

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS)
COIMBATORE-641 018**

**Learning outcomes-based Curriculum Framework
(LOCF) for**

B.Sc. INFORMATION TECHNOLOGY

(Effective from Academic year 2021-2022)



**POSTGRADUATE DEPARTMENT OF INFORMATION TECHNOLOGY
MAY-2021**

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Preamble

Over the past decades the higher education system of our country has undergone substantial structural and functional changes resulting in both quantitative and qualitative development of the beneficiaries. Such changes have gained momentum with the introduction of Choice Based Credit System (CBCS) which further expects learning outcome-based curriculum in order to maximize the benefits of the newly designed curriculum. The learning outcome-based curriculum will definitely help the teachers of the discipline to visualize the curriculum more specifically in terms of the learning outcomes expected from the students at the end of the instructional process. It is pertinent to mention here that the purpose of education is to develop an integrated personality of the individual and the educational system provides all knowledge and skills to the learner for this.

Tamil Nadu State Council for Higher Education (TANSCHE) has formed the State Integrated Boards of Studies, which, with great diligence and expertise has devised the mandatory areas that have to be covered for three-year undergraduation and two-year postgraduation courses to realize the facilitation of the mobility of faculty and students from one university to another and to easily solve the problem of equivalence among courses. Great care has been taken so that these areas would take 75% of the course content and the remaining 25% can be decided by the individual institutions. The areas that must be covered by the student that are mandatory for earning the degree to have due value has been worked out so that the student will gain enough depth of knowledge in the subject concerned. 25% percent of the syllabus should be designed by the institutions, and the areas covered under this also must have a weightage of 25%. This gives the autonomous institution seamless liberty on every Board of Studies (BOS) to innovate and experiment, and more importantly, it is here that the institution devises appropriate strategies by which (i) to make creative and critical applications of what has been learnt in the mandatory components, and (ii) to meaningfully connect the learners to the career demands and expectations. It is essential that the theoretical subject knowledge of the students must be translated into practical hands-on experience.

One of the significant reforms in the undergraduate education is to introduce the Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the country which will help the students to ensure similar quality of education irrespective of the institute and location. With initiatives of University Grants Commission

(UGC) for nation-wide adoption and implementation of the LOCF for bachelor's programmes in colleges, universities and HEIs in general. A Core Expert Committee (CEC) was constituted to formulate the modalities for developing the LOCF in various subjects being taught in the undergraduate courses in sciences, humanities, commerce and professional courses. The CEC also constituted the Subject Expert Committees (SEC) in various subjects to prepare detailed guidelines for the LOCF in subjects concerned.

The key components of the planning and development of LOCF are given in terms of clear and unambiguous description of the Graduate Attributes (GA), Qualification Descriptors (QD), Program Learning Outcomes (PLO) and Course Learning Outcomes (CLO) to be achieved at the end of the successful completion of each undergraduate program to be offered by HEIs. In undergraduate education in Information Technology, the programme of study leading to the degree of B.Sc. in Information Technology is discussed herewith.

The Qualification Descriptors (QD), Program Learning Outcomes (PLO) and the Course Learning Outcomes (CLO) were also finalized keeping the broad requirement of the programme in view. The LOCF also gives general guidelines for the Teaching Learning Process (TLP) corresponding to each component of theory, experiment, tutorials, projects and industrial / field visits to be followed in order to achieve the stated outcomes for each component. Finally, some suggestions for using various methods in the assessment and evaluation of learning levels of students are also made. It is a student centric framework where they are expected to learn fundamentals of Information Technology along with the latest trends and techniques like Artificial Intelligence, Internet of Things, Machine Intelligence along with advanced skillsets that include Mobile Application Development, Object Oriented Programming among many other courses.

1. Introduction

Information Technology (IT) has been evolving as an important branch of science and engineering throughout the world in the last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Information Technology is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Information Technology can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain.

Information Technology has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Information Technology is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Universities and other HEIs introduced programmes of studies in Information Technology as this discipline evolved itself to a multidisciplinary discipline. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavor has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge. In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Simultaneously, BSc and MSc programmes with specialization in Information Technology were introduced to train manpower in this highly demanding area. B.Sc in Information Technology are being planned and introduced in

different colleges and institutions.

Information Technology education at undergraduate level will result in earning a Bachelor of Science (BS) degree in Information Technology. The coursework required to earn a BSc is equally weighted in mathematics and science. B.Sc in Information Technology are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in Information Technology leading to research, can be employable at IT industries, or can pursue a teachers' training programme such as B.Ed., in Computer Education, or can adopt a business management career. BSc in Information Technology aims at laying a strong foundation of Information Technology at an early stage of the career along with two other subjects such as Maths and Statistics. There are several employment opportunities and after successful completion of an undergraduate programme in Information Technology, graduating students can fetch employment directly in companies as Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Learning Outcome-based Curriculum Framework in Information Technologies aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in Information Technology courses, in outcome-based curriculum framework, helps students to learn in solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help students learn programming techniques and the syntax of one or more programming languages.

Many of the learning outcomes of Information Technology can be achieved only by programming a computer for several different meaningful purposes. All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Learning Outcome-based Curriculum Framework for bachelor's degrees in Information Technology is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation.
- To develop the ability to use this knowledge to analyse new situations
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics and statistics to find the solution, interpret the results and make predictions for the future developments.

1.1 Course Structure – Types of Courses.

The following types of courses are offered under CBCS-LOCF:

1. **Core Courses (CC).** A core course is a compulsory course. A student of Information Technology has to take 14 such Information Technology courses over six semesters.

2. **Elective Courses (EC).** An elective course is a course that is to be chosen from a specified set of courses. These courses are of two types.

Discipline Specific Electives (DSE). These are elective courses that provide advanced undergraduate training in specialised areas of Information Technology. A set of 4, semester-specific, courses of this kind are offered in the fifth and sixth semesters of the Undergraduate programme.

Generic Electives (GE). These courses, in disciplines other than Information Technology, are intended to broaden the training of a student in the Information Technology Undergraduate programme. A student of Information Technology will take one such course, offered by another department, in each of Semester V to VI.

3. **Ability Enhancement Compulsory Course (AECC).** Two such courses are to be taken, one in Semester I (Environmental Studies) and one in Semester II (Value Education– Gandhian Thoughts).

4. **Skill Enhancement Course (SEC).** A student is to take one such course each in Semester III through Semester VI. Besides, an individual/group project in Semester VI.

2. Learning Outcomes-based Approach To Curriculum Planning and Development (LOACPD)

2.1 Nature and Extent of the B.Sc Information Technology

The undergraduate programs in Information Technology builds on science-based education at +2 level. The +2 secondary school education aims and achieves a sound grounding in understanding the basic scientific temper with introduction to process of computation by introducing some programming languages. This prepares a young mind to launch a rigorous investigation of exciting world of Information Technology.

Framing and implementation of curricula and syllabi is envisaged to provide an understanding of the basic connection between theory and experiment and its importance in understanding the foundation of computing. This is very critical in developing a scientific temperament and to venture a career with a wide spectrum of applications as well as theoretical investigations. The undergraduate curriculum provides students with theoretical foundations and practical experience in both hardware and software aspects of computers. The curriculum in Information Technology is integrated with courses in the sciences and the humanities to offer an education that is broad, yet of enough depth and relevance to enhance student employment opportunities upon graduation. As a Bachelor's degree program, the curriculum is based on the criterion that graduates are expected to function successfully in a professional employment environment immediately upon graduation.

The undergraduate program in Information Technology is presently being offered through the courses designed for granting the Information Technology degree by various colleges and universities in India. Information Technology course are of 3-year duration spread over six semesters.

2.2 Aims of Bachelor of Science Programme in Information Technology

The Bachelor of Science degree in Information Technology emphasizes problem solving in the context of algorithm development and software implementation and prepares students for effectively using modern computer systems in various applications. The curriculum provides required Information Technology courses such as programming languages, data structures, computer

architecture and organization, algorithms, database systems, operating systems, and software engineering as well as elective courses in artificial intelligence, computer-based communication networks, graphics, multimedia, web technology, and other current topics in Information Technology. The main aim of this Bachelor's degree is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. The purpose of the Information Technology programs are twofold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, and (2) to prepare the student for entry into a program of postgraduate study in Information Technology/engineering and related fields.

3. Graduate Attributes

Graduate Attributes (GA) are the qualities, skills and understandings that students should develop during their time with the HEI. These are qualities that also prepare graduates as agents of social good in future. Graduate Attributes can be viewed as qualities in following subcategories.

- Knowledge of the discipline
- Creativity
- Intellectual Rigour
- Problem Solving and Design
- Ethical Practices
- Lifelong Learning
- Communication and Social Skills

Afore-mentioned GAs can be summarized in the following manner.

GA 1. A commitment to excellence in all scholarly and intellectual activities, including critical judgment

GA 2. Ability to think carefully, deeply and with rigour when faced with new knowledge and arguments.

GA 3. Ability to engage constructively and methodically when exploring ideas and theories.

GA 4. Ability to consider others points of view and make a thoughtful argument

GA 5. Ability to develop creative and effective responses to intellectual, professional and social challenges

- GA 6. Ability to apply imaginative and reflective thinking to their studies
- GA 7. Commitment to sustainability and high ethical standards in social and professional practices.
- GA 8. Ability to be responsive to change, to be inquiring and reflective in practice, through information literacy and autonomous self-managed learning.
- GA 9. Ability to communicate and collaborate with individuals and within teams, in professional and community settings
- GA 10. Ability to demonstrate competence in the practical art of computing by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problems
- GA 11. Ability to use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
- GA 12. Ability to understand, design, and analyse precise specifications of algorithms, procedures, and interaction behaviour.
- GA 13. Ability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems
- GA 14. Ability to be equipped with a range of fundamental principles of Information Technology that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
- GA 15. Ability of working in teams to build software systems.
- GA 16. Ability to identify and to apply relevant problem-solving methodologies
- GA 17. Ability to design components, systems and/or processes to meet required specifications
- GA18.Ability to apply decision making methodologies to evaluate solutions for efficiency, effectiveness and sustainability
- GA 19.A capacity for self-reflection and a willingness to engage in self-appraisal

4. Qualification Descriptors

Qualification descriptors are generic statements of the outcomes of study. Qualification descriptors are in two parts. The first part is a statement of outcomes, achievement of which a

student should be able to demonstrate for the award of the qualification. This part will be of interest to those designing, approving and reviewing academic programmes. They will need to be satisfied that, for any programme, the curriculum and assessments provide all students with the opportunity to achieve, and to demonstrate achievement of the outcomes. The second part is a statement of the wider abilities that the typical student could be expected to have developed. It will be of assistance to employers and others with an interest in the general capabilities of holders of the qualification. The framework has the flexibility to accommodate diversity and innovation, and to accommodate new qualifications as the need for them arises.

Qualification Descriptor for B.Sc. in IT

On completion of B.Sc. in Information Technology, the expected learning outcomes that a student should be able to demonstrate are the following.

- QD-1.** Fundamental understanding of the principles of Information Technology and its connections with other disciplines.
- QD-2.** Procedural knowledge that creates different types of professionals related to Information Technology, including research and development, teaching and industry, government and public service;
- QD-3.** Skills and tools in areas related to Information Technology and current developments in the academic field of study.
- QD-4.** Use knowledge, understanding and skills required for identifying problems and issues, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, and their application, analysis and evaluation using methodologies as appropriate to Information Technology for formulating solutions
- QD-5.** Communicate the results of studies undertaken in Information Technology accurately in a range of different contexts using the main concepts, constructs and techniques
- QD-6.** Meet one's own learning needs, drawing on a range of current research and development work and professional materials
- QD-7.** Apply Information Technology knowledge and transferable skills to new/unfamiliar contexts,
- QD-8.** Demonstrate subject-related and transferable skills that are relevant to industry and employment opportunities.

5. Programme Learning Outcomes

These outcomes describe what students are expected to know and be able to do by the time of graduation. They relate to the skills, knowledge, and behaviours that students acquire in their graduation through the program.

Programme Learning Outcomes for B.Sc Information Technology

The Bachelor of Science with Information Technology (BSc with IT) program enables students to attain, by the time of graduation

- will be able to demonstrate:
 - (i) Fundamental/systematic or coherent knowledge and understanding of Information Technology and its applications.
 - (ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of study, including research and development, teaching and government and public service.
 - (iii) Skills in the area of Software, Hardware and current developments.
- Skills attained are as related to one's specialization and current developments in the academic field of study.
- Use knowledge, understanding and skills required for identifying problems and issues, collection of relevant data based on a wide range of sources and their application, analysis and evaluation using methodologies for generating solutions. Undertake hands on lab work and activities that develop practical knowledge and skills in the field of information Technology.
- Communicate the results of studies undertaken in an academic field accurately in a range of different contexts using the main concepts, constructs and techniques of the various subjects in Information Technology.
- Meet one's own learning needs, drawing on a range of current research and development work and professional materials.
- Ability to acquire knowledge and skills, including 'learning how to learn', that are necessary for participating in learning activities throughout life.
- Ability to embrace moral/ethical values in conducting one's life, and use/ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, void unethical behavior such as fabrication, falsification or misrepresentation of data or committing

plagiarism, not adhering to intellectual property rights and adopting objective, unbiased and truthful actions in all aspects of work.

