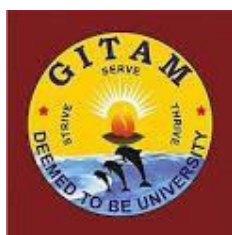# GITAM INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University, Estd. u/s 3 of UGC Act 1956)
VISAKHAPATNAM , HYDERABAD, BENGALURU
Accredited by NAAC with 'A⁺' Grade

REGULATIONS AND SYLLABUS
of
B.Sc Computer Science with Cognitive Systems
(in collaboration with TCS)

(w.e.f 2021-22 Admitted batch)

B.Sc Computer Science with Cognitive System
REGULATIONS
(w.e.f. 2021-22 admitted batch)

1. **ADMISSION**
   - Admission into B.Sc Computer Science with Cognitive Systems program of GITAM University in collaboration with TCS is governed by GITAM University admission regulations.

2. **ELIGIBILITY CRITERIA**
   a. A pass in intermediate / +2 with a minimum aggregate of 50% marks in the qualifying examination.
   b. Admission into B.Sc (Computer Science with Cognitive Systems) will be based on an All India GITAM Science Admission Test (GAT) conducted by GITAM University and the rule of reservation, wherever applicable.

3. **CHOICE BASED CREDIT SYSTEM**
   Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines to promote:
   1. Student-Centered Learning
   2. Cafeteria approach
   3. Inter-disciplinary learning

   Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

4. **STRUCTURE OF THE PROGRAM**
   - The Program Consists of
     - Foundation Courses (compulsory) which give general exposure to a Student in communication and subject-related area.
     - Core Courses (compulsory).
     - Discipline centric electives which
       - are supportive of the discipline
       - give an expanded scope of the subject
       - give interdisciplinary exposure
       - Nurture the student skills
     - Open electives are general either related or unrelated to the discipline.
     - Practical Proficiency Courses Laboratory and Project work.
   - Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.
   - In general, credits are assigned to the courses based on the following contact hours per week per semester.
     1. One credit for each Lecture / Tutorial hour per week.

2. One credit for two hours of Practical per week.
3. Eight credits for project.
- The curriculum of the six semesters B.Sc Computer Science with Cognitive System program is designed to have a total of 122 credits for the award of B.Sc Computer Science with Cognitive Systems degree.

5. **MEDIUM OF INSTRUCTION**
   The medium of instruction (including examinations and project reports) shall be English.

6. **REGISTRATION**
   Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

7. **ATTENDANCE REQUIREMENTS**
   - A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend that end - semester examination and he/she will not be allowed to register for the subsequent semester of study. He/she has to repeat the semester along with his / her juniors.
   - However, the Vice-Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% genuine grounds and on payment of the prescribed fee.

8. **EVALUATION**
   - The assessment of the student's performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).
   - A student has to secure an aggregate of 40% in the course in continuous evaluation and semester-end examination, the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.
   - Practical / Viva-voce etc. courses are completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table1.

1. Table 1: Assessment Procedure

S. No.	Component of assessment	Marks allotted	Type of Assessment	Scheme of Examination
1	Theory	40	Continuous Evaluation	1. Three mid semester examinations shall be conducted for 15 marks each. The performance in best two shall be taken into consideration. 2. 5 marks are allocated for quiz. 3. 5 marks are allocated for assignments.
		60	Semester-end Examination	The semester-end examination shall be for a maximum of 60 marks.
	Total	100		
2	Practicals	100	Continuous Evaluation	60 marks for performance, regularity, record/and case study. Weightage for each component shall be announced at the beginning of the semester. 40 marks (30 marks for the experiment(s) and 10 marks for practical Viva-Voce.) for the test conducted at the end of the Semester conducted by the concerned Lab Teacher.
	Total	100		
3	Project Work	200	Project Evaluation	150 marks for evaluation of the project work dissertation submitted by the candidate. 50 marks are allocated for the project Viva-Voce. The project work evaluation and the Viva-Voce shall be conducted by one external examiner outside the University and the internal examiner appointed by the Head of the Department.

9. RETOTALING & REVALUATION

- Re-totaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within one week after the announcement of the results.

- Revaluation of the theory answer scripts of the semester-end examination are permitted on request by the student by paying the prescribed fee within one week after the announcement of the result.

10. PROVISION FOR ANSWER BOOK VERIFICATION & CHALLENGE EVALUATION:

- If a student is not satisfied with his/her grade after revaluation, the student can apply for, answer book verification on payment of the prescribed fee for each course within one week after the announcement of revaluation results.
- After verification, if a student is not satisfied with revaluation marks/grade awarded, he/she can apply for challenge valuation within one week after announcement of answer book verification result/ two weeks after the announcement of revaluation results, which will be valued by the two examiners i.e., one Internal and one External examiner in the presence of the student on payment of the prescribed fee. The challenge valuation fee will be returned if the student is succeeded in the appeal with a change for a better grade.

11. SUPPLEMENTARY EXAMINATIONS & SPECIAL EXAMINATIONS:

- The odd semester supplementary examinations will be conducted on a daily basis after conducting regular even semester examinations in April/May.
- The even semester supplementary examinations will be conducted on a daily basis after conducting regular odd semester examinations during November/December
- A student who has completed his/her period of study and still has an "F" grade in final semester courses is eligible to appear for Special Examination normally held during summer vacation.

12. PROMOTION TO THE NEXT YEAR OF STUDY

- A student shall be promoted to the next academic year only if he/she completes the academic requirements of 60% of the credits until the previous academic year.
- Whenever there is a change in syllabus or curriculum he/she has to continue the course with new regulations after detention as per the equivalency established by the Board of Studies (BoS) to continue his/her further studies.

13. BETTERMENT OF GRADES

- A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in 'n' (where 'n' is no.of semesters of the program) theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.
- Betterment of Grades is permitted 'only once', immediately after completion of the program of study.

14. REPEAT CONTINUOUS EVALUATION

- A student who has secured an 'F' grade in a theory course shall have to reappear at the subsequent examination held in that course. A student who has secured 'F' grade can improve continuous evaluation marks up to a maximum of 50% by attending special instruction classes held during summer.
- A student who has secured an 'F' grade in a practical course shall have to attend Special Instruction classes held during summer

- A student who has secured an 'F' grade in a combined (theory and practical) course shall have to reappear for theory component at the subsequent examination held in that course. A student who has secured 'F' grade can improve continuous evaluation marks up to a maximum of 50% by attending special instruction classes held during summer.

- The RCE will be conducted during summer vacation for both odd and even semester students. Students can register a maximum of 4 courses. Biometric attendance of these RCE classes has to be maintained. The maximum marks in RCE are limited to 50% of Continuous Evaluation marks. The RCE marks are considered for the examination held after RCE except for final semester students.

- RCE for the students who completed course work can be conducted during the academic semester. The student can register a maximum of 4 courses at a time in a slot of 4 weeks. Additional 4 courses can be registered in the next slot.

- A student is allowed to Special Instruction Classes (RCE) 'only once' per course.

15. GRADING SYSTEM

- Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

2. Table 2: Grades & Grade Points

Sl.No.	Grade	Grade Points	Absolute Marks
1	O (outstanding)	10	90 and above
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	70 to 79
4	B+ (Good)	7	60 to 69
5	B (Above Average)	6	50 to 59
6	C (Average)	5	45 to 49
7	P (Pass)	4	40 to 44
8	F (Fail)	0	Less than 40
9	Ab. (Absent)	0	-

- A student who earns a minimum of 4-grade points (P grade) in a course is declared to have completed the course, subject to securing an average GPA (average of all GPAs in all the semesters) of 5 at the end of the Program to declare pass in the program.
  Candidates who could not secure an average GPA of 5 at the end of the program shall be permitted to reappear for a course(s) of their choice to secure the same.

16. GRADE POINT AVERAGE

- A Grade Point Average (GPA) for the semester will be calculated according to

the formula:

$$GPA = \frac{\Sigma\,[\,C * G\,]}{\Sigma\,C}$$

Where

C = number of credits for the course,
G = grade points obtained by the student in the course.
To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student's performance in all the courses taken, in all the semesters up to the particular point of time.

- CGPA required for classification of class after the successful completion of the program is shown in Table 3.

Table 3: CGPA required for award of Class

Class	CGPA Required
First Class with Distinction	≥ 8.0*
First Class	≥ 6.5
Second Class	≥ 5.5
Pass Class	≥ 5.0

* In addition to the required CGPA of 8.0 or more the student must have necessarily
passed all the courses of every semester in first attempt.

- **ELIGIBILITY FOR AWARD OF THE B.SC COMPUTER SCIENCE WITH COGNITIVE SYSTEMS DEGREE**

- Duration of the program: A student is ordinarily expected to complete B.Sc Computer Science with Cognitive Systems program in Six semesters of three years. However a student may complete the program in not more than Six years including the study period.
- However, the above regulation may be relaxed by the Vice-Chancellor in individual cases for cogent and sufficient reasons.
- A student shall be eligible for the award of the B.Sc Computer Science with Cognitive Systems Degree if he/she fulfill all the following conditions.
    - Registered and successfully completed all the courses and projects.
    - Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
    - Has no dues to the Institute, hostels, Libraries, NCC / NSS, etc. and
    - No disciplinary action is pending against him/her.
- The degree shall be awarded after approval by the Academic Council.

- **DISCRETIONARY POWER**
    Notwithstanding anything contained in the above sections, the Vice-Chancellor may review all exceptional cases, and give his decision, which will be final and binding.

Programme Educational Objectives:

PO1 : Create and Execute solutions on the knowledge acquired to address the issues.

PO2 : Able to Implement Cognitive Skill-based solutions for the betterment of

Society.

PO 3 : Apply mathematical knowledge and Algorithmic approach to information analysis and Applications

PO4: Be an effective and inspiring leader for fellow professionals and face the challenges of the rapidly changing multi-dimensional, contemporary world.

PROGRAM OUTCOMES (POS)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering Fundamentals, and an Engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to as assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

The Curriculum is designed to achieve the learning goals :

- To create awareness in understanding about Computer Science and Cognitive based applications .
- To introduce in a wide range of careers and/or graduate studies in computer science or related fields with apassion for lifelong learning.
- Knowledge imparted in the programming skills will require the use of best practices.
- To understand of professional, ethical, legal, security, and social issues and responsibilities of the computingprofession.
- To know how technological advances impact society and the social, legal, ethical and cultural ramificationsof computer technology and their usage.

B.Sc Computer Science with Cognitive Systems

Semester - I

Course Code	Category	Title	L	T	P	C
LANG 1011	AECC-I	Communication Skills in English	0	0	4	2
MATH1271	CC	Linear Algebra	3	0	0	3
CSCI1161	CC	Problem Solving and Programming with Python	3	0	0	3
CSCI1181	CC	Operating Systems	3	0	0	3
CSCI1141	CC	Introduction to Information Technology	3	0	0	3
CSCI1151	PCC	IT Workshop	0	0	2	1
CSCI1171	PCC	Programming with Python Lab	0	0	2	1
CSCI1191	PCC	Operating Systems Lab	0	0	2	1
PSYC1031	SEC-I	Psychology	2	1	0	2
		Semester Total				**19**

Semester - II

Course Code	Category	Title	L	T	P	C
LANG 1021	AECC -II	Advanced Communication Skills in English	0	0	4	2
VEDC1001	SEC-II	Venture Development	2	0	0	2
CSCI1201 CSCI1211	GE-I	**General Elective-I** Design Thinking E-commerce	3	0	0	2
MATH1281	CC	Probability and Statistics	3	1	0	3
CSCI1221	CC	Introduction to Computer Networks	3	0	0	3
CSCI1241	CC	Programming with C++	3	0	0	3
CSCI1251	PCC	Programming with C++ Lab	0	0	2	1
CSCI1231	PCC	Computer Networks Lab	0	0	2	1
						17

Semester - III

Course Code	Category	Title	L	T	P	C
XXXXXXX LANG1131	AECC-III	Hindi German French	2	0	0	2
XXXXX CSCI2131	GE-II	General Elective-II Optimization Techniques Web Technologies	3	0	0	2
ENVS1001	MC	Environmental Studies	3	0	0	3
CSCI2141	CC	Data Structures with C++	3	0	0	3
CSCI2161	CC	Fundamentals of Cloud and Virtualization	3	0	0	3
CSCI2181	CC	Database Management Systems	3	0	0	3
CSCI2151	PCC	Data Structures with C++ Lab	0	0	2	1
CSCI2191	PCC	DBMS Lab	0	0	2	1
CSCI2171	PCC	Cloud and Virtualization Lab	0	0	2	1
		Semester Total				**19**

Semester - IV

Course Code	Category	Title	L	T	P	C
CSCI2201	CC	Introduction to Artificial Intelligence	3	0	0	3
CSCI2221 XXXXX	GE-III	**Generic Elective-III** Blockchain Technologies Intellectual Property Rights	3	0	0	2
CSCI2231	CC	Programming with Java	3	0	0	3
CSCI2251	CC	IT Infrastructure Management	3	0	0	3
CSCI2271	CC	Process Management	3	0	0	3
CSCI2281 CSCI2291 CSCS2301	DSE	**Department Specific Elective** Introduction to Cryptography Mobile Computing Mean Stack Development	3	0	0	3
CSCI2261	PCC	IT Infrastructure Management Lab	0	0	2	1
CSCI2211	PCC	Artificial Intelligence Lab	0	0	2	1
CSCI2241	PCC	Programming with Java Lab	0	0	2	1
	SEC-III	Philosophy	2	0	0	2
Semester Total						**22**

Semester - V

Course Code	Category	Title	L	T	P	C
CSC3101	CC	Introduction to Cognition	3	0	0	3
CSCI3111	CC	Client Relationship Management	3	0	0	3
CSCI3121	CC	Digital Technology	3	0	0	3
CSCI3141	CC	Software Engineering and Testing	3	0	0	3
CSCI3161 CSCI3171 CSCI3181	DSE - II	Department specific elective-II Cyber Security Data Mining DevOps	3	0	0	3
CSCI3131	PCC	Digital Technology Lab	0	0	2	1
CSCI3151	PCC	Software Testing Lab	0	0	2	1
CSCI3191	SEC - II	IT Infrastructure Library	3	0	0	3
XXXXX	PCC	Minor Project Spoken Tutorial / Summer Internship	0	0	4	2
Semester Total						**22**

Semester-VI

Course Code	Category	Title	L	T	P	C
CSCI3211	CC	Fundamentals of Neural Learning	3	0	0	3
CSCI3231	CC	Introduction to Machine Learning	3	1	0	3
CSCI3241	SEC-III	Statistical Computing with R	3	0	0	3
CSCI3261 CSCI3271 CSCI3281	DSE-III	Department Specific Elective-III Introduction to IoT Introduction to Data Analytics Data Center Management	3	0	0	3
CSCS3221	PCC	Neural learning Lab	0	0	2	1
CSCI3251	PCC	Statistical computing with R Lab	0	0	2	1
CSCI3291	PCC	Major Project	0	0	12	8
		Total Semester				22

Total Credits - 122

AECC	Ability Enhancement Compulsory Course
SEC	Skill Enhancement Course
CC	Core Course
PCC	Practical Course
MC	Mandatory Course

B.Sc Computer Science with Cognitive Systems
I SEMESTER
LANG 1011 : COMMUNICATION SKILLS IN ENGLISH

Hours per week: 4 P   **Continuous Assessment: 100 Marks**

Credits: 2

(Communication Skills in English -01)
UNIT-I

Understand the speaker's point of view in fairly extended talks on general or discipline-specific topics, and follow simple lines of argument in discussions on familiar contemporary issues. (Bloom's Taxonomy Level/s: 3)

UNIT-II

Make short presentations on a limited range of general topics using slides, and engage in small group discussions sharing experiences/views on familiar contemporary issues and give reasons for choices/opinions/plans. (Bloom's Taxonomy Level/s: 3 & 4)

UNIT-III

Read and demonstrate understanding of articles and reports on limited range of contemporary issues in which the writers adopt particular stances. Also provide samples of written communication containing fairly complex information and reasons for choices/opinions/stances. (Bloom's Taxonomy Level/s: 2 & 3)

UNIT-IV

Write clear, fairly detailed text (a short essay) on a limited range of general topics, and subjects of interest, and communicate clearly through email/letter to seek/pass on information or give reasons for choices/opinions/plans/actions. (Bloom's Taxonomy Level/s: 3)

UNIT-V

Identifying unfamiliar words from text and exploring their meaning to deduce sentence through contextual clues.

B.Sc Computer Science with Cognitive Systems
I SEMESTER
MATH 1271: LINEAR ALGEBRA

Hours per week: 3 L   End Examination: 60 Marks

Credits:3   Continuous Assessment : 40 Marks

Preamble: This course covers the concepts on theory of matrices and linear operators, bases and vector spaces, orthogonal and symmetric linear operators, eigen values and factorizations of linear operators, solving system of linear equations and apply their knowledge to psychological problems and their formalization in terms of computational methods.

Course Objectives:
- To familiarize the students with the theory of Matrices, main operations and properties of matrices.
- To understand the linear independence, span, basis and properties of Eigen value and Eigen vectors.
- To acquire computational proficiency involving procedures in Linear Algebra.
- To demonstrate the intersection of linear algebra, calculus, and psychology

UNIT - I

Matrix and their Properties: Definition of Matrices, Matrix Multiplication, Algebraic Properties of Matrix Operations, Rank of a matrix by echelon form, solving system linear equations.   (10)

Learning Outcomes:

By the end of this Unit, the student will be able to
- Apply the different algebraic operations on matrices.(L3)
- Find the rank of matrix and know the solution of nature of system of equations. (L2)
- Solve system of homogeneous and non-homogeneous linear equations.(L3)

UNIT - II

Vector spaces and Linear transformation: Vector space, subspace and span of a set, Linear dependence and independence of a set of vectors, basis and dimension, Linear transformation.   (10)

Learning Outcomes:

   By the end of this Unit, the student will be able to
- Know the linear dependence and independence properties of vectors.(L2)
- Find the span of vectors space and dimension of basis.(L2)

UNIT - III

Eigen values, Eigenvectors: Eigen values, Eigenvectors, and their properties, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.   (8)

Learning Outcomes:

After completion of this unit, the student will be able to
- Find the eigen values and eigenvectors of a matrix. (L2)
- Perform diagonalization of a matrix. (L3)

UNIT - IV

Matrix Decompositions: UL Decomposition, Singular value decomposition.   (6)

Learning Outcomes:

After completion of this unit, the student will be able to
- Decompose the matrix into lower and upper triangular matrices. (L2)
- Factorize a matrix, into singular vectors and singular values. (L2)

Numerical linear algebra*:* Gauss elimination with partial pivoting and scaling, Iterative methods for solving linear system of equations.   (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Solve the systems of equations by elementary row operations. (L3)
- Solve the systems of equations numerically by iteration method. (L3)

Suggested Readings:

1. K Hoffman and R Kunze, Linear Algebra, Pearson Education, 2nd Edition, 2005.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

Other Resources:

1. Gilbert Strang , Introduction to Linear Algebra, Fifth Edition, 2016.

2. Gene H. Golub , Charles F. Van Loan , Matrix Computations , Johns Hopkins, 4th Edition, 2015.

3. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

Course Outcomes:

After completion of this course, the student will be able to

1. Carry out matrix operations, including inverses and determinants. (L2)

2. Demonstrate the concepts of vector space and subspace, linear independence, span, and basis. (L2)

3. Determine eigen values and eigen vectors and solve eigen value problems and apply decomposition technique on linear transformations to find the desire results. (L3)

4. Solve systems of linear equations using multiple methods, including Gaussian elimination and iteration method. (L3)

5 .Apply the linear algebra towards modeling of neural and cognitive data and systems. (L3)

B.Sc Computer Science with Cognitive Systems
I SEMESTER
CSCI 1161: PROBLEM SOLVING AND PROGRAMMING WITH PYTHON

Hours per week: 3 L   End Examination: 60 Marks

Credits: 3   Continuous Assessment : 40 Marks

Preamble : The course enhances computational thinking and develops problem solving skills. The function oriented programming and visualization along with data structures in python are introduced.

Course Objectives:

- To introduce problem solving through Flowchart and algorithms.
- To elucidate problem solving through python programming language.
- To introduce function-oriented programming paradigm through Python.
- To outline different concepts of data structures and file handling in Python.
- To demonstrate visualization of data in python.

UNIT - I

Computational Thinking, Algorithms and Flowchart design: Introduction to computational thinking, Introduction to the idea of an algorithm, Pseudo code and Flow charts. Flowchart symbols Input / Output, Assignment, operators, conditional if, repetition, procedure and sub charts. algorithemic problem solving, simple strategies for developing algorithms (iteration, recursion).   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Select flowchart symbols for solving problems. (L1)
- Develop basic flowcharts for performing Input, Output and Computations (L3)
- Problem solving using algorithms (L3)

UNIT – II

Introduction to Python: Features of Python, Python interpreter and interactive mode; Data, Expressions, Statements, values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; control statements, Idiomatic approach to solve programming problems.   (8)

Learning outcomes:

After completion of this unit the student will be able to

- Interpret numbers, strings, variables, operators, expressions and math functions using Python Interactive Mode. (L2)
- Solve simple problems using control structures, input and output statements. (L3)
- Demonstrate best practices of "Idiomatic Python". (L2)

UNIT - III

Functions and Exception Handling: Modules and functions, function definition and use, flow of execution, parameters and arguments, User defined functions, parameters to functions, recursive functions, errors and exceptions, handling exceptions, user defined exceptions.   (8)

Learning Outcomes:

After completion of this unit the student will be able to

- Learn about modular programming using function (L1)
- Develop user defined functions (recursive and non-recursive). (L3)
- Apply exception handling mechanism to identify errors in problem solving (L3)

Data Structures: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; sets, Operations on sets, Dictionaries: operations and methods; Strings. (8)

Learning outcomes:

After completion of this unit the student will be able to

- Summarize the features of lists, tuples, dictionaries, strings and files. (L2)
- Demonstrate use of data structures for efficient storage and retrieval of data during problem solving. (L3)

UNIT - V

File handling and Packages : Text files, reading and writing files, format operator; command line arguments, Numpy - Create, reshape, slicing, operations such as min, max, sum, search, sort, math functions etc. Matplotlib - Visualizing data with different plots, use of subplots, User defined packages. (8)

Learning outcomes:

After completion of this unit the student will be able to

- Read data from files of different formats and perform operations insert, delete, update (L3)
- Manipulate and visualize the data using different standard packages (L4)
- Ability to define packages (L3)

Suggested Readings:

1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Shroff/O'Reilly Publishers, 2016.

2. Reema Thareja, Python Programming: Using Problem Solving Approach, 1st edition, Oxford University Press, 2018.

3. John V Guttag, Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press, 2013.

4. Wes McKinney , Python for Data Analysis, O'Reilly, 2017.

Course outcomes:

After the completion of the course, the student will be able to

1. Develop flowcharts and algorithms to solve the given problems. (L3)
2. Translate algorithms and flowchart to build python programs to solve problems (L3)
3. Utilize different data structures and packages for efficient python programming (L2)
4. Develop visualization and file handling operations using Python (L3)

I SEMESTER

CSCI 1181: OPERATING SYSTEMS

Hours perweek: 3 L   End Examination: 60 Marks

Credits: 3   Continuous Assessment : 40 Marks

Preamble : The course provides a clear description of the concepts that underlie operating systems. The outline of operating system services, processes, process management, and memory management is presented.

Course Objectives:
- To understand the general structure of modern computers, purpose, functions of operating systems.
- To understand concept of process and general CPU Scheduling Algorithms.
- To understand different approaches of memory management.
- To understand the structure and organization of the file system.
- To understand the process of installation, administer and manage Linux and Windows OS.

UNIT – I

Introduction to Operating Systems
- Computer Basics: Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working
- Hardware Basics: Central Processing Unit – I/O Devices-Memory Devices- Secondary storage devices
- Operating System Basics: OS Definition, Functions, OS as a Resource Manager, Types of OS, Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.   (8)

Learning Outcomes:

After completion of this unit the student will be able to
- Understand the basic blocks of a digital computer (L1)
- Understand the evolution, functions of Operating Systems (L1)
- Understand different services provided by the operating system. (L1)

UNIT - II

Process Management:Basic Concepts, Process Scheduling, Operations on Processes, Inter-process Communication, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.   (8)

Learning Outcomes:

After completion of this unit the student will be able to
- Identify the information stored about a process. (L2)
- Explain the goals of CPU Scheduling, difference between pre emptive and non preemptive scheduling algorithms. (L2)
- Understand various CPU Scheduling algorithms. (L1)
- Understand the concept of interprocess communication. (L1)

UNIT - III

Memory Management: Memory Management Strategies, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management, Demand Paging, Page Replacement Techniques and Algorithms.   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Understand the need of memory management.(L1)
- Analyze various memory management algorithms and paging systems. (L3)

UNIT - IV

Storage Management : File Concept, Access Methods, Directory Structure, Protection, Implementing File Systems, File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery(10)

Learning Outcomes:

After completion of this unit the student will be able to

- Understand the function of file systems. (L1)
- Differentiate various file access methods. (L3)
- Understand the directory structure, allocation methods. (L1)
- Understand free space management techniques. (L1)

UNIT – V

Operating Systems:

Introduction to Linux: Versions, Components, Features; Installation of Linux OS, Managing Directories, Managing Files.

Introduction to Windows: Versions, GUI Components, Features; Installation of Client OS and Server OS, Installation of Roles and Features, Managing Users and Groups, Managing Devices and Printers, Storage Management, Managing and Monitoring of Server, Backup & Restoration.

(10 hours)

Learning Outcomes:

After completion of this unit the student will be able to

- Understand the features of Linux and Windows operating system. (L1)
- Install and administer the windows and linux OS. (L3)
- Create users, groups and Manage users, devices. (L3)

Suggested Readings:

1. Silberschatz, A., Galvin, P. B., & Gagne, G. Operating system concepts, Seventh Edition, John Wiley &Sons,2009.
2. Operating System- Neso Academy.
3. Greg Tomsho, "Guide to Operating System", 5th Edition, 2017.

Course Outcomes:

After the completion of the course, the student will be able to

1. Understand the design of operating systems. (L1)
2. Utilize the different file management functions for organization of files and directories. (L4)
3. Evaluate the process management policies and scheduling of processes by CPU. (L2)
4. Describe and analyze the memory management and its allocation policies. (L3)
5. Manage the windows server OS with its different administrative tools. (L3)

CSCI 1141: INTRODUCTION TO INFORMATION TECHNOLOGY

Hours per week: 3 L   End Examination: 60 Marks

Credits: 3   Continuous Assessment : 40 Marks

Preamble : The course deals with introductory concepts in Information technology that includes basics of Computer system, Input output devices, binay codes, Computer Software and World wide web.

Course Objectives:
- To familiarize with the working principle of computers and their components.
- To understand the different types of memory and input/output devices.
- To provide knowledge on different type of representation of information used in computer systems.
- To introduce the computer software systems and their functionality.
- To learn and utilize the World Wide Web.

UNIT - I

Introduction to Computers: Basics of computer, Characteristics of computers, Limitations of computers, System Components, Input devices, Output devices, Computer Memory, Central Processing Unit, Motherboard, Computer Generations, Evolution of computers, Classification of Computers.   (8)

Learning outcome:

After completion of this unit, the student will be able to
- Understand the basics of computer system. (L1)
- Identify the components of computers. (L2)

UNIT - II

Types of Memory- RAM and ROM, Cache memory, Input/output devices: Monitor, Mouse, Keyboard, Disk, joysticks, Printers Types of printers, Scanner, Modem, Video, Sound cards, Speakers, Storage Devices, floppy disk, CD, DVD, Pen drive, trackballs.   (8)

Learning outcome:

After completion of this unit, the student will be able to
- Understand about different types of memory and input/output device. (L1)
- Utilize different types of devices for specified operation depending on requirement. (L3)

UNIT - III

Definition of Information, Difference between data and information, Importance of Binary Number System, Various number systems, Conversion from Decimal to Binary, Conversion from Binary to Decimal, Binary number into Hexadecimal number, Hexadecimal number into binary number, Memory Addressing and its Importance, ASCII and EBCDIC coding System.   (10)

Learning outcome:

After completion of this unit, the student will be able to
- Understand different mechanism of information representation. (L1)
- Demonstrate uses of different type of number system for information coding. (L2)
- Perform conversion of one type of number system to another. (L3)

Introduction to Computer Software: Computer Software, Overview of different operating systems, Overview of different application software, Overview of proprietary software, Overview of open source technologies. Generations of Programming Languages, Characteristics of Programming Languages, Categories of Programming Languages, Popular high level Languages, Factors affecting Programming Languages, Developing Programs, Running a program.   (10)

After completion of this unit, the student will be able to

- Understand the overview of computer softwares. (L1)
- Uses of software for performing specific task. (L3)
- Troubleshoot the software related issues. (L3)

UNIT - V

Internet and Its Working: History of Internet , WWW, Web browsers, Web servers, Hypertext Transfer Protocol, Internet Protocols Addressing, Internet Connection Types, How Internet Works, Internet Security, Uses of Internet, Virus, Antivirus.   (8)

 After completion of this unit, the student will be able to

- Understand the worldwide web, its protocols and its threats. (L1)
- Uses of the world wide web. (L3)
- Protect and troubleshoot the system in case of threats of attack. (L3)

Suggested Readings:

1. Balagurusamy, E., Fundamentals of Computers, Tata McGraw Hill Education Pvt. Ltd, New Delhi.
2. Shelly, Gary B. Introduction to Computers and data processing. Shelley Cashman Series, 2010.
3. Vikas Gupta, Comdex Information Technology Course Tool Kit, Wiley Dreamtech, 2009.
4. ITL Education Solutions limited, Introduction to Information Technology, Pearson Education, 2006.

Course Outcomes:

At the end of the course, students will be able to

1. Work with computer system and its different components. (L4)
2. Demonstrate use of different number systems for information representation. (L2)
3. Use various software tools to perform their requisite tasks. (L3)
4. Work with world wide web and protect their systems from threats. (L4)

B.Sc Computer Science with Cognitive Systems
I SEMESTER
CSCI 1151: IT WORKSHOP

Hours per week: 2 P

Credits: 1   Continuous Assessment: 100 Marks

Internet and World Wide Web (WWW)

Task 1: Web Browsers and Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 2: Search Engines and Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. On completion, the outcome should be demonstrated to the instructor.

Task 3: Cyber Hygiene: Students would be exposed to various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then, they need to customize their browsers to block pop-ups, block ActiveX downloads to avoid viruses and/or worms.

Excel

Task 4: Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent,(FