recommended:

- Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
- Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
- N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

Online Resources:

- Swayam/NPTEL: https://www.youtube.com/channel/UC6ZY_csXZc7YZZm2W8HcQ6A
- Javatpoint: <https://www.javatpoint.com/iot-internet-of-things>
- Tutorialspoint: https://www.tutorialspoint.com/internet_of_things/index.htm
- Topics Related to IOT from data-flair: <https://data-flair.training/blogs/iot-tutorial/>
- Topics Related to IOT from edureka: <https://www.edureka.co/blog/iot-tutorial/>
- https://www.lnmiit.ac.in/Department/ECE/uploaded_files/Internet_of_Things_Lab_manual.pdf

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- https://www.iare.ac.in/sites/default/files/lab1/IARE_IOT%20LAB%20_MANUAL.pdf
- https://www.amirajcollege.in/wp-content/uploads/2020/06/2180709-iot_manual.pdf
- <https://peer.asee.org/internet-of-things-iot-laboratory.pdf>
- <https://www.teachmint.com/tfile/studymaterial/class-7th/internetofthingsiot/iotlabmanualpdf/d85015cf-722b-4b50-86e4-0f456f91bfa0>
- <https://www.slideshare.net/RadheyShyam18/iot-lab-manual-new>
- <https://www.psgrkew.ac.in/wp-content/uploads/2021/08/IoT-Applications-Lab-Manual-IT.pdf>
- <https://www.coursehero.com/file/37028140/IoT-Lab-Manualpdf/>
- <https://www.scribd.com/document/408744059/IoT-Lab-Manual>
- https://mrcet.com/CSE_downloads.html
- <http://iotmumbai.bharatividyaapeeth.edu/index.php/lab-manuals#computer-technology>

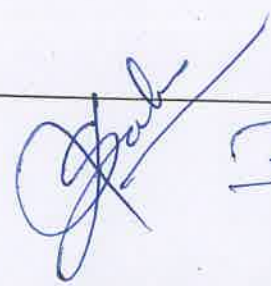
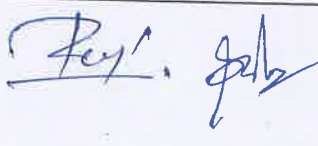
PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 25

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): .NIL	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment 1. Performed the Task based on lab. work - 10 Marks 2. Spotting based on tools & technology (written) – 10 Marks 3. Viva-voce (based on principle/technology) - 05 Marks TOTAL-25 MARKS	Managed by Course teacher as per lab. Status
Name and Signature of Convener & Members:		




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PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester – VIII	Session: 2025-2026
1	Course Code	BIT-803(L)	
2	Course Title	Soft Computing	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: - Analyze and appreciate the applications which can use fuzzy logic. - Understand the difference between learning and programming and explore practical applications of Neural Networks (NN). - Students would understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications - Ability to appreciate the importance of optimizations and its use in computer engineering fields and other domains. - To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.	
6	Credit Value	3Credits	3 Credit = 45 Hours - Learning & Observation
7	Total Marks	Max. Marks: 75	Min Passing Marks: 30

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) – 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction: Soft computing, Different tools of soft computing: Fuzzy logic, Artificial Neural Network, Genetic Algorithm), Area of application. Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets, Membership Function, properties and operations of classical set and Fuzzy set, α-cuts, Properties of α-cuts, Linguistic Variables, Membership function, Classical relation and Fuzzy Relation and its properties and operations, Defuzzification and its methods, Fuzzy rule base.	11



II	Artificial Neural Network(ANN): Architecture, Introduction, Evolution of Neural Network, Biological Neural Network Vs ANN, Basic Model of ANN, Different types of ANN, Single layer Perceptron, Solving XOR problem, Activation function, Linear severability, Supervised and unsupervised learning, perceptron learning, delta learning, Feed-forward and Feedback networks, Error Back Propagation Network (EBPN), Associative memories and its types, Hopefield Network, Kohenenself-organizing Map.	13
III	Genetic Algorithm: What is Optimization?, Introduction, Application, GA operators: selection, crossover and mutation, different techniques of selection, crossover and mutation, different types of chromosomes, Application of GA.	11
IV	Hybrid soft commuting: Design of Neuro-Fuzzy model like ANFIS, Neuro-Genetic, Fuzzy-Genetic Neuro-Fuzzy-Genetic model.	10
Keywords	Soft Computing, Fuzzy Logic, ANN, Genetic Algorithm.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Principles of soft computing, S.N. Shivanandan and S.N. Deepa , Wiley publication, Wiley India Edition.
- Neural network and Learning Machines, Simon Haykin, Pearson Education, 2011.
- Artificial Neural Networks, Robert J. Scholkoff, McGraw Hill Education (India) Pvt. Limited, 1997.
- Fuzzy Sets, Uncertainty and Information, G. J. Klir and T.A. Folger, PHI learning private limited. Publisher- Pearson 3Edition 1999

Reference Books Recommended:

- Neural Networks and Fuzzy Systems, A dynamical Systems Approach to Machine Learning, Bart Kosko, PHI learning private limited.
- Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rakasekaran, G.A. VijayalakshmiPai, PHI learning private limited, 14th Edition. 2003.
- Neural Networks and Fuzzy Logic, K. Vinoth Kumar, R. Saravana Kumar, S. K. Kataraiia and Sons publication.
- Artificial Neural Networks, B.Yegnanarayana Prentice Halll of India (P) Limited.
- Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publication House.

Online Resources:

- Introduction to Soft computing: [What is soft computing - Javatpoint](#)
- Need for Soft Computing: [Need for Soft Computing - GeeksforGeeks](#)

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- Introduction To Soft Computing: [Introduction To Soft Computing - Course \(nptel.ac.in\)](https://nptel.ac.in)

PART -D: Assessment and Evaluation

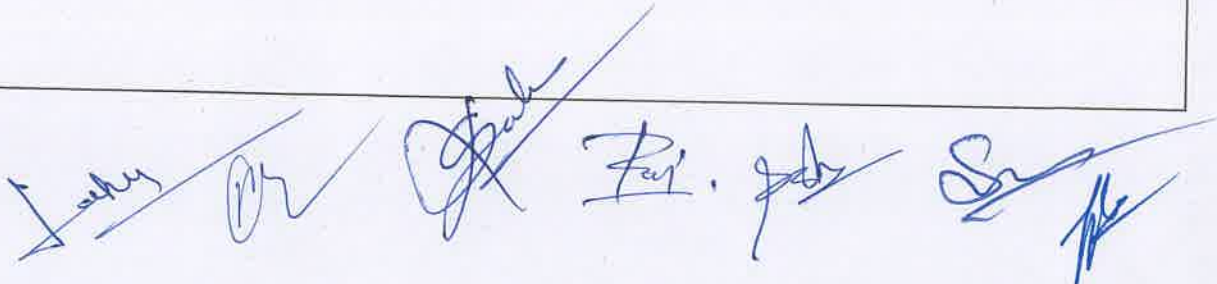
Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 60 Marks

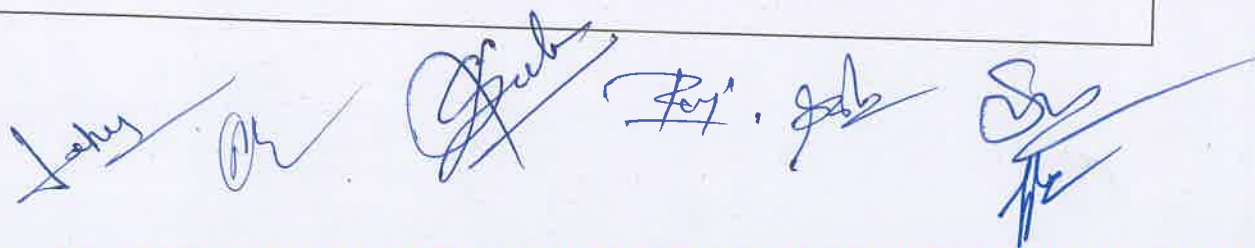
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 15 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 2.5 x 4 = 10 Marks Question - C: Short answer type question 5 x 4 = 20 Marks Question -D: Long answer type question 6 x 5 = 30 Marks Total = 60 Marks	
Name and Signature of Convener & Members:		



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DEPARTMENT OF COMPUTER SCIENCE
AND INFORMATION TECHNOLOGY
COURSE CURRICULUM 2025-26

PART A: INTRODUCTION

Program: BSC IT(UG)		Class: BSC IT Semester – VIII	Session:2025-2026
1	Course Code	BIT-804(P)	
2	Course Title	SOFT COMPUTING	
3	Course Type	Practical	
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Explain the fundamental concepts of soft computing and its distinction from hard computing. • Identify the different components of soft computing: Fuzzy Logic, Artificial Neural Networks (ANN), and Genetic Algorithms • Define and apply the concept of classical sets and fuzzy sets. • Construct different membership functions and perform operations on fuzzy sets. • Design and implement a fuzzy inference system for real-world problems. • Apply different defuzzification methods to convert fuzzy outputs into crisp values. • Describe the architecture and functioning of biological neural networks and artificial neural networks. • Implement single-layer and multi-layer perceptron for solving classification problems. • Solve the XOR problem using a multi-layer perceptron with backpropagation. • Differentiate between supervised and unsupervised learning and apply them to practical problems. • Design and implement Hopfield networks and self-organizing maps for pattern recognition • Explain the concept of optimization and the role of genetic algorithms in solving optimization problems.	
5	Credit Value	1 Credit	1 credit =30 Hours – Learning and Observation
6	Total Marks	Maximum Marks :25	Minimum Passing Marks:10



Part B

List of Program

1. Write a program to demonstrate **classical set** and **fuzzy set** operations (union, intersection, complement).
2. Create a program to define and display different **membership functions** (triangular, trapezoidal, Gaussian).
3. Implement α -cut of a fuzzy set and show its properties using graphical output.
4. Implement fuzzy relation operations (union, intersection, composition).
5. Write a program to calculate the **max-min composition** of two fuzzy sets.
6. Implement and compare different **defuzzification methods** (centroid, mean of maximum, height).
7. Design a **fuzzy logic controller** for a temperature control problem using fuzzy rules.
8. Implement a **single-layer perceptron** to solve the AND, OR, and NOT problems.
9. Demonstrate the **XOR problem** using a single-layer perceptron and explain why it fails.
10. Solve the XOR problem using a **multi-layer perceptron** with backpropagation.
11. Implement a program to show the effect of different **activation functions** (Sigmoid, ReLU, Tanh).
12. Implement **delta learning rule** for training a neural network.
13. Implement **Hebbian learning** for simple binary classification.
14. Create a Hopfield network for pattern recognition and test with noisy input.
15. Implement Kohonen's Self-Organizing Map for clustering data points.
16. Write a program to solve a simple optimization problem using GA.
17. Implement **selection operators**: Roulette Wheel, Tournament, Rank-Based Selection.
18. Implement **crossover techniques**: One-point, Two-point, and Uniform Crossover.
19. Implement **mutation techniques**: Bit Flip, Swap Mutation.
20. Solve the TSP using a genetic algorithm.
21. Optimize the parameters (population size, mutation rate) for better performance.
22. Design an **Adaptive Neuro-Fuzzy Inference System (ANFIS)** for a classification task.
23. Use a **Genetic Algorithm** to optimize the weights of an ANN.
24. Use a genetic algorithm to optimize the membership functions of a fuzzy system.
25. Create a combined **Neuro-Fuzzy-Genetic** model for a complex classification problem.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

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TEXT BOOKS Recommended:

1. S. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, PHI Learning Pvt. Ltd.
2. J. S. R. Jang, C. T. Sun, and E. Mizutani, Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence. Pearson Education
3. Timothy J. Ross, Fuzzy Logic with Engineering Applications. Wiley
4. Simon Haykin, Neural Networks and Learning Machines, Pearson

Reference Books:

1. K. H. Lee, *First Course on Fuzzy Theory and Applications*, Springer
2. Laurene Fausett, *Fundamentals of Neural Networks: Architectures, Algorithms, and Applications*, Pearson
3. Andries P. Engelbrecht, *Computational Intelligence: An Introduction*, Wiley.
4. Martin T. Hagan, Howard B. Demuth, Mark H. Beale, *Neural Network Design*, PWS Publishing

Online Resources: (e-Resources/ e-Books/ e-Learning Portals)

Coursera – <https://www.coursera.org>

edX – <https://www.edx.org>

Udemy – <https://www.udemy.com>

NPTEL-<https://nptel.ac.in>

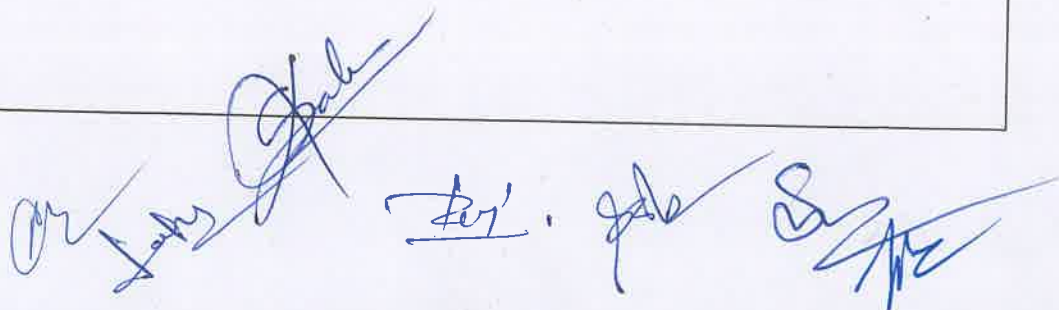
Khan Academy – <https://www.khanacademy.org>

IEEE Xplore – <https://ieeexplore.ieee.org>

Springer – <https://link.springer.com>

PART -D: Assessment and Evaluation**Suggested Continuous Evaluation Methods:****Maximum Marks:****25 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): NIL	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment 1. Performed the Task based on lab. work - 10 Marks 2. Spotting based on tools & technology (written) – 10 Marks 3. Viva-voce (based on principle/technology) - 05 Marks TOTAL-25 MARKS	Managed by Course teacher as per lab. Status
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AND INFORMATION TECHNOLOGY
COURSE CURRICULUM 2025-26

PART- A: Introduction

**Program: Bachelor in Science
(IT)**

(Certificate / Diploma / Degree/Honors)

Semester – VIII

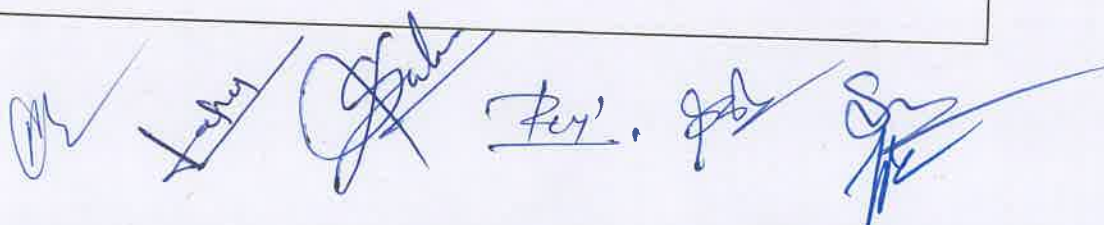
Session: 2025-2026

1	Course Code	BIT-805(L)		
2	Course Title	Advanced Concepts in Operating Systems		
3	Course Type	DSE (Discipline Specific Elective)		
4	Prerequisite	As per program		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Knowledge about advanced concepts in OS. • Ability to develop OS for distributed systems. • Understand process synchronisation and concurrency control. • Understand the architecture and functioning of mobile operating system. • Ability to develop modules for mobile devices.		
6	Credit Value	4 Credits	4 Credit = 60 Hours - Learning & Observation	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Multiprocessor Operating Systems: System Architectures, Structures of OS, OS design issues, Process synchronization, Process Scheduling and Allocation, memory management.	15
II	Distributed Operating Systems: System Architectures, Design issues, Communication models, clock synchronization, mutual exclusion, election algorithms, Distributed Deadlock detection, Distributed scheduling, Distributed shared memory, Distributed File system, Multimedia file systems, File placement, Caching.	15



III	Database Operating Systems: Requirements of Database OS, Transaction process model, Synchronization primitives, Concurrency control algorithms.	15
IV	Mobile Operating Systems: ARM and Intel architectures, Power Management, Mobile OS Architectures, Underlying OS, Kernel structure and native level programming, Runtime issues, Approaches to power management.	15
Keywords	Multiprocessor operating system, Distributed operating system, Database operating System, Mobile Operating system.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Mukesh Singhal, Niranjana Shivaratri, "Advanced Concepts in Operating Systems", TMH, 2001
- William Stallings, "Operating Systems – Operating System: Internals and Design Principles", Prentice Hall, 2005.

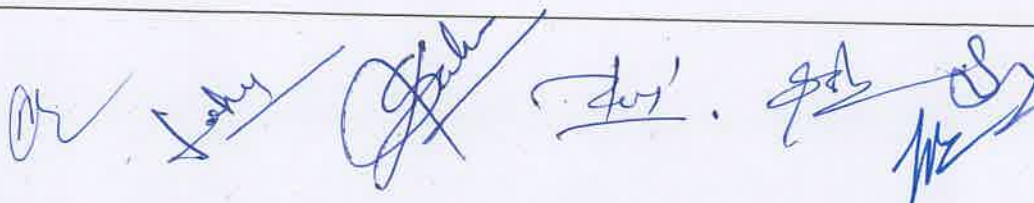
Reference Books Recommended:

- Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education, 1995.
- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", John Wiley & Sons Inc., 2006.

Online Resources:

- Advanced Concepts in Operating Systems:
https://books.google.co.in/books/about/Advanced_Concepts_in_Operating_Systems.html?id=ajx9NAEACAAJ&redir_esc=y
- Distributed Operating System:
<https://www.javatpoint.com/distributed-operating-system>
- Mobile Operating System
<https://www.sciencedirect.com/topics/computer-science/mobile-operating-system>
https://baou.edu.in/assets/pdf/PGDMAD_101_slm.pdf
- Database operating System:
- [https://www.redswitches.com/blog/database-operating-system/#:~:text=A%20Database%20Operating%20System%20\(DBOS,storage%2C%20retrieval%2C%20and%20manipulation.](https://www.redswitches.com/blog/database-operating-system/#:~:text=A%20Database%20Operating%20System%20(DBOS,storage%2C%20retrieval%2C%20and%20manipulation.)
<https://www.ibm.com/docs/en/psfa/7.2.1?topic=logs-database-operating-system>
<https://eecs.berkeley.edu/230426-2/>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:**Maximum Marks: 100 Marks****Continuous Internal Assessment (CIA): 20 Marks****End Semester Exam (ESE): 80 Marks****Continuous Internal Assessment (CIA): (By Course Teacher)****Internal Test / Quiz-(2): 20****Total Marks -****20****Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks****Semester End Exam (SEE)****Pattern -FOUR Questions (A, B, C, D) from each Unit****Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks****Question - C: Short answer type question****05 x 5 = 25 Marks****Question -D: Long answer type question****07 x 5 = 35 Marks****Total****= 80 Marks****Name and Signature of Convener & Members:**

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COURSE CURRICULUM 2025-26

PART- A: Introduction

Program: Bachelor in Science (IT)

(Certificate / Diploma / Degree/Honors)

Semester – VIII

Session: 2025-2026

1	Course Code	BIT-806(L)		
2	Course Title	Digital Image Processing		
3	Course Type	DSE (Discipline Specific Elective)		
4	Prerequisite (if, any)	As per program		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Learn and understand the digital image processing. • Learn and understand various image transform used in digital image processing. • Learn and understand various image enhancement technique used in digital image processing. • Learn and understand various image restoration technique and methods used in digital image processing. • Learn and understand various image compression and Segmentation used in digital image processing.		
6	Credit Value	4 Credits	4 Credit = 60 Hours - Learning & Observation	
7	Total Marks	Max. Marks:	100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction to digital image processing, Elements of Digital Image Processing system, Visual perception and properties of human eye, Image representation, A simple image model, Some basic relationship between pixels, Image geometry.	15
II	Introduction to Fourier Transform, DFT & FFT, Properties of 2D Fourier Transform, Separable Image Transforms –Walsh, Hadamard Transform, Discrete Cosine Transform, Haar Transform	15

III	Image Enhancement - Histogram Modeling, Equalization and modification, Image smoothing, Image sharpening, Spatial Filtering, Homomorphic filtering for image enhancement, Model of Image Degradation/Restoration process, Inverse filtering, Least Mean Square (Wiener) filtering, Constrained least mean square restoration, Singular value decomposition, Recursive filtering.	15
IV	Image compression models, Lossless compression: Variable length coding, LZW coding, Lossy Compression: Transform coding, Wavelet coding, Image Segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding-Region oriented segmentation and Texture.	15
Keywords	Digital Image, Image Transform, Image Enhancement, Image compression.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Rafael C Gonzalez, Richard E Woods, "Digital Image Processing" - 2nd Edition, Pearson Education 2003
- Jain A.K., "Fundamentals of Digital Image Processing", Pearson education.

Reference Books Recommended:

- William K Pratt, "Digital Image Processing", John Willey 2001
- Millman Sonka, Vaclav Hlavac, Roger Boyle, Broos/Colic, "Image Processing Analysis and Machine Vision" - Thompson Learning, 1999.
- Chanda S., Dutta Majumdar - "Digital Image Processing and Applications", Prentice Hall of India, 2000.

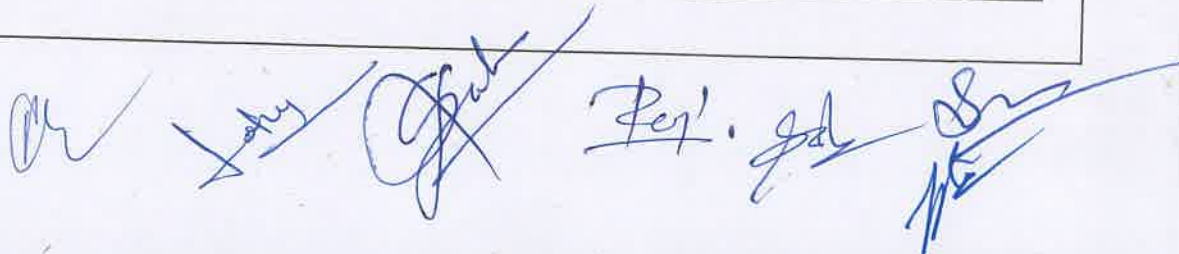
Online Resources:

- Digital Image Processing Basics: <https://www.geeksforgeeks.org/digital-image-processing-basics/>
- Digital Image Processing: <https://www.javatpoint.com/digital-image-processing-tutorial>
- Digital Image Processing: <https://www.tutorialspoint.com/dip/index.htm>
- Digital Image Processing: <https://in.mathworks.com/discovery/digital-image-processing.html>
- NPTEL: https://onlinecourses.nptel.ac.in/noc19_ee55/preview

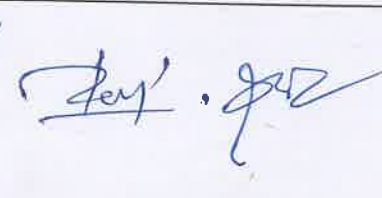
PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	20 Marks
End Semester Exam (ESE):	80 Marks



Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks	
Name and Signature of Convener & Members:		


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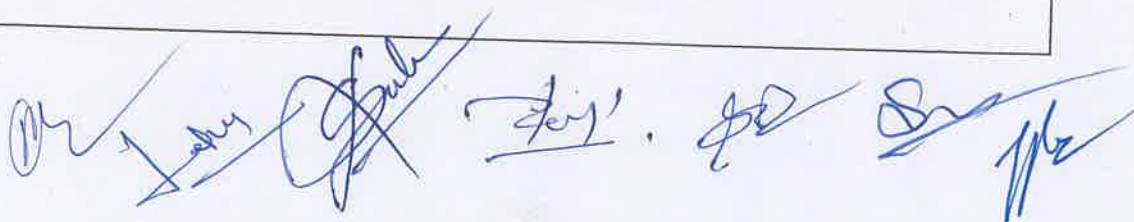
PART- A: Introduction

Program: Bachelor in Science (IT) (Certificate / Diploma / Degree/Honors)		Semester - VIII	Session: 2025-2026
1	Course Code	BIT-807(L)	
2	Course Title	Cloud Computing	
3	Course Type	DSE (Discipline Specific Elective)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	After Completing this course, students will be able to: • Understand the concepts, characteristics and benefits of cloud computing. • Understand the key security and compliance challenges of cloud computing. • Understand the concept of Cloud Security and governance. • Learn the Concept of Cloud Infrastructure Model. • Understand the cloud storage, Cloud Virtualization & Micro services.	
6	Credit Value	4 Credits	4 Credit = 60 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Fundamental Cloud Computing: Concepts, Terminology, Technologies, Benefits, Challenges, SLAs and business cost metrics associated with cloud computing, SaaS, IaaS, PaaS delivery models, Common cloud deployment models and cloud characteristics, Various applications of cloud computing. Cloud Architecture: The technology architecture of cloud platforms and cloud-based solutions and services and their utilization via a set of cloud computing design patterns, Hybrid cloud deployment models, Compound design patterns and solution architectures that span cloud and on-premise environments.	15



II	Cloud Security & Governance: The cloud security mechanisms, cloud security architecture, A set of security design patterns, The definition of cloud governance precepts, Roles, Practices and processes, Common governance challenges and pitfalls specific to cloud computing.	15
III	Cloud Storage: The cloud storage devices, Structures and technologies, cloud storage mechanisms, Persistent storage, Redundant storage, Cloud-attached storage, Cloud-remote storage, Cloud storage gateways, Cloud storage brokers, Direct Attached Storage (DAS), Network Attached Storage (NAS), Storage Area Network (SAN), Various cloud storage-related design patterns.	15
IV	Cloud Virtualization & Microservices: Core topic areas pertaining to the fundamental virtualization mechanisms and types used within contemporary cloud computing platforms are explored along with various key performance indicators and related metrics, Microservices of Cloud Computing.	15
Keywords	Cloud Computing, Security, Governance, Storage, Virtualization.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Distributed Computing by Dollymore Cloud Computing (Wind) by Dr. Kumar Saurabh, 2nd Edition, Wiley India.

Reference Books Recommended:

- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012.
- Handbook of Cloud Computing by Anand Nayyar, Publisher: BPB Publication.

Online Resources:

- Introduction to Cloud Computing from W3shool:
<https://www.w3schools.in/cloud-computing/tutorials/>
- Introduction to Cloud Computing from Coursera:
<https://www.coursera.org/learn/introduction-to-cloud>
- Cloud Computing Basics:
<https://www.coursera.org/learn/cloud-computing-basics>
- Cloud Computing Concepts:
<https://www.coursera.org/learn/cloud-computing>
- Cloud Computing Specialization from Coursera:
<https://www.coursera.org/specializations/cloud-computing>
- Cloud Computing from SWAYAM/NPTEL:
https://onlinecourses.nptel.ac.in/noc22_cs20/preview
<https://www.youtube.com/channel/UCK73enkjfQNDwdBqMyaMtRg>

(Signatures)

- Cloud Computing Basics: https://terrorgum.com/tfox/books/cloudcomputingbasics_asefteachingintroduction.pdf
- CLOUD COMPUTING Principles and Paradigms : https://dphoto.lecturer.pens.ac.id/lecture_notes/internet_of_things/CLOUD%20COMPUTING%20Principles%20and%20Paradigms.pdf
- Cloud Computing Tutorial For Beginners: https://www.youtube.com/watch?v=fLV_t2qKYyU
- Introduction to Cloud Computing: <https://www.youtube.com/watch?v=Dv0sjAYnVCY>
- Cloud Computing Tutorials: <https://www.youtube.com/watch?v=NyA9PB6j8bg>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks	

Name and Signature of Convener & Members:

(Handwritten signatures of Convener and Members)