- Ability to work effectively and respectfully with diverse teams, facilitate cooperative, coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
- Ability to work independently, identify appropriate resources required for a project and manage a project and complete the work.

B. Sc., Information Technology Syllabi and Scheme of Examinations for the Students Admitted from 2021-2022 Academic year onwards

	Sub Code	Title of the Paper	Hours (week)	Internal (CIA) Marks	External Marks	Total Marks	Ext – Min.	Total Pass Marks	Credits
Semester - I									
I	21TAM11L	Part – I: Language: Tamil I	6	50	50	100	20	40	3
II	21ENG12L	Part –II: English I	6	50	50	100	20	40	3
III	21BIT13C	Core : Computer Fundamentals and C Programming	5	50	50	100	20	40	4
III	21BIT14A	Allied:1- Mathematics:1 Mathematical Foundations for Information Technology	6	50	50	100	20	40	4
III	21BIT15P	Practical 1: C Programming Lab	5	50	50	100	20	40	2
IV	21ENV19E	Environmental Studies	2	50	50	100	20	40	2
Semester – II									
I	21TAM21L	Part – I: Language: Tamil II	6	50	50	100	20	40	3
II	21ENG22L	Part –II: English II	6	50	50	100	20	40	3
III	21BIT23C	Core: Object Oriented Programming with C++	5	50	50	100	20	40	4
III	21BIT24A	Allied:2- Mathematics:2 Computer Oriented Numerical and Statistical Methods	6	50	50	100	20	40	4
III	21BIT25P	Practical 2: C++ Programming Lab	5	50	50	100	20	40	2
IV	21VAL24E	Value Education Gandhian Thoughts	2	50	50	100	20	40	2
Semester – III									
III	21BIT31C	Core : Operating Systems	5	50	50	100	20	40	5
III	21BIT32C	Core : Data Structures	5	50	50	100	20	40	5
III	21BIT33C	Core : Java Programming	5	50	50	100	20	40	5
III	21BIT34A	Allied - 3: Digital Computer Fundamentals	6	50	50	100	20	40	4
III	21BIT35P	Practical 3: Java Programming Lab	5	50	50	100	20	40	2
IV	21BIT36S	Skill Based Subject-I: Web Technology	4	50	50	100	20	40	3

Semester – IV									
III	21BIT41C	Core : Python Programming	5	50	50	100	20	40	5
III	21BIT42C	Core : Computer Networks and Cryptography	5	50	50	100	20	40	5
III	21BIT43C	Core : Visual Basic Programming	5	50	50	100	20	40	5
III	21BIT44A	Allied – 4: Computer System Architecture	5	50	50	100	20	40	5
III	21BIT45P	Practical 4: Visual Basic and Python Programming Lab	5	50	50	100	20	40	2
IV	21BIT46S	Skill Based Subject – II: Microprocessor and ALP	5	50	50	100	20	40	3
V	21EXA44E	@Extension Activities: NCC/NSS/SPORTS//YRC	-	-	-	-	-	-	1
Semester – V									
III	21BIT51C	Core : Software Engineering and Modelling	5	50	50	100	20	40	5
III	21BIT52C	Core : Relational Database Management System	6	50	50	100	20	40	5
III	21BIT53C	Core : Computer Graphics	6	50	50	100	20	40	5
III	21BIT54P	Practical 5: Relational Database Management System Lab	5	50	50	100	20	40	2
IV	21BIT55S	Skill Based Subject – III: Data Mining and Warehousing	5	50	50	100	20	40	3
IV	21BIT5EL	Non-Major Elective Paper – I: Information Technology - 1 (Basics of Computers and Office Automation)	3	50	50	100	20	40	2
Semester – VI									
III	21BIT61C	Core : Programming in PHP	6	50	50	100	20	40	5
III	21BIT62C	Core : Mobile Computing	5	50	50	100	20	40	5
III	21BIT63P	Practical 6: PHP Programming Lab	5	50	50	100	20	40	2
III	21BIT64V	Mini Project	6	50	50	100	20	40	15
IV	21BIT65S	Skill Based Subject – IV: Artificial Intelligence and Expert Systems	5	50	50	100	20	40	3
IV	21BIT6EL	Non-Major Elective Paper – II: Information Technology - 2 (System Administration and Maintenance)	3	50	50	100	20	40	2
Total / Credits			180			3600			140

@ No External Examinations. Only Continuous Internal Assessment (CIA).

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: COMPUTER FUNDAMENTALS AND C PROGRAMMING	I	21BIT13C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Infer fundamentals of computers, OS, flowchart and algorithm
- CLO2 Discuss the program structure of C
- CLO3 Analyse the concept of decision making and branching and decision making and looping
- CLO4 Compute about the arrays and strings
- CLO5 Classify different category of functions
- CLO6 Differentiate Structure from Union
- CLO7 Explain about pointers and files in C
- CLO8 Develop C programs to solve simple problems using arrays , functions, structures

UNIT I: Fundamentals of Computers: Introduction –Generations of Computers - Classification of Computers-Basic Anatomy of a Computer System-Input Devices Processor-Output Devices-Memory Management – Types of Software- Overview of Operating System- Programming Languages-Translator Programs-Problem Solving Techniques.

UNIT II: Overview of C: Introduction – Importance of C- Character set - C tokens - keyword & Identifiers -Constants - Variables - Data types - Declaration of variables - Assigning values to variables -Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Increment and Decrement operators, Conditional, Bitwise, Special Operators - Arithmetic Expressions - Evaluation of expressions -precedence of arithmetic operators - Type conversion in expressions – operator precedence & associativity - Mathematical functions- Reading & Writing a character - Formatted input and output.

UNIT III: Decision Making and Branching: Introduction – If, If...Else, nesting of If ...Else statements- Else If ladder – The Switch statement, The ?: Operator – The Go to Statement. Decision Making and Looping: Introduction- the While statement- the do statement – the for statement-jumps in loops. Arrays - Character Arrays and Strings.

UNIT IV: User-Defined Functions: Introduction – Need and Elements of User-Defined Functions- Definition of functions- Return Values and their types - Function Calls – Function Declaration– Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - Structures and Unions.

UNIT V: Pointers: Understanding pointers - Accessing the address of a variable - Declaring and

initializing pointer variables - Accessing a variable through its pointer - Pointer expressions – pointer increments and scale factor - Pointers and arrays-Pointers and character strings – Array of pointers. File Management in C: Introduction- Defining and opening a file -Closing a file – Input /Output operations on files - Error handling during I/O operations -Random access to files - Command line arguments.

TEXT BOOK

1. E Balagurusamy, ” Computing Fundamentals & C Programming” - TataMcGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.

REFERENCES

1. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
2. Henry Mullish&HuubertL.Cooper: The Spirit of C, Jaico Pub. House, 1996.

FURTHER READING

https://www.tutorialspoint.com/cprogramming/c_quick_guide.htm

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge			✓	✓	✓			
Communication Skills	✓	✓			✓			✓
Critical Thinking			✓	✓		✓	✓	
Problem Solving			✓	✓	✓	✓	✓	
Analytical Reasoning					✓	✓	✓	✓
Research Related Skills			✓			✓		
Scientific Reasoning		✓		✓		✓	✓	✓
Life-Long Learning	✓			✓	✓	✓		

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Practical 1: C PROGRAMMING LAB	I	21BIT15P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Compute the program structure of C
- CLO2 Explain about operators and evaluate expressions in C.
- CLO3 Apply the concept of decision making and branching and decision making and looping.
- CLO4 Write C programs using arrays and string handling functions.
- CLO5 Analyse various types of functions
- CLO6 Distinguish Structure from Union
- CLO7 Develop C programs using pointers.
- CLO8 Create file programs in C using command line arguments.

List of Programs

1. Write a C program to find the largest of 3 numbers using nested if ...else statements.
2. Write a C program to print multiplication table using do ... while.
3. Write a C program to print nth Fibonacci number using for loop.
4. Write a C program to print all prime numbers between 1 and n using function.
5. Write a C program to illustrate the use of BREAK and CONTINUE statement.
6. Write a C program to find the transpose of a matrix.
7. Write a C program to sort the given set of numbers in ascending order.
8. Write a C program to count the number of Vowels and consonants in a text string.
9. Write a C program to check whether the given string is a palindrome or not.
10. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.

11. Write a C program which receives two filenames as arguments and check whether the file contents are same or not. If same delete the second file.
12. Write a program which takes a file as command line argument and copy it to another file. At the end of the second file write the total i) number of chars ii) number of words and iii) number of lines.

FURTHER READING:

<https://www.tutorialspoint.com/cprogramming/index.htm>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓		✓					
Communication Skills								
Critical Thinking	✓	✓	✓	✓	✓	✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills						✓	✓	✓
Scientific Reasoning	✓	✓	✓	✓				
Life-Long Learning							✓	

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	ENVIRONMENTAL STUDIES (For all UG courses)	I	21ENV1GE

COURSE LEARNING OUTCOMES:

On the successful completion of the course, students will be able to:

1. Recognize the role of the environment and the need to conserve it for sustaining life.
2. Enumerate the natural resources
3. Explores the adverse effects of deforestation and over exploitation of natural resources
4. Associate the components of the ecosystem and need for biodiversity conservation.
5. Evaluate the environmental pollution hazards and their effects on the living system.
6. Interpret the different disaster management procedures.
7. Analyse the climatic change and global effects
8. Infer the need for environmental laws in the constitution of India.
9. Relate the growth of the human population and its impact on the environment.

UNIT I:

Environment – Introduction – Nature - Scope – Content – Need for study. Natural resources- Forest and energy resources- Use and overexploitation - deforestation. Energy resources- renewable and non-renewable energy resources.

UNIT II:

Ecosystem – concept – types- Forest, Grassland, Desert and Aquatic (Pond)- Structure and function of an ecosystem – Producers- consumers and decomposers – Food chain – food web- ecological pyramids- energy flow. Biodiversity and its conservation- *in situ* and *ex situ* conservation- Mega biodiversity centres and hotspots.

UNIT III:

Environmental pollution- definition- causes-effects and control measures of air, water, soil, thermal and nuclear pollution. Waste management- Industrial and solid waste. Disaster management – earthquake, cyclone, flood and landslides.

UNIT IV:

Social Issues and the environment-Urbanization-Urban problems related to energy and watershed management. Environmental Ethics- Issues and possible solutions- Wasteland reclamation- Climate change - causes and effects. Global warming- Acid rain- Ozone layer depletion- Public awareness. Environmental laws- Environment Protection Act, Wildlife Protection Act, Forest Conservation Act.

UNIT V:

Human population and its impact on environment- Population growth- Resettlement and Rehabilitation of project affected persons- Case studies – Sardar Sarovar Project, Maharashtra and Bandipur National Park- Project Tiger, Karnataka, NTPC, India. Role of Indian and Global religions and Cultures in environmental conservation- Case study: sacred groves in Western Ghats (kavu) & Chinese culture. Human and Wildlife Conflict.

PEDAGOGY STRATEGIES

- ❖ Board and Chalk lectures
- ❖ PowerPoint slide presentations

❖ Assignments

Textbooks:

1. Sharma, P. D. 2000. Ecology & Environment. Rastogi Publications, Meerut, India.
2. Bharucha, E. 2003. Text book of Environmental Studies. UGC, New Delhi & Bharati Vidyapeeth Institute of Environmental Education and Research, Pune.
3. Arumugam, M. and Kumaresan, V. 2016. Environmental Studies (Tamil version). Saras Publications, Nagerkoil.

Online/E-Resources:

<https://www.edx.org/course/subject/environmental-studies>
[https://www.coursera.org/courses? facet changed =true&domains=life-sciences%2Cphysical-science-and-engineering%2Csocial-sciences&query=environmental%20science%20and%20sustainability&userQuery=environmental%20science%20and%20sustainability](https://www.coursera.org/courses?facet_changed=true&domains=life-sciences%2Cphysical-science-and-engineering%2Csocial-sciences&query=environmental%20science%20and%20sustainability&userQuery=environmental%20science%20and%20sustainability)
<https://www.open.edu/openlearn/nature-environment/free-courses>

COURSE LEVEL MAPPING OF PROGRAMME LEVEL OUTCOME:

Program Level Outcomes (PLO)	COURSE LEARNING OUTCOMES (CLO)								
	1	2	3	4	5	6	7	8	9
Disciplinary Knowledge		√	√		√	√			
Communication Skills		√		√				√	√
Critical Thinking	√		√		√		√		
Research related skills	√		√			√		√	
Analytical reasoning	√			√		√		√	
Problem Solving		√	√			√			√
Team Work				√	√		√		√
Moral and ethical awareness		√		√		√		√	√

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: OBJECT ORIENTED PROGRAMMING WITH C++	II	21BIT23C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Able to differentiate the procedure oriented and object oriented concepts
- CLO2 Generalize the basic concepts of C++ programming
- CLO3 Design programs with classes and objects
- CLO4 Apply the concepts of friend functions and overloading
- CLO5 Analyze the concept reusability through inheritance
- CLO6 Demonstrate the concept of object oriented programming through C++
- CLO7 Explore the ease of C++ programming
- CLO8 Develop programs using I/O streams

Unit I: Introduction to C++: Object oriented technology- Programming paradigms- Key concepts of OOP – Advantages – object oriented languages – Input and output in C++: Streams in C++ - Pre- Defined Streams – Unformatted console I/O operation – Formatted console I/O operations – C++Declarations – Control structures: Decision Making statements –If...Else – Jump – GOTO – Break – Continue – Switch case statements – Loops in C++ : For – While – Do... While Loops – Functions in C++ - In Line Functions – Function Overloading.

Unit II: Class and Object: Declaring objects – Defining Member Functions – Static Member Variables and Functions – Array of Objects – Friend Functions – Overloading Member Functions –Constructor and Destructors: Characteristics – Calling Constructor and Destructors – Constructors and Destructors with Static Member.

UNIT III: Operator Overloading: Overloading Unary – Binary Operators – Overloading Friend Functions – Type Conversion – Inheritance: Types of Inheritance – Single – Multilevel – Multiple – Hierarchical – Hybrid and Multi Path Inheritance – Virtual Base Classes – Abstract Classes.

UNIT IV: Pointers: Declaration – Pointer to Class – Object – THIS Pointer – Pointer to Derived Classes and Base Classes – Arrays: Characteristics – Arrays of Classes – Memory Models – New and Delete Operators–Virtual Functions –Pure virtual functions. Working with Strings: Declaring and initializing string objects-String Attributes- Accessing elements of strings- comparing and exchanging.

UNIT V: Files: File Stream Classes – File Modes – Sequential Read/ Write Operations – Binary and ASCII Files – Random Access Operation – Command Line Arguments - Exception Handling: Principles of Exception Handling – The Keywords try, Throw and Catch – Exception Handling Mechanism –

Multiple Catch Statements – Catching Multiple Exceptions – Re-throwing Exception.

TEXT BOOK

1. Ashok N Kamthane (2011).Object Oriented Programming with ANSI and Turbo C++. Pearson Education Publications.

REFERENCES

1. E. Balagurusamy, (2012), Object-Oriented Programming with C++, Tata McGraw Hill Education Private Ltd., New Delhi, Sixth edition.

2. Bjarne Stroustrup(2014). Programming – Principles and Practice using C++, Second Edition. Addison Wesley publications.

3. K.R.Venugopal, (2013), Mastering C++, McGraw Hill Education India Pvt. Ltd, Second edition.

FURTHER READING

www.nptel.ac.in

www.cplusplus.com

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓	✓	✓	✓	✓	✓
Critical Thinking	✓		✓	✓	✓	✓	✓	✓
Problem Solving			✓	✓	✓	✓	✓	✓
Analytical Reasoning			✓	✓	✓	✓	✓	✓
Research Related Skills			✓	✓	✓	✓	✓	✓
Scientific Reasoning			✓	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Practical 2: C++ PROGRAMMING LAB	II	21BIT25P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Infer the basic concepts of C++ programming
- CLO2 Design programs with classes and objects
- CLO3 Distinguish the concepts of constructors and destructors
- CLO4 Apply the concepts of friend functions and overloading
- CLO5 Analyze the concept reusability through inheritance
- CLO6 Demonstrate the concept of pointers
- CLO7 Explore the ease of C++ programming
- CLO8 Develop programs using I/O streams

List of Exercises:

1. Program using looping and branching statements.
2. Program based on Classes and objects.
3. Program based on Class and Array of objects.
4. Program based on Objects as function arguments and function that return objects.
5. Programs based on inline functions.
6. Program based on friend function.
7. Program on based on function overloading.
8. Program based on constructors and destructors.
9. Program using binary operator overloading.
10. Program based on inheritance
11. Program using pointers.
12. Program using the concept of Files.

TEXT BOOK

1. Ashok N Kamthane (2011).Object Oriented Programming with ANSI and Turbo C++. Pearson Education Publications.

REFERENCES

1. E. Balagurusamy, (2012), Object-Oriented Programming with C++, Tata McGraw Hill Education Private Ltd., New Delhi, Sixth edition.

2. Bjarne Stroustrup(2014). Programming – Principles and Practice using C++, Second Edition. Addison Wesley publications.

3. K.R.Venugopal, (2013), Mastering C++, McGraw Hill Education India Pvt. Ltd, Second edition.

FURTHER READING

www.researchgate.com

www.tutorialspoint.com

www.programiz.com

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills								
Critical Thinking	✓	✓	✓	✓	✓	✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills	✓	✓	✓	✓	✓	✓	✓	✓
Scientific Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Ability Enhancement Compulsory Course(AECC)

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	VALUE EDUCATION – GANDHIAN THOUGHTS (For all UG courses)	II	21VAL2GE

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to:

1. Interpret Gandhiji's experiments to his spiritual pursuits and search for purity, political activities through fasting protests, and even his role as an educator using diet and meals as teaching exercises.
2. Lead a life marked with humility and truthfulness and subsequent realization of the Truth as the purpose of human life.
3. Infer lessons that are fundamental to living in harmony and social progress such as respect, empathy, equality, solidarity and [critical thinking](#).
4. Promote tolerance and understanding above and beyond our political, cultural and religious differences.
5. Create special emphasis on the defense of human rights, the protection of ethnic minorities
6. Emerge as responsible citizens with clear conviction to practice values and ethics in life.
7. Transform themselves to become good leaders.
8. Realize their role and contribution to the nation building

UNIT I: Birth and Parentage - Childhood - At the High school - Stealing and Atonement - Glimpses of Religion - Gandhi's choice - Experiments in Dietetics - Acquaintance with Religions - The Great Exhibition.

UNIT II: The first case - Preparing for South Africa - same experiences - on the way to Pretoria – Coolie - National Indian Congress - Education of Children - Brahmacharya.

UNIT III: Simple life - The Boer war - Sanitary Reform and Famine Relief - Lord Curzon's Darbar - A month with Gokhale - Experiments in Earth and water treatment - Indian opinion - Coolie Locations or Ghettoes - The Black plague.

UNIT IV: The Magic spell of a Book - The Zulu Rebellion - The Birth of Satyagraha - More

experiments in Dietetics - Kasturbai's Courage - Domestic Satyagraha- Fasting - Shanti Niketan - Woes of Third-Class passengers.

UNIT V: Kumbha mela - Lakshman Jhula - Founding of the Ashram - Abolition of Indentured Emigration - The Kheda Satyagraha - The Rowlatt Bills - Navajivan and young India - Congress Initiation - The Birth of Khadi.

TEXT BOOKS

1. M.K. GANDHI, “The Story of My Experiments with Truth”, An Autobiography Apple publishing International(P) Ltd, Chennai.
- 2.

- மகாத்மா காந்தியின் சுயசரிதை - சத்தியசோதனை தமிழாக்கம் -
-ரா.வேங்கடராஜ்*லு, நவஜீவன் பரசுராலயம், அகமதாபாத

PEDAGOGY STRATEGIES

- Board and Chalk lecture
- Powerpoint slide presentations
- Seminar
- Assignments
- Quizes
- Group discussion

COURSE LEVEL MAPPING OF PROGRAM LEVEL OUTCOMES.

		Course Level Outcomes (CLO)								
		1	2	3	4	5	6	7	8	
Program Level Outcomes (PLO)	1	Reflective thinking	✓	✓			✓		✓	✓
	2	Communication skills		✓		✓	✓	✓	✓	✓
	3	Critical thinking	✓			✓		✓	✓	✓
	4	Multicultural competence				✓	✓	✓	✓	✓
	5	Analytical reasoning		✓	✓	✓		✓		
	6	Problem solving		✓	✓	✓		✓	✓	✓
	7	Team work	✓		✓		✓	✓	✓	
	8	Leadership readiness/qualities			✓		✓	✓		✓
	9	Moral and ethical awareness	✓		✓		✓	✓		✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: OPERATING SYSTEMS	III	21BIT31C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Summarize the basic knowledge about the functionalities of operating system
- CLO2 Paraphrase the concepts of process
- CLO3 Discuss the concepts of deadlock
- CLO4 Summarize about storage management, auxiliary storage management
- CLO5 Impart the knowledge of disk performance optimization techniques
- CLO6 Analyze the need for scheduling algorithms
- CLO7 Discuss the concept of distributed Computing
- CLO8 Associate the concepts of Scheduling

Unit I: INTRODUCTION AND PROCESS CONCEPTS: what is an Operating System? Definition of process – process states – process state transition – interrupt processing – mutual exclusion – semaphores – deadlock and indefinite postponement.

Unit II: STORAGE MANAGEMENT: REAL STORAGE – storage organization, management and hierarchy - storage management strategies – contiguous Vs non-contiguous storage allocation – single user contiguous storage allocation – fixed partition multiprogramming – variable partition multiprogramming – multiprogramming with storages wrapping.

Unit III: VIRTUAL STORAGE MANAGEMENT: Introduction - Virtual storage management strategies – page replacement strategies –working sets – demand paging – page size. **PROCESSOR MANAGEMENT: JOB AND PROCESSOR SCHEDULING:** Scheduling Objectives-Preemptive vs non-preemptive scheduling – priorities – deadline scheduling – FIFO – RR – SJF – SRT – HRN.

Unit IV: DISTRIBUTED COMPUTING: Classification of sequential and parallel processing - pipelining –vector processing - array processors – dataflow computers – multiprocessors – fault tolerance. **AUXILIARY STORAGE MANAGEMENT: DISK PERFORMANCE OPTIMIZATION:** Operation of moving head disk storage – need for disk scheduling – seek optimization – FCFS – SSTF – SCAN – RAM disks – optical disks.

Unit V: FILE AND DATABASE SYSTEMS: File system – functions – organization – allocating and freeing space – file descriptor – access control matrix – backup and recovery – file servers – distributed file system.

TEXT BOOK

1. H.M Deitel., “Operating Systems”, 2nd Edition, Pearson Education Publ., 2004.

REFERENCES

- 1.Achyut S Godbole, “Operating Systems”, TMH Publ., 2002.
- 2.Andrew S. Tanenbaum, (2014), Modern Operating Systems, Pearson Prentice Hall of India, Fourth Edition.
- 3.Abraham Silberschatz, Peter B. Galvin and Greg Gagne, (2012), Operating System Concepts, John Wiley and Sons Inc., Ninth Edition.

FURTHER READING

www.udacity.com

www.sites.google.com

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓	✓	✓	✓	✓	✓
Critical Thinking		✓	✓	✓	✓	✓	✓	✓
Problem Solving			✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills			✓	✓	✓	✓	✓	✓
Scientific Reasoning		✓	✓	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: DATA STRUCTURES	III	21BIT32C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Write and analyze efficient algorithm for a problem
- CLO2 Apply the suitable data structure to a given problem
- CLO3 Utilize data structure sorting and searching techniques in problem solving
- CLO4 Gain knowledge on memory management, trees and its implementation
- CLO5 Distinguish the concepts of linear and non-linear data structures and its application
- CLO6 Able to use the algorithms in real time applications
- CLO7 Analyze the efficiency of different algorithms
- CLO8 Explain the technologies to be used in programming languages

UNIT I: Introduction and overview: Preliminaries: Mathematical Notations and Functions- Algorithmic Notations- Complexity of Algorithms- Other Asymptotic Notations for complexity of algorithms. Arrays, Records and pointers: Introduction- Linear arrays- Arrays as ADT- representation of Linear arrays in memory- Traversing Linear arrays- Inserting and deleting- Multidimensional arrays- Representation of Polynomials using arrays- pointers- dynamic memory management- records- representation of records- matrices- sparse matrices.

UNIT II: Stacks, queues, Recursion: Introduction- stacks- array representation of stacks- linked representation of stacks- application of stacks- recursion- towers of Hanoi- queues- linked representation of queues- circular queues- deques - application of queues.

UNIT III: Searching and Sorting: Linear Search- Binary Search-Bubble sort-Insertion sort- Selection sort- merge sort- shell sort- radix sort- heap sort. Searching and data modification - hashing.

UNIT IV: Linked List: Representation of linked list in memory- traversing a linked list- searching a linked list- insertion into a linked list- deletion from a linked list- circular linked list- doubly linked list.

UNIT V: Trees: Introduction- binary trees- representing binary trees in memory- traversing a binary tree- binary search trees. Graphs: introduction- graph theory terminology- Linked representation of a graph - traversing a graph.

TEXT BOOK

1. “Data structures with C”, Seymour Lipschutz – Schaum’s outlines 2012.

REFERENCES

1. Ellis Horowitz & Sartaj Sahani “Fundamentals of data Structure”, Galgotia Books source, 1999.
2. Ashok N Kamthane, “Programming and Data Structures”, Pearson Education, 2004.
3. Algorithms + Data Structures= Programs by Niklaus Wirth, Prentice Hall of India Pvt Ltd.

FURTHER READING

1. <http://nptel.ac.in/courses/106103069/>

2. https://lecturenotes.in/materials/11971-data-structure-using-c?utm_source=subjectpage&utm_medium=web&utm_campaign=materialpage

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓		✓	✓			✓
Communication Skills		✓					✓	
Critical Thinking		✓			✓			✓
Problem Solving	✓		✓		✓	✓	✓	
Analytical Reasoning	✓		✓					
Research Related Skills			✓	✓	✓	✓		
Scientific Reasoning		✓		✓	✓	✓		
Life-Long Learning		✓				✓		✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: JAVA PROGRAMMING	III	21BIT33C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Explain basic concepts of object Oriented program design
- CLO2 Discuss the program structure in Java
- CLO3 Apply the various building blocks of a Java program
- CLO4 Differentiate between interfaces and multiple inheritance
- CLO5 Identify the characteristics and uses of packages
- CLO6 Describe the advantages of using Java for Applets and Graphics programming
- CLO7 Explain the usage of I/O streams and file handling in Java.
- CLO8 Develop Java programs to solve simple problems

UNIT I: JAVA Evolution History – Features – How Java Differs from C and C++ – Java and Internet – Java and WWW – Web Browsers. Overview of Java Language: Introduction –Simple Java Program – Structure – Java Tokens – Statements – Java Virtual Machine.

UNIT II: Constants – variables – Data types – Type Casting - Operators and Expressions. Decision Making and Branching: If, If...else, else...If Ladder, switch, ? : operator - Decision making and looping: while, do, for – jumps in loops – labeled loops. Classes, Objects and Methods

UNIT III: Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Defining, Extending and Implementing Interfaces - Packages: Putting classes together – Multi Threaded Programming.

UNIT IV: Managing Errors and Exceptions: Types of errors and exceptions - Syntax of exception handling code - Multiple catch statements - Using finally statement - Throwing our own exceptions – Applet Programming: Applets and Applications - Applet code - Applet life cycle - Applet Tag - Adding applet to HTML file - Passing parameters to applets - Event Handling - Graphics programming: The Graphics class - Lines, rectangles, circles, ellipses, arcs, polygons - Line graphs, Bar charts - Introduction to AWT package and Swings.

UNIT V: Files: Introduction – Concepts of Streams – Stream classes – Using Streams – I/O classes – File class – I/O Exceptions – creation of files – Reading / Writing characters / Bytes –Handling primitive data types – Random access Files.

TEXT BOOK

1. E. Balagurusamy “Programming with Java - A Primer”, TMH Publ., 4th Edition, 2010.

REFERENCES

1. Patric Naughton, and Herbert Scheldt “The Complete Reference Java 2” Tata McGraw Hill Publishers, 2000.
2. C. Xavier “Programming with Java 2”, SciTech Publ., 2000.

FURTHER READING

1. <https://www.edx.org/course/java>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓			✓				✓
Critical Thinking			✓		✓		✓	
Problem Solving				✓	✓	✓	✓	✓
Analytical Reasoning	✓		✓		✓		✓	✓
Research Related Skills						✓	✓	✓
Scientific Reasoning	✓	✓					✓	
Life-Long Learning	✓			✓		✓		

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Allied 3: DIGITAL COMPUTER FUNDAMENTALS	III	21BIT34A

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Associate basic concepts of number system and its conversion
- CLO2 Summarize the various types of codes
- CLO3 Outline the boolean laws and Evaluate the expressions
- CLO4 Simplify SOP and POS using K - Map
- CLO5 Design logic circuits
- CLO6 Discuss TTL and CMOS circuits
- CLO7 Construct counters using flip flops
- CLO8 Compare A/D, D/A Conversion

UNIT I: Number Systems: Decimal, Binary, Octal, Hexadecimal – conversion from one to another – Binary Addition, Subtraction, Multiplication and Division – Codes – BCD – Weighted – Excess-3 – Gray – Error Detection Codes.

UNIT II: Basic Logic Gates – Boolean Laws And Theorems – Sum Of Products Method– Truth Table To Karnaugh Map – Pairs, Quads And Octets – Karnaugh Simplifications –Don’t Care Conditions - Product Of Sums Method - Product Of Sum Simplification.

UNIT III: Data Processing Circuits: Multiplexers – Demultiplexers – 1-OF-16 Decoder – Encoders - Arithmetic building blocks: Half Adder, Full Adder – Adder - Subtractor. TTL Circuits: Digital IC – Positive and negative logic – CMOS circuits: Enhancement Type MOSFETS – CMOS Characteristics.

UNIT IV: Flip Flops: RS Flip Flop, Clocked RS Flip Flop, DFlip Flop, - Edge triggered D Flip Flop, JK Flip Flop, JK Master/Slave Flip Flop- Shift Register: Serial In Serial Out - Counters – Asynchronous Counters – Synchronous Counters, MOD-3 Counter - MOD-5 Counter, Shift Counters.

UNIT V: D/A and A/D Conversion: Variable – Resistor Network - Binary Ladder – D/A Converter – A/D Converter: Simultaneous Conversion - Counter Method – A/D Techniques.

TEXT BOOK

1. “Digital Principles and Applications” – Albert Paul Malvino, Donald, P. Leach, McGraw Hill,2002.

REFERENCES

1. Digital Computer Fundamentals – Bartee, Tata McGraw Hill, 1996.
2. Digital Logic & Computer Design, Morris Mano, PHI, 2001.

FURTHER READING:

https://www.tutorialspoint.com/computer_fundamentals/index.htm

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge		✓		✓		✓	✓	
Communication Skills	✓							✓
Critical Thinking	✓		✓	✓	✓		✓	✓
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓		✓		✓	
Research Related Skills			✓	✓		✓		✓
Scientific Reasoning	✓	✓		✓	✓	✓	✓	
Life-Long Learning	✓		✓		✓		✓	

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Practical 3: JAVA PROGRAMMING LAB	III	21BIT35P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Discuss basic concepts of object Oriented program design
- CLO2 Discuss the program structure in Java
- CLO3 Apply the various building blocks of a Java program
- CLO4 Differentiate between interfaces and multiple inheritance
- CLO5 Identify the characteristics and uses of packages
- CLO6 Describe the advantages of using Java for Applets and Graphics programming
- CLO7 Explain the usage of I/O streams and file handling in Java.
- CLO8 Develop Java programs to solve simple problems

LIST OF PROGRAMS

1. Write a Java program to define a class, describe its constructors and instantiate its object.
2. Write a Java program to define a class, define instance methods and overload them.
3. Write a Java program to implement an array of objects.
4. Write a Java program to use string class and its methods.
5. Write a Java program to implement Inheritance and demonstrate method overriding.
6. Write a Java program to demonstrate use of implementing interfaces.
7. Write a Java program to demonstrate use of extending interfaces.
8. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
9. Write a Java program to implement the concept of multithreading by extending thread class.
10. Write a Java program to implement the concept of Exception Handling by creating user defined exceptions.
11. Write a Java program to display a message in an Applet.
12. Write a Java program to display basic shapes and fill them.

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	
Communication Skills								
Critical Thinking	✓				✓			
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓			
Research Related Skills	✓				✓		✓	
Scientific Reasoning		✓		✓		✓		
Life-Long Learning	✓		✓			✓		✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Skill Based Subject-I: WEB TECHNOLOGY	III	21BIT36S

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Restate and apply to create web application
- CLO2 Solve real time problems using HTML,XML and CSS
- CLO3 Apply controls and menus
- CLO4 Examine the complexity of problems, analyze and design style sheets
- CLO5 Explain basic concepts of VBscript and java script
- CLO6 Discuss the concepts of objects
- CLO7 Analyze java script programs
- CLO8 Create HTML forms and simple web application projects

UNIT I: HTML- Outline of an HTML document- Head Section- Body Section- Headers- Paragraphs- Text formatting- Linking-Internal linking- Embedding images- Lists- Tables- Frames- Other Special tags and characters- HTML Forms-[Examples](#).

UNIT II: Cascading Style Sheet- Coding CSS- Properties of tags- properties of values- other style properties- In-line style sheet- embedded style sheets- External Style sheets- Grouping- positioning- background- element dimensions.

UNIT III: XML- Introduction- HTML Vs XML- Syntax- XML attributes- XML validation- XML DTD- Building blocks of XML- DTD element- DTD Attributes- DTD entities- DTD Validation.

UNIT IV: Javascript- Introduction- Language elements- identifiers- expressions- keywords- operators- statements- Functions- Object of Javascript- Window object- Document object- forms object- Text boxes, Text areas- Buttons, Radio buttons and Checkboxes- Select Object-Date Object- Math Object- String Object- Arrays.

UNIT V: VB Script- Introduction- Embedding VB Script code in an HTML document- Comments- Variables- Operators- Procedures- Conditional Statements- Looping Constructs.

TEXT BOOK:

1. N.P. Gopalan, J.Akilandeswari, “Web Technology, A developers Perspective”- Prentice Hall of India PVT Limited, New Delhi.

REFERENCES

1. Tomas A.Powell, “The complete Reference Web design”, Tata McGraw Hill Pub.
2. C.Xavier, “World Wide Web Design with HTML”, TML Publications, 2001.
3. Joel Sklar, “Principles of Web Design”, Vikas Pub, 2001.

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓	✓	✓	✓	✓	✓
Critical Thinking		✓	✓	✓	✓	✓	✓	✓
Problem Solving			✓	✓	✓	✓		✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills			✓	✓	✓	✓	✓	✓
Self-directed Learning		✓	✓	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: PYTHON PROGRAMMING	IV	21BIT41C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Demonstrate the working environment of python
- CLO2 Develop programs using conditional statements, looping constructs and functions
- CLO3 Devise lists, tuples and dictionaries
- CLO4 Identify and debug errors in the program
- CLO5 Discuss the basic concepts of python
- CLO6 Illustrate the concepts of files
- CLO7 Build efficient programs using python
- CLO8 Explain the concepts of directories

UNIT-I: Introduction to Python: Python Overview-Getting Started with Python-Python Identifiers- Reserved Keywords-Variables-Standard Data Types-Operators- Statement and Expression-String Operations-Boolean Expressions-Control Statements-Iteration-while Statement-Input.

UNIT-II: Functions: Introduction-Built-in Functions-Composition of Functions-User Defined Functions-Parameters and Arguments-Function Calls- The Return Statement-Python Recursive Function-The Anonymous Functions-Writing Python Scripts.

UNIT-III:Strings: Strings-Compound data types- len function- String Slices-Strings are Immutable- String Traversal-Escape Characters-String formatting operators and functions. Lists: Values and accessing elements-lists are mutable-Traversing and deleting elements – Built-in operators and methods.

UNIT-IV: Tuples: Creating tuples-accessing values-tuple assignment-tuples as return values- variable length argument tuples-basic tuple operations-built-in tuple functions. Dictionaries: Creating and accessing values in a dictionary - updating and deleting elements -operations and built-in dictionary methods.

UNIT-V:

Files: Text files-Opening and Closing a file-Reading and Writing from a file-File object attributes-Renaming the file-Deleting a file- Files related methods- Directories.

TEXT BOOK

1. E.Balagurusamy, “Introduction to Computing and Problem Solving Using Python”, McGraw Hill Education Private Limited, 1st Edition, New Delhi.

REFERENCES

1. Martin C. Brown, “PYTHON: The Complete Reference”, McGraw-Hill, 2001.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>).
3. Mark Summerfield. “Programming in Python 3: A Complete introduction to the Python Language”, Addison-Wesley Professional, 2009.

FURTHER READING

<https://www.w3schools.com/python/>

<https://www.tutorialspoint.com/python/index.htm>

<https://www.programiz.com/python-programming>

Programme Level outcomes	Mapping							
	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓			✓
Communication Skills			✓		✓		✓	
Critical Thinking		✓		✓		✓	✓	
Problem Solving	✓	✓	✓			✓	✓	
Analytical Reasoning		✓	✓	✓		✓	✓	
Research Related Skills				✓				✓
Scientific Reasoning								
Life-Long Learning	✓			✓	✓		✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: COMPUTER NETWORKS AND CRYPTOGRAPHY	IV	21BIT42C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Know the basics of computer networks and network reference models
- CLO2 Discuss transmission of data and multiplexing
- CLO3 Discuss how data can be transmitted without errors
- CLO4 Have an insight into the technologies like bluetooth and RFID
- CLO5 Outline how data can be routed from source to destination
- CLO6 Know about the different internet protocols
- CLO7 Discuss about domain name system
- CLO8 Know about network security and cryptography

UNIT I: Introduction- The Uses of Computer Networks – Network hardware – Network software – Reference models.

UNIT II: The Physical Layer - Guided Transmission Media – Wireless transmission - Communication satellites – The public switched telephone network : Trunks and Multiplexing - Switching.

UNIT III: The Data Link layer - Data link layer Design Issues – Error Detection and Correction- Medium Access Control Sub Layer : The channel allocation problem – Multiple access protocols : Aloha - Carrier sense multiple access protocols. Bluetooth : Bluetooth Architecture , bluetooth applications, RFID : EPC Gen 2 Architecture

UNIT IV: The Network Layer – Network Layer Design Issues – Routing Algorithms - shortest path routing, flooding, distance vector routing, routing for mobile hosts. The network layer in the internet : The IP Version 4 Protocol, IP Addresses, IP Version 6

UNIT V: Application Layer – DNS – The Domain Name System . Network Security : Cryptography– Symmetric - KeyAlgorithms .
Case Study : Compare IPV4 and IPV6

TEXT BOOKS

1. Andrew S. Tanenbaum, “Computer Networks”, 5th Edition, Pearson Education Publ..

REFERENCES

1. Miller, "Data and Network Communications", Vikas Publ., 2001.
2. William A Shay, "Understanding data communications and Networks", 2nd Edition, Vikas Publ., 2001.

FURTHER READING

1. James F. Kurose, "Computer Networking", 8th Edition., University of Massachusetts, Amherst. Keith Ross., Pearson
2. <https://www.cse.iitk.ac.in/users/dheeraj/cs425/>
3. https://w3.cs.jmu.edu/bernstdh/web/common/help/topics_computer-networks.php

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓			✓
Communication Skills	✓	✓	✓	✓	✓			✓
Critical Thinking			✓	✓				✓
Problem Solving			✓	✓	✓			✓
Analytical Reasoning			✓	✓	✓			
Research Related Skills		✓	✓	✓	✓	✓	✓	✓
Scientific Reasoning		✓	✓					✓
Life-Long Learning		✓	✓	✓	✓	✓		✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: VISUAL BASIC PROGRAMMING	IV	21BIT43C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Acquire knowledge in branching and looping
- CLO2 Solve real world problems
- CLO3 Apply controls and menus
- CLO4 Examine the complexity of problems, modularize the problems into small modules
- CLO5 Generalize the working nature of files
- CLO6 Compare the concepts of front end and back end
- CLO7 Evaluate menus and dialog boxes
- CLO8 Create MDI forms and simple IOT projects form design using VB

UNIT I: Introduction - VB Environment – VB Fundamental: Constants, Variables, Data Types, and Data Declaration – Operators – Expressions – Library Functions.

UNIT II: Branching and Looping: If...Then, If-Then-Else, Else If, Nested If, Selected-Case, For-Next, Do-Loop, While-Wend, Nested Loops, Stop Statement. VB Controls: Textbox – Checkbox – List Box – Combo Box –Label – Command Button – Directory List –Box –Drive List Box. Assigning Values to Forms and Controls – Naming Controls and Forms – Executing Commands – Displaying O/P Data – Assigning Properties Collectively Using With Block.

UNIT III: Timer Control, Scroll Bar, Message Box (), Input Box (), Functions, Menus and Dialog Boxes: Building Drop – Down Menus, Sub Menus - Pop - Up Menus –Dialog Boxes – Debugging and Executing A Project – syntactic Errors- Logical Errors- Setting Breakpoints- Defining Watch Values- Stepping through a Program- User-induced Errors- Error Handlers- Generating a Stand-Alone Executable Program.

UNIT IV: Procedures- Modules and procedures- subroutines- Event procedures- Function Procedures- Scope- Optional Arguments- Arrays –Parsing Arrays to Procedures- Dynamic Arrays –Array Function – Control Arrays.

UNIT V: Data Files –Data file characteristics- saving and processing a data file. Processing A Data Files –Sequential File –Random Access File. Case study: Hospital Management system- Two Wheeler Show Room Management System.

TEXT BOOK

1. Byron S. Gottfried, Ph.D, “Visual Basic”, Schaum’s Outlines.

REFERENCES

1. David Jung, Pierre Boutquin, John D.Conley III, Loren Eidahl, Lowell Mauer, JackPurdum, “Visual Basic 6 , Super Bible” , Techmedia.
2. Peter Wrights,“Beginning Visual Basic 6 “, SPD.
3. Steven Holzner, “Visual Basic 6 Black Book “, DreamTech Press, 2000.

FURTHER READING

<https://www.computer-pdf.com/tutorials-visual-basic-6>

<https://ceng.eskisehir.edu.tr/emrekacmaz/bil158/VBTutorial.pdf>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓		✓	✓	✓		✓	✓
Communication Skills	✓	✓		✓	✓			
Critical Thinking						✓	✓	
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning			✓	✓	✓			✓
Research Related Skills		✓				✓		
Scientific Reasoning		✓					✓	
Life-Long Learning		✓		✓		✓		

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Allied – 4: COMPUTER SYSTEM ARCHITECTURE	IV	21BIT44A

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Summarize arithmetic, logic and shift microoperations and draw the circuit diagram of ALS unit
- CLO2 Discuss about various instruction codes and registers
- CLO3 Implement Stack operations (push and pop)
- CLO4 Analyse RTL using various instruction formats
- CLO5 Explain about different addressing modes
- CLO6 Differentiate RISC from CISC
- CLO7 Apply addition, subtraction, multiplication and division algorithm
- CLO8 Impart knowledge of various memories

UNIT I: Data Representation: Fixed point representation – Floating point representation – Alphanumeric code - Register Transfer and Micro operation: Register Transfer Language – Register Transfer – Arithmetic Micro operation – Logic Micro operation – Shift Micro operation – Arithmetic Logic Shift Unit.

UNIT II: Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions - Instruction Cycle – Input-Output and Interrupt - Micro-Programmed Control: Control Memory – Address Sequencing – Design of Control Unit.

UNIT III: Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control – Reduced Instruction Set Computer – CISC.

UNIT IV: Computer Arithmetic: Addition and Subtraction – Multiplication Algorithm – Division Algorithm - Input Output Organization: Peripheral Devices – Input Output Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access – Input Output Processor (IOP).

UNIT V: Memory Organization: Memory Hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory – Virtual memory.

TEXT BOOKS

1. M. Morris Mano, “Computer System Architecture”, Third Edition, PHI, 2001.

REFERENCES

1. Hayes. J. P, “Computer Architecture and Organization”, McGraw Hill, 1998.

Further Reading:

<https://www.tutorialspoint.com/Computer-System-Architecture>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓		✓		✓		
Communication Skills			✓		✓			
Critical Thinking		✓	✓		✓		✓	✓
Problem Solving		✓		✓				✓
Analytical Reasoning	✓		✓		✓	✓	✓	
Research Related Skills	✓	✓		✓			✓	✓
Scientific Reasoning	✓		✓	✓	✓		✓	
Life-Long Learning		✓		✓				✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Practical 4: VISUAL BASIC AND PYTHON PROGRAMMING LAB	IV	21BIT45P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Identify the basic programming knowledge
- CLO2 working decision structures, loops and functions
- CLO3 Illustrate programs with MDI forms
- CLO4 Apply, compile and debug programs
- CLO5 Analyze and solve simple VB projects
- CLO6 Familiarize with connecting front end and back end
- CLO7 Working and applying advanced controls
- CLO8 Summarize to program with mathematical concepts

VISUAL BASIC PROGRAMMING- LIST OF PROGRAMS

1. Write a simple VB program to find out area and circumference of a rectangle and circle.
2. Write a simple VB program to add the items to list box with user input and move the selected Item to combo box one by one.
3. Write a simple VB program to develop a calculator with basic operation.
4. Design a form using common dialog control to display the font, save and open dialog box without using the action control property.
5. Write a simple program to prepare a Questionnaire.
6. Write a VB Program to develop a menu driven program
 - a. Add a MDI window in the form and arrange them in the cascading/horizontal
 - b. style using menus (Create a menu to add form, arrange) (Menu Item 1).
 - c. Also change the form color using the menu in another menu item (Menu Item 2).
7. Write a VB application for Student Mark List Processing System.

PYTHON PROGRAMMING-LIST OF PROGRAMS

- 1.Program using Operators and Expressions.
- 2.Program using conditional control structures.
- 3.Program to explore string functions.
- 4.Program using Arrays.
- 5.Program to demonstrate the use of lists.
- 6.Program to demonstrate the use of tuple .
- 7.Program to implement a dictionary.
- 8.Program to demonstrate a file.

TEXT BOOKS

1. Byron S. Gottfried, Ph.D, “Visual Basic”, Schaum’s Outlines.
2. Gary Cornell, “Visual Basic 6 from the GROUND UP”, Tata Mcgraw- Hill Edition.

REFERENCES

- 1.David Jung, Pierre Boutquin, John D.Conley III, Loren Eidahl, Lowell Mauer, JackPurdum, “Visual Basic 6 , Super Bible” , Techmedia.
- 2.Peter Wrights, “Beginning Visual Basic 6 “, SPD.
- 3.Steven Holzner, “Visual Basic 6 Black Book “, DreamTech Press, 2000.

FURTHER READING

<https://www.computer-pdf.com/tutorials-visual-basic-6>

<https://ceng.eskisehir.edu.tr/emrekacmaz/bil158/VBTutorial.pdf>

<https://www.w3schools.com/python/>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓		
Communication Skills	✓	✓		✓		✓	✓	✓
Critical Thinking				✓		✓	✓	
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning		✓		✓		✓		
Research Related Skills			✓	✓				
Scientific Reasoning			✓		✓	✓	✓	
Life-Long Learning		✓		✓			✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Skill Based Subject – II: MICROPROCESSOR & ALP	IV	21BIT46S

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Discuss the basic architecture of microprocessor INTEL 8085
- CLO2 Apply the usage of Instruction set and data formats
- CLO3 Apply the usage of Instruction set and data formats
- CLO4 Analyze different addressing modes
- CLO5 Apply different Intel 8085 Instructions
- CLO6 Write Assembly language programming
- CLO7 Explain the usage of interfacing devices
- CLO8 Interfacing I/O devices and Memory

UNIT I: Introduction to Microprocessors – Evolution of Microprocessors- Buses -Microprocessor Architecture: Intel 8085 – ALU - Timing and control unit – Registers - Pin configuration - Instruction cycle: Fetch and Execute operation - Machine cycle and state.

UNIT II: Instruction set of INTEL 8085: Introduction – Instruction and Data formats - Addressing Modes - Status Flags - Intel 8085 Instructions: Data transfer group – Arithmetic group- Logical group - Branch group - Stack, I/O machine control group - Assembly language: stacks – subroutines – MACRO.

UNIT III: Assembly language programming - Addition of two 8-bit numbers - 8-bit subtraction -Decimal addition of two 8-bit numbers - Addition of two 16-bit numbers - 8-bit decimal subtraction - finding square from look-up table - Finding largest number in a data array - Arrange a data array in ascending and descending order - Sum of series of 8-bit numbers - 8-bit multiplication - 8-bit division.

UNIT IV: Peripheral devices and their interfacing: Address space partitioning - Memory and I/O interfacing -Data Transfer schemes- Interrupts of Intel 8085.

UNIT V: Interfacing Devices and I/O Devices- Generation of Control Signals for Memory and I/O Devices- I/O ports- Programmable Peripheral interface - Architecture of Intel 8255-Programmable DMA controller - Programmable interrupt controller 8259 - Programmable communication interface 8251.

TEXT BOOK

1. B.RAM, “Fundamentals of Microprocessors and Microcontrollers,” DhanpatRai Publications, 7th Edition, 2010.

REFERENCES

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, Penram International publishing (India) PVT. LTD., 6th Edition, 2013.
2. Aditya P Mathur, “Introduction to Microprocessors”, McGraw Hill Education (India) Private Limited, 3rd Edition, 2001.

FURTHER READING

1. <http://nptel.ac.in/courses/106108100/>
2. <https://books.google.co.in/books?isbn=8131769062>
3. www.science.smith.edu/~jcardell/Courses/EGR328/Readings/uProc%20Ovw.pdf

Programme Level outcomes	Mapping							
	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓		✓					
Communication Skills				✓				
Critical Thinking	✓		✓	✓	✓	✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓		✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills						✓	✓	
Self-directed Learning	✓	✓	✓	✓				
Life-Long Learning			✓				✓	

Year	Subject Title	Sem	Sub Code
2021-22 Onwards	CORE: SOFTWARE ENGINEERING AND MODELLING	V	21BIT51C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Get insight of Software development model
- CLO2 Gain knowledge on Software requirement specification and Scenario based modelling
- CLO3 Testing conventional applications
- CLO4 Understand and design the architecture for a software
- CLO5 Improve knowledge on software quality metrics and testing strategies
- CLO6 Acquire knowledge on software configuration management and software maintenance
- CLO7 Design component level methodology
- CLO8 Create different diagrams and models

UNIT I: Introduction to Software Engineering: Software Process- Software Engineering practice- Process Model: A generic model- Waterfall Model- Incremental Process model- RAD model- Evolutionary process model- Spiral Model- Concurrent process model. Agile Development: Agility- Agile Process- Other Agile Process Model.

UNIT II: Understanding requirements – Establishing the groundwork – Eliciting requirements – Developing use cases – Building requirements model- Negotiating requirements – Validating requirements – Requirements analysis.

UNIT III: Requirements Modeling – Scenario based Modeling – UML Models – Data Modeling Concepts – Class-based Modeling – Flow-Oriented Modeling – Creating a data flow Model – Control flow Model – Modeling for Web apps.

UNIT IV: Software Design: Design Concepts – Design Process – Design Model – Component level Design: What is a Component – Designing Class-based Components – Conducting component level design – Designing traditional components.

UNIT V: Testing conventional Applications: White box testing – Basis Path testing – Control Structure Testing – Black-box Testing. Maintenance and Reengineering : Software Maintenance – Software Reengineering – Reverse Engineering – Restructuring.

TEXT BOOK

1. “Software Engineering – A Practitioner’s Approach” – Seventh Edition – Roger S. Pressman –

McGraw - Hill Publishing Company Limited.

REFERENCES

1. Software Engineering – K. L. James, Prentice Hall of India Pvt.Ltd, New Delhi – 2009
2. Fundamentals of Software Engineering – Rajib Mall, Prentice Hall of India Pvt.Ltd., New Delhi – 2003.

FURTHER READING

1. <http://www.engpnt.com/2011/12/software-engineering-pressman-ppt.html>
2. http://www.nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
3. Richard Farley(2004). Software Engineering Concepts. TMH.
4. Jeff Tian(2006). Software Quality Engineering. Student Edition. Wiley India.

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓	✓	✓	✓		✓
Communication Skills	✓	✓		✓		✓	✓	
Critical Thinking				✓	✓			✓
Problem Solving	✓		✓			✓	✓	✓
Analytical Reasoning				✓	✓			
Research Related Skills				✓		✓		✓
Scientific Reasoning	✓		✓				✓	✓
Life-Long Learning		✓		✓		✓		✓

Year	Subject Title	Sem	Sub Code
2021-22 Onwards	Core: RELATIONAL DATABASE MANAGEMENT SYSTEM	V	21BIT52C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Study the basic concepts of Relational Data Model, Entity- Relationship Model and process of Normalization
- CLO2 Study the basic concepts of Relational Data Model, Entity- Relationship Model and process of Normalization
- CLO3 Understand the database using Structured Query Language (SQL) in Oracle9i environment.
- CLO4 Construct the database using Structured Query Language (SQL) in Oracle9i environment.
- CLO5 Explain basics of PL/SQL. Understand and use built-in functions and enhance the knowledge of handling multiple tables
- CLO6 Develop programs using Cursors, Exceptions, Procedures and Functions.
- CLO7 Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)

UNIT I: Database Concepts: A Relational approach: Database–Relationships–DBMS–Relational Data Model–Integrity Rules–Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling–Dependency–Database Design – Normal forms– Dependency Diagrams- Renormalizations – Another Example of Normalization.

UNIT II: Oracle9i: Overview: Personal Databases–Client/ServerDatabases–Oracle 9i an introduction–SQL*Plus Environment–SQL–Logging into SQL*Plus–SQL*Plus Commands–Oracle Errors and Online Help–Alternate Text Editors–SQL*PlusWorksheet – iSQL*Plus .Oracle Tables: DDL: Naming Rules and conventions– Data Types–Constraints–Creating an Oracle Table–Displaying Table Information–Altering an Existing Table–Dropping, Renaming, Truncating Table–Table Types–Spooling–Error codes.

UNIT III: Working with Tables: Data Management and Retrieval: DML – Adding a new Row/Record – Customized Prompts – Updating and Deleting Existing Rows/Records–Retrieving Data from A Table– Arithmetic Operations– Restricting Data with WHERE clause– Sorting– Revisiting Substitution Variables–DEFINE command–CASE structure. Functions and Grouping: Built-in functions – Grouping Data .Multiple Tables: Joins and Set operations: Join–Set Operators.

UNIT IV: PL/SQL: A Programming Language: History–Fundamentals–Block Structure–Comments – Data Types–Other Data Types–Variable Declaration–Anchored Declaration-Assignment operation –

Bind Variables–Substitution Variables–Printing–Arithmetic Operators. Control Structures and Embedded SQL: Control Structures–Nested Blocks–SQL in PL/SQL–Data Manipulation –Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes–Cursor FOR loops–SELECT...FOR UPDATE – WHERE CURRENT OF clause– Cursor with Parameters– Cursor Variables– Exceptions– Types of Exceptions.

UNIT V: PL/SQL:PL/SQL Composite Data Types: Records–Tables– Varrays. Named Blocks: Procedures–Functions–Packages–Triggers – Data Dictionary Views.

Case Study: Banking System

TEXT BOOK

1. “Database Systems Using Oracle”–NileshShah,2ndEdition, PHI.

REFERENCES

- 1.“Database Management Systems”,ArunMajumdar&PritimoyBhattacharya,2007,TMH.
- 2.“Database Management Systems”,GeraldV.Post,3rdedition,TMH.

FURTHER READING:

www.tutorial points.com
www.guru99.com

Mapping							
Programme Level outcomes	Course Level Outcomes(CLOs)						
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓				
Critical Thinking				✓	✓	✓	✓
Problem Solving					✓	✓	✓
Analytical Reasoning						✓	✓
Research Related Skills			✓	✓	✓	✓	✓
Scientific Reasoning						✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: COMPUTER GRAPHICS	V	21BIT53C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Discuss input devices and input techniques available to work with graphics
- CLO2 Demonstrate their ability to use computer graphics techniques
- CLO3 Apply different algorithms to solve graphics problems
- CLO4 Discuss the 2D and 3D Graphics and their transformations
- CLO5 Apply clipping techniques to graphics
- CLO6 Apply Display Techniques
- CLO7 Explain Three-Dimensional viewing and Hidden-Surface and Hidden-Line removal
- CLO8 Discuss colour models and colour applications

UNIT-I: Overview of Graphics System – Display Devices – CRT – Random Scan and Raster Scan Monitors – Techniques for Producing Colour Display – Beam – Penetration and Shadow – Mask Methods – DVST – Plasma – Panel Displays – Hardcopy Devices – Printers and Plotters – Display Processors – Output Primitives – DDA and Bresenham’s line drawing algorithms – Bresenham’s Circle Algorithm.

UNIT-II: Two-dimensional Transformations – Scaling, Translation and Rotation – Matrix Representations – Composite Transformations – Reflection – Shearing – Other Transformations. Windowing and Clipping – Concepts – Cohen and Sutherland Line Clipping Algorithm – Midpoint Subdivision.

UNIT III: Three dimensional Concept- Three-Dimensional object representations – polygon surfaces – polygon tables- plane equations - Three-Dimensional geometric transformations – translation – rotation – scaling – other transformations.

UNIT IV: Three-Dimensional viewing – viewing pipeline - Display Techniques – Parallel Projection – Perspective Projection – Hidden-Surface and Hidden-Line removal – Back face removal – Depth Buffer Method – Scan Line Method – BSP Tree Methods – Depth-Sorting Method – Area-subdivision Method – Octree Methods.

UNIT V: Colour models and colour applications – properties of light – standard primaries and the

chromaticity diagram – XYZ colour model – CIE chromaticity diagram – RGB colour model – YIQ, CMY, HSV colour models, conversion between HSV and RGB models, HLS colour model.

TEXT BOOK

1. Donald Hearn and Pauline Baker, “Computer Graphics”, Second Edition, PHI.

REFERENCES

1. “Computer Graphics” – Schaums outline series, Second Edition.
2. William M. Newman and Robert F.Sproull, “Principles of Interactive Computer Graphics”, Mc GrawHill 1978.

FURTHER READING

1. https://onlinecourses.nptel.ac.in/noc20_cs90/preview
2. <https://nptel.ac.in/courses/106/106/106106090/>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓		✓					
Communication Skills					✓		✓	
Critical Thinking	✓	✓		✓	✓	✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓		✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills						✓	✓	
Scientific Reasoning	✓	✓	✓	✓	✓	✓		
Life-Long Learning	✓	✓	✓	✓	✓		✓	

Year	Subject Title	Sem	Sub Code
2021-22 Onwards	PRACTICAL 5: RELATIONAL DATABASE MANAGEMENT SYSTEM LAB	V	21BIT54P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 discuss the concepts of database
- CLO2 Apply the concepts of Structured Query Language (SQL)
- CLO3 Apply PL/SQL to develop programs using cursor, procedures and functions
- CLO4 Analyzing data structure of SQL operators
- CLO5 Evaluate various data base concepts and methods
- CLO6 Build efficient programs
- CLO7 identify, debug and correct errors
- CLO8 Demonstrating the concepts of SQL

List of Programs

1. SQL queries using DDL using constraints
2. SQL queries using DML, TCL commands
3. SQL queries using built in functions
4. SQL queries using group functions
5. SQL queries using HAVING clause
6. SQL queries using advanced SQL operators
7. SQL queries using multiple sub query
8. PL/SQL block using %type attribute
9. PL/SQL block using %row type attribute
10. PL/SQL block using conditional statements
11. PL/SQL block using loops
12. PL/SQL block using implicit cursors

13. PL/SQL block using explicit cursors

14. PL/SQL block using procedures

15. PL/SQL block using functions

FURTHER READING:

swayam.gov.in

<https://www.w3schools.com/>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓			✓		✓	✓	✓
Critical Thinking	✓	✓		✓		✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning				✓	✓	✓	✓	✓
Scientific Reasoning				✓	✓	✓	✓	✓
Research Related Skills	✓	✓	✓	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Skill Based Subject III – DATA MINING AND WAREHOUSING	V	21BIT55S

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Explain the basics of Data Mining and Data Warehousing
- CLO2 Identify the appropriate data mining technique for problem solving
- CLO3 Demonstrate various data mining techniques and data warehousing tool
- CLO4 Implement the methods and techniques with an example dataset
- CLO5 Know how to identify associations between given dataset
- CLO6 Know how to group data based on classification and clustering methods
- CLO7 Identify how web content is mined
- CLO8 Apply the learned techniques in different case studies

UNIT I: Introduction: Data Mining Applications – Data Mining Techniques – The Future of Data Mining - Data Mining Software. Data understanding and data preparation: introduction - data collection and preprocessing - Outliers - Mining Outliers - Missing data - Types of Data - Computing Distance - Data summarising using basic statistical measurements - Displaying data graphically - Multi dimensional Data Visualisation.

UNIT II: Association Rule Mining: Introduction – Basics – The Task and a Naïve Algorithm – The Apriori Algorithm – Improving the Efficiency of the Apriori Algorithm – Mining Frequent patterns without Candidate Generation (FP-Growth) – Performance Evaluation of Algorithms.
Classification: Introduction – Decision Tree – Over fitting and Pruning – Decision Tree Rules – Naïve Bayes Method – Estimating Predictive Accuracy of Classification Methods – Improving Accuracy of Classification Methods – Other Evaluation Criteria for Classification Methods – Classification Software.

UNIT III: Cluster Analysis: Introduction – features – Types of Data – Computing Distance - Types of cluster Analysis Methods – Partitioned Methods – Hierarchical Methods – Density Based Methods – Quality and validity of Cluster Analysis Methods – Cluster Analysis Software.

UNIT IV: Web Data Mining: Introduction – Web Terminology and Characteristics – Locality and Hierarchy in the Web – Web Content Mining – Web Usage Mining – Web Structure Mining – Web Mining Software. Search Engines: Search Engine Functionality - Search Engine Architecture – Ranking of Web Pages.

UNIT V: Data Warehousing: Introduction – Operational Data Stores – Data Warehouses – Data

warehouse Design – Guidelines for Data Warehouse Implementation – Data Warehouse Metadata.

Case study 1 : Mining the student assessment data

Case study 2 : Mining the super market data

TEXT BOOK

1. G.K Gupta, “Introduction to Data Mining with Case Studies”, Prentice Hall of India(Pvt) Ltd, India, 2008.

REFERENCES

1. Jinweihan, MichelineKambler, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers, New Delhi.
2. Margaret.H.Dunham, “Data Mining Introductory and advanced topics” , Prentice Hall of India(Pvt) Ltd, India,

FURTHER READING

- 1.Paul C Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, David Corrigan, James Giles, "Harness the Power of Big Data", The McGraw-Hill Publications,2013,1st Edition.
- 2.Arun.K.Pujari, “Data Mining Techniques”, Universities Press, 2008
- 3.<https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/>
- 4.https://www.researchgate.net/publication/228571634_Mining_Students_Data_to_Analyze_Learning_Behavior_A_Case_Study
- 5.https://www.ripublication.com/ijcir17/ijcirv13n8_08.pdf

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓	✓	✓	✓	✓	✓
Critical Thinking		✓	✓	✓	✓	✓	✓	✓
Problem Solving		✓		✓	✓	✓	✓	
Analytical Reasoning		✓	✓	✓	✓	✓		
Research Related Skills		✓	✓		✓	✓	✓	
Self-directed Learning		✓			✓	✓		✓
Life-Long Learning		✓	✓	✓	✓	✓		

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Non-Major Elective Paper – I INFORMATION TECHNOLOGY - 1 (Basics of Computers and Office Automation)	V	21BIT5EL

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Summarize the types, characteristics and generations of Computers
- CLO2 Discuss the Functions and Components of Computer
- CLO3 Realize the basic concept of Computer software and Programming Languages
- CLO4 Distinguish between input and output device
- CLO5 Explain Text Manipulations and text formatting using MS-office
- CLO6 Outline Editing, Usage of Formulae, File Manipulations and Creating Graphs using MS-Excel
- CLO7 Preparing and Presenting slide show using MS-Powerpoint
- CLO8 Creating application using MS Office packages

UNIT-I:Introduction to Computer: Introduction - Types of computers - Characteristics of Computers. Generations of Computers: First Generation - Second Generation - Third Generation - Fourth Generation - Fifth Generation. Classification of Digital Computers:

Anatomy of Digital Computer : Functions and Components of Computer - Central Processing Unit - Control Unit - Arithmetic - Logic Unit - Memory - Registers - Addresses. Memory Units: RAM, ROM,

UNIT – II: Computer Software: Introduction - Operating System - Utilities - Compiler and Interpreters – Programming Languages: High level language - Types of High Level Language.

Input Devices: Output Devices:

UNIT – III:MS-Office: Text Manipulations - Usage of Numbering, Bullets, Footer and Headers - Usage of Spell check, Find & Replace - Text Formatting - Picture insertion and alignment - Creation of documents, using templates - Formatting a Table - Mail Merge Concepts

UNIT – IV :MS-EXCEL : Cell Editing - Usage of Formulae and Built-in Functions - File Manipulations - Data Sorting (both number and alphabets) - Creating Graphs

UNIT – V: MS-POWER POINT : Inserting Clip arts and Pictures - Frame movements of Clip arts and Pictures - Insertion of new slides - Preparation of Organization Charts - Presentation using Wizards - Usage of design templates

Case Studies: Designing Advertisement and Document creation with special features like header, footer, tables, etc -PowerPoint presentation on various concepts

TEXT BOOK:

1. Alexis Leon and Mathews Leon, "Fundamentals of Computer Science and Communication Engineering", Leon Techworld, 1998.
2. Joyce Cox and Team, "Step by Step 2007 Microsoft Office System", PHI Learning Private limited, New Delhi, 2009.

REFERENCES

1. B Ram and Sanjay Kumar, "Computer Fundamentals", 5th Edition, New Age International Publishers, 2014.
2. Anita Goel, "Computer Fundamentals", 1st Edition, Pearson Education India, 2010.
3. Peter Weverka, "MS Office 2013 All-in-One for Dummies", 1st Edition, Wiley Publications, 2013.

FURTHER READING

1. <https://www.msuniv.ac.in/images/econtent/6.Computer%20%20Fundamentals%20and%20Office%20Automation.pdf>
2. <https://www.wileyindia.com/computer-basics-with-office-automation.html>
3. <https://support.microsoft.com/en-us/office/create-a-cross-reference-300b208c-e45a-487a-880b-a02767d9774b>
4. <https://www.informit.com/articles/article.aspx?p=170392>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge			✓	✓	✓			
Communication Skills	✓	✓			✓		✓	
Critical Thinking			✓	✓		✓	✓	
Problem Solving			✓	✓	✓	✓	✓	
Analytical Reasoning					✓	✓	✓	✓
Research Related Skills			✓		✓			
Co-operation/Team work		✓		✓		✓	✓	✓
Life-Long Learning	✓			✓	✓	✓		

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Core: PROGRAMMING IN PHP	VI	21BIT61C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Develop programs using conditional statements, looping constructs
- CLO2 Analyze array concepts, Create functions
- CLO3 Analyse the concept of forms, files and dictionaries
- CLO4 Create cookies and session related programs
- CLO5 Discuss the concepts of Mysql, create connectivity, develop programs
- CLO6 Illustrate the concepts string, numeric, date and time function
- CLO7 Build efficient programs using PHP, with HTML
- CLO8 Discuss the concepts of OOPs and apply in PHP

UNIT I: PHP Introduction: History-unique features-basic development concepts. Using variables and operators: storing data in variables-understanding. PHP's data types - using constants. Controlling program flow: if, if-else, if-else if-else, switch case, while, do while, for loop, Interrupting and Skipping Loops.

UNIT II: Working with string and numeric functions: using string functions, using numeric functions. Working with arrays: Storing Data in Array - Processing Arrays with Loops and Integrators - Using array with forms - Working with array functions - Working with Dates and Times - Creating user defined functions.

UNIT III: Creating Classes: Introducing classes and objects-defining and using classes-Using advanced OOPs concepts - using constructors and destructors - extending classes -adjusting visibility settings - Working with files and directories: reading local file-remote file-specific segments of a file - Writing files - Processing directories - Performing other file and directory operations.

UNIT IV: Working with forms: creating a simple Input form –Accessing form- combining HTML and PHP code on single page –using hidden fields to save state –redirecting the user –working with file uploads. Working with Cookies, Sessions and Headers : Working with cookies – Working with sessions - Working with Headers. Handling errors: Handling script errors – Using exceptions.

UNIT V: Database & MySQL – Installing MySQL – Integrating PHP & MySQL – Connecting to MySQL – MySQL Queries – Dataset – Multiple Connection – Error Checking – Creating MySQL Database with PHP – MySQL Data types – MySQL Functions.

TEXT BOOKS

1. Vikram Vaswani, "PHP: A beginners guide", TMH Hill, 1st edition, 2010.
2. Steve Suehring, Tim Converse, Joyce Park , "PHP 6 and MySQL 6 Bible", Wiley India PVT. Ltd., Edition, 2009

REFERENCES

1. Matt Doyle, " Beginning PHP 5.3", Wiley India pvt. Ltd, First edition, 2010.
2. Luke welling and Laura Thomson, "PHP and MySQL Web Development", 5th Edition, 2016.
3. Julie C. Meloni , "PHP, MYSQL and Apache", Dorling Kindersley(India) Pvt Ltd, 2005.

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓		✓		✓	✓	✓
Communication Skills			✓		✓		✓	✓
Critical Thinking	✓		✓	✓		✓	✓	✓
Problem Solving			✓		✓	✓		✓
Analytical Reasoning		✓		✓		✓	✓	
Research Related Skills	✓			✓	✓	✓	✓	✓
Scientific Reasoning	✓		✓		✓		✓	
Life-Long Learning	✓		✓	✓		✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021-2022 Onwards	Core: MOBILE COMPUTING	VI	21BIT62C

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Outline the fundamentals of Mobile Computing
- CLO2 Differentiate Mobile networks from other types of networks
- CLO3 Analyse the Mobile Computing Architecture
- CLO4 Evaluate emerging technologies that use mobile computing
- CLO5 Describe the GSM standard for mobile computing
- CLO6 Distinguish between GSM and GPRS
- CLO7 Compare mobile computing over SMS
- CLO8 Design simple mobile computing applications

UNIT I: Introduction: Mobility of Bits and Bytes –Wireless: The Beginning –Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Applications and services Developing Mobile computer Applications – Security in mobile computing – Standards - Why is it necessary – Standard bodies.

UNIT II: Mobile Computing Architecture: History of computers and Internet – Architecture for mobile computing – Three-tier architecture – Design considerations for mobile computing - Mobile computing through Internet – Making existing applications mobile enabled.

UNIT III: Mobile Computing Through Telephony: Evolution of telephony – Multiple access procedures –Satellite Communication Systems-Mobile computing through telephone – Developing an IVR Application – Voice XML – Telephony application Programming Interface - Emerging Technologies: Introduction - Bluetooth – Radio Frequency Identification– Wireless Broadband– Mobile IP – Internet Protocol Version 6 – Java Card.

UNIT IV: GSM: Global System for mobile communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM –Mobility Management-GSM Frequency allocations – Authentications and Security.

UNIT V: GPRS – GPRS and packet data network – GPRS network architecture – GPRS network operations– Data services in GPRS – Application for GPRS - SMS: Mobile Computing Over SMS - Short Message Service-Value Added Services through SMS. **Case Study:** How to analyse and design a mobile application?

TEXT BOOK

1."Mobile Computing - Technology, Applications and Service Creation", Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, Second Edition, 2010.

REFERENCES

1. Raj Kamal, “Mobile Computing”, Second Edition, Pearson Education, New Delhi, 2007.
2. Ikvinderpalsingh, “Mobile Computing”, First Edition, Khanna book publications,2017.

FURTHER READING

1. <http://www.gsmworld.com>
2. <http://www.etsi.org>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓		✓		✓	✓	✓
Communication Skills			✓		✓			✓
Critical Thinking	✓		✓	✓			✓	✓
Problem Solving			✓		✓	✓		✓
Analytical Reasoning		✓		✓		✓	✓	
Research Related Skills	✓		✓		✓	✓	✓	✓
Scientific Reasoning	✓		✓		✓		✓	
Life-Long Learning	✓			✓		✓		✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Practical: PHP PROGRAMMING LAB	VI	21BIT63P

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Evaluate electric bill using PHP
- CLO2 Explain the looping concepts
- CLO3 Program to create classes and objects
- CLO4 Apply the concepts uploading files
- CLO5 Analyze the concept of strings, date and time functions
- CLO6 Demonstrate the HTML application
- CLO7 Explore the concept of using images
- CLO8 Develop programs using MySQL

List of Programs

1. Write a PHP program to calculate electricity bill using if-else conditions.

Conditions:

- For first 50 units – Rs. 3.50/unit
 - For next 100 units – Rs. 4.00/unit
 - For next 100 units – Rs. 5.20/unit
 - For units above 250 – Rs. 6.50/unit
2. Write a PHP program using nested for loop that creates a chess board.
 3. Write a PHP program to draw different shapes.
 4. Write a PHP program to perform the string manipulation.
 5. Write a PHP program to perform uploading files.
 6. Write a PHP program to perform user registration form using HTML tags.
 7. Write a PHP program to display current date and time with specific format.
 8. Write a PHP program to find factorial of a given number using recursive function.
 9. Write a PHP program to perform file manipulations.
 10. Write a PHP program to handle cookies and sessions.
 11. Write a PHP program to illustrate classes and objects.
 12. Write a PHP program to access the database table using MySQL.

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disiplinary Knowledge	✓	✓	✓	✓	✓	✓	✓	✓
Communication Skills								
Critical Thinking	✓	✓	✓	✓	✓	✓	✓	✓
Problem Solving	✓	✓	✓	✓	✓	✓	✓	✓
Analytical Reasoning	✓	✓	✓	✓	✓	✓	✓	✓
Research Related Skills								
Scientific Reasoning								
Life-Long Learning	✓	✓	✓	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Skill based subject IV ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	VI	21BIT65S

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Discuss the nature of AI problems and task domains of AI.
- CLO2 Apply the appropriate search procedures to solve the problems by using best algorithms
- CLO3 Analyze and select the suitable knowledge representation method
- CLO4 Manipulate the acquired knowledge and infer new knowledge
- CLO5 Demonstrate the development of AI systems by encoding the knowledge

UNIT I:Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search

UNIT II:Heuristic Search techniques: Generate and Test–Hill Climbing– Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis

UNIT III:Knowledge representation issues: Representations and mappings–Approaches to Knowledge representations –Issues in Knowledge representations– Frame Problem.

UNIT IV:Using Predicate Logic: Representing simple facts in logic-Representing Instance and Isa Relationships-Computable Functions and Predicates-Resolution-Natural Deduction–Procedural Vs Declarative Knowledge - Logic Programming.

UNIT V: Expert Systems - Representing and Using Domain Knowledge - Expert System Shells-Explanation - Knowledge Acquisition . Perception and Action - Real time Search - Perception - Action - Robot Architectures.

TEXT BOOK

- 1.Artificial Intelligence, Elaine Rich and Kelvin Knight, TMH, 2nd Edn,1991

REFERENCES

- 1.Artificial Intelligence, George FLuger,4th Edition,Pearson,2002.
- 2.Foundations of Artificial Intelligent and Expert Systems, VS Janaki Raman, K Sarukesi, P Gopala Krishnan, MacMillan India limited

FURTHER READING

www.tutorials.com/AI

Mapping					
Programme Level outcomes	Course Level Outcomes(CLOs)				
	CLO1	CLO2	CLO3	CLO4	CLO5
Disiplinary Knowledge	✓	✓	✓	✓	✓
Communication Skills	✓	✓	✓		
Critical Thinking				✓	✓
Problem Solving				✓	✓
Analytical Reasoning					✓
Research Related Skills	✓	✓	✓	✓	✓
Self-directed Learning	✓	✓	✓	✓	✓
Life-Long Learning	✓	✓	✓	✓	✓

Year	Subject Title	Sem	Sub Code
2021 -22 Onwards	Non-Major Elective Paper – II: INFORMATION TECHNOLOGY - 2 (System Administration and Maintenance)	VI	21BIT6EL

COURSE LEARNING OUTCOMES

On Successful Completion of the Course, the students will be able to :

- CLO1 Identify the opportunities in IT Industry Certifications
- CLO2 Know the Hardware Components of computer system
- CLO3 Demonstration of Step by Step Computer Assembly- To install various computer components
- CLO4 Discuss the Preventive Maintenance and Troubleshooting process
- CLO5 Explain the characteristics and fundamentals Operating System
- CLO6 Comparison of Laptops and Portable Devices
- CLO7 Explain the fundamentals of Printers, Scanners and Network Principles
- CLO8 Troubleshoot Operating system, Laptop & Portable Devices and Network

UNIT – I:Introduction to the Personal Computer - IT Industry Certifications - A+ and EUCIP Certification - Computer System : Hardware Components - Power Supplies - Purposes, and Characteristics of Internal Components - Purposes, and Characteristics of ROM and RAM- Purposes, and Characteristics of Storage Drives- Purposes, and Characteristics of Ports and Cables

UNIT – II:Computer Assembly Step by Step- Attach the Components to the Motherboard and Install the Motherboard- Install Internal Drives- Install Adapter Cards- Connect All Internal Cables- Connection of external cables -Boot the Computer

UNIT – III: Preventive Maintenance and Troubleshooting: Purpose of Preventing Maintenance - Steps of Troubleshooting Process- Data Protection purposes. Fundamental Operating System: Purposes - Characteristics of Modern Operating Systems - Determination of Operating System based on Customer Needs - Installation of Operating System - Common Preventive Maintenance Techniques

UNIT – IV:Fundamentals of Laptops and Portable Devices: Common Uses - Components of Laptop - Comparison of the components of Desktop and Laptops - Configure Laptops - Mobile Phone Standards – Preventive Maintenance Techniques -.

UNIT –V:Fundamentals of Printers and Scanners: Types of Printers and Scanners - Installation and Configuration Process of Printers and Scanners - Preventive Maintenance Techniques - Fundamental Networks: Principles - Types - Concepts and Technologies – Physical Components

Case Studies: Troubleshoot operating system - Troubleshoot Laptop and Portable Devices - Troubleshoot a Network.

TEXTBOOK

1. David Anfinson & Ken Quamme, "IT Essentials: PC Hardware and Software Companion Guide", 3rd Edition, Pearson Publications, 2008.

REFERENCES

- 1.Quentin Docter, Emmett Dulaneyand Toby Skandier, "CompTIA A+ Complete Review Guide:

Exam 220-901, Exam 220 - 902", 3rd Edition, Wiley Publications, 2015.

FURTHER READING

1. <https://edu.gcfglobal.org/en/computerbasics/setting-up-a-computer/1/>
2. <https://www.pcbuildadvisor.com › how-to-build-a-com>
3. <https://www.ciscopress.com/articles/article.asp?p=2999386&seqNum=5>

Mapping								
Programme Level outcomes	Course Level Outcomes(CLOs)							
	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Disciplinary Knowledge	✓	✓	✓					
Communication Skills	✓	✓			✓		✓	
Critical Thinking			✓	✓		✓	✓	
Problem Solving			✓	✓	✓	✓	✓	
Analytical Reasoning					✓	✓	✓	✓
Research Related Skills			✓		✓			
Co-operation/Team Work	✓			✓		✓		
Life-Long Learning	✓			✓	✓	✓		

7. Teaching-Learning Methodologies

The teaching-learning process should be in-line with the course objective and outcomes. Teaching has to ensure that the suggested outcomes are ensured for each course and overall programme. Teaching-aids should be used wherever required to facilitate proper and impactful learning. Blended learning is recommended with the use different platforms and classroom teaching.

To meet the set of objectives of the course and enable students achieve the expected outcomes of the course the teaching-learning process should be appropriately chosen. Though the teachers are best positioned to create innovative models suitable for teaching the course, certain well accepted and widely tested processes are suggested to achieve the desired outcomes.

Classroom teaching - Regular classroom and face to face teaching and tutorials can be primarily used for imparting theoretical foundations of Information Technology. Applications of the same may be explained from time to time so that the student can appreciate the theory.

Laboratory - Lab exercises in programming and usage of package / software tools should be made mandatory and integral part. Open source software/Packages should be preferred over proprietary tools wherever available.

Seminars - Guest lectures and seminars involving industry experts and eminent teachers should be arranged to help the students understand the practices in the industry and developments in the field.

Assignments - Home assignments should be designed to make student collect information from various sources and solve unfamiliar problems and make comparisons of solutions.

Project - Students are required to complete a project which includes the planning, system study, design and development of a complete system to develop live projects with industry orientation /industry problem.

8. Assessment and Outcome Measurement Methods

The committee recommends that assessment should be viewed not only merely as a testing by the institution to evaluate the students' progress, but also as a valuable tool for a student to learn what is expected of him/her, where their level of knowledge and skill is lacking, and perhaps most importantly, what he/she could do to improve these levels with the valuable inputs of the lecturers. Assessment methods are the strategies, techniques, tools and instruments for collecting information to determine the extent to which students demonstrate desired learning outcomes. In the Bachelor's programmes leading to degrees such as BSc with Information Technology, the assessment and evaluation methods focus on testing the conceptual understanding of the basic ideas of computer hardware and software, development of programming skills and experimental techniques, retention and ability to apply the knowledge acquired to real-life applications, and to solve new problems and communicate the results and findings effectively. Based on the Learning Objectives defined for each course as proposed in detail, assessment methods can be designed to monitor the progress in achieving the Learning Objectives during the course and test the level of achievement at the end of the course. Several methods can be used to assess student learning outcomes. Relying on only one method to provide information about the program will only reflect a part of students' achievement.

The continuous assessment occurs on a regular and continuous basis, it is an ongoing formative and summative process, involves the monitoring of students, is integrated with teaching, involves a systematic collection of marks or grades into a final score, may be used to determine the students' final grades.

Direct methods of assessment ask students to demonstrate their learning while indirect methods ask students to reflect on their learning. Tests, essays, presentations, etc. are generally direct methods of assessment, and indirect methods include surveys and interviews. For each Learning Objective, a combination of direct and indirect assessment methods should be used.

As this is a technology oriented programme and new technologies are introduced quite often, care should be taken to familiarize the students with the recent advances through seminars or term papers and case studies. This should be given due weightage during continuous evaluation process. To achieve this objective, the following are suggested

- (i) The end examination papers should be covering all units of the syllabus. Questions should be balanced and evaluate the comprehension, analytical and problem -solving skills.
- (ii) The students should be evaluated on teamwork in addition to the technical skills through projects.
- (iii) Ability to self-learning and solving new problems should be assessed through assignments, Seminars and project work.
- (iv) It is recommended weightage be given for practical and laboratory work.
- (v) Peer evaluation component is recommended for project evaluation and seminar.
- (vi) Online course certification should be encouraged and equivalent grade for the same need to be worked to achieve the outcome of self-learning.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE - 641 018
DEPARTMENT OF INFORMATION TECHNOLOGY

DISTRIBUTION OF MARKS FOR CONTINUOUS INTERNAL ASSESSEMENT(CIA) AND
COMPREHENSIVE EXTERNAL EXAMINATIONS(CEE)

BOARD OF STUDIES APPROVED SYLLABUS, 2021-2022 ONWARDS

UG THEORY PAPER

UG THEORY PAPER			UG TOTAL	
Maximum INT. MARKS #	Maximum EXT. MARKS	External Passing Minimum	Max. Marks	Passing Minimum
50	50	20	100	40

No passing minimum for Internal Marks

UG PRACTICAL PAPER

UG PRACTICAL PAPER			UG PRACTICAL TOTAL	
Maximum INT. MARKS #	Maximum EXT. MARKS	External Passing Minimum	Max. Marks	Passing Minimum
50	50	20	100	40

No passing minimum for Internal Marks

UG PROJECT

UG PROJECT			PROJECT TOTAL	
Maximum INT. MARKS #	Maximum EXT. MARKS	External Passing Minimum	Max. Marks	Passing Minimum
50	50	20	100	40

No passing minimum for Internal Marks

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE - 641 018
DEPARTMENT OF INFORMATION TECHNOLOGY

BOARD OF STUDIES APPROVED SYLLABUS, 2021-2022 ONWARDS

COMPONENTS OF CONTINUOUS INTERNAL ASSESSMENT-50 MARKS

Average of two IAT(INTERNAL ASSESSMENT TEST) for 50 marks each will be converted to 30 marks for CIA calculation.

THEORY PAPER

IAT- INTERNAL ASSESSMENT TEST

COMPONENTS		MARKS	TOTAL
IAT-I	50	50+50 converted to 30 marks	50 marks
IAT-II	50		
Assignment @		10	
Seminar		5	
Class Participation		5	

@- Two assignments to be given with 5 Marks each.

PRACTICAL PAPER

COMPONENTS		MARKS	TOTAL
Model Practical		50 converted to 30 marks	50 marks
Observation Notebook		15	
Skill		5	

PROJECT

COMPONENTS	MARKS	TOTAL
Periodic Review	40	50 Marks
Regularity	10	

**INTERNAL EXAMINATIONS TOTAL MARKS:50
OUT OF TWO TESTS BEST ONE WILL BE TAKEN
INTERNAL MARKS DISTRIBUTION**

1	THEORY	30 MARKS
2	ASSIGNMENT(2NOS:2*5=10)	10 MARKS
3	SEMINAR	5 MARKS
4	OVERALL ATTENDANCE (CLASS PARTICIPATION)	5 MARKS

INTERNAL EXAMINATION QUESTION PAPER FORMAT FOR UG

Max. Marks:50

PART-A

I Choose the Best Answers (5*1=5 Marks)

With 4 distractions – Avoid using none of the above , all of the above

Question 1 from Unit – I

Question 2 from Unit – II

Question 3 from Unit – III

Question 4 from Unit – IV

Question 5 from Unit – V

II Answer Any THREE Questions(3*2=6 Marks)

Question 6 from Unit – I

Question 7 from Unit – II

Question 8 from Unit – III

Question 9 from Unit – IV

Question 10 from Unit – V

PART-B(5*3=15 Marks)

Short Answers not exceeding 25 words each

Answer all Questions

Question 11. a) or b) From Unit - I

Question 12. a) or b) From Unit - II

Question 13. a) or b) From Unit - III

Question 14. a) or b) From Unit - IV

Question 15. a) or b) From Unit – V

PART-C (3*8=24 Marks)

Answers any Three questions not exceeding 200 words each

Question 16. From Unit - I

Question 17. From Unit - II

Question 18. From Unit - III

Question 19. From Unit - IV

Question 20. From Unit – V

INTERNAL EXAMINATION QUESTION PAPER FORMAT FOR UG

21BIT13C

REG. NO _____

**B.Sc DEGREE EXAMINATIONS NOVEMBER-2021
SEMESTER I INFORMATION TECHNOLOGY
TITLE _____**

TIME: 2 Hrs

Max. Marks:50

PART-A

I Choose the Best Answers

(5*1=5 Marks)

- 1.
- 2.
- 3.
- 4.
- 5.

II Answer Any THREE Questions

(3*2=6 Marks)

- 6.
- 7.
- 8.
- 9.
- 10

PART-B (5*3=15 Marks)

Answer all Questions

11. a.

(or)

b.

12. a.

(or)

b.

13. a.

(or)

b.

14. a.

(or)

b.

15. a.

(or)

b.

PART-C (3*8=24 Marks)
Answers any Three questions

- 16.
- 17.
- 18.
- 19.
- 20.

SEMESTER EXAMINATION QUESTION PAPER FORMAT FOR UG

Max.Marks:50

PART-A

I Choose the Best Answers (5*1=5 Marks)

With 4 distractions – Avoid using none of the above , all of the above

Question 1 from Unit – I

Question 2 from Unit – II

Question 3 from Unit – III

Question 4 from Unit – IV

Question 5 from Unit – V

II. Answer any three questions (3*2=6Marks)

Short answers not exceeding 25 words each

Question 6 from Unit – I

Question 7 from Unit – II

Question 8 from Unit – III

Question 9 from Unit – IV

Question 10 from Unit – V

PART-B (5*3=15 Marks)

Short Answers not exceeding 100 words each

Answer all Questions

Question 11. a) or b) From Unit - I

Question 12. a) or b) From Unit - II

Question 13. a) or b) From Unit - III

Question 14. a) or b) From Unit - IV

Question 15. a) or b) From Unit – V

PART-C (3*8=24 Marks)

Answers any Three questions not exceeding 750 words each

Question 16. From Unit - I

Question 17. From Unit - II

Question 18. From Unit - III

Question 19. From Unit - IV

Question 20. From Unit – V

SEMESTER EXAMINATION QUESTION PAPER FORMAT FOR UG

21BIT13C

REG. NO _____

**B.Sc DEGREE EXAMINATIONS NOVEMBER-2021
SEMESTER I INFORMATION TECHNOLOGY
TITLE _____**

TIME: 2 Hrs

Max. Marks:50

PART-A

I Choose the Best Answers

(5*1=5 Marks)

- 1.
- 2.
- 3.
- 4.
- 5.

II Answer Any THREE Questions

(3*2=6 Marks)

- 6.
- 7.
- 8.
- 9.
- 10

PART-B (5*3=15 Marks)

Answer all Questions

11. a.

(or)

b.

12. a.

(or)

b.

13. a.

(or)

b.

14. a.

(or)

b.

15. a.

(or)

b.

PART-C (3*8=24 Marks)
Answers any Three questions

- 16.
- 17.
- 18.
- 19.
- 20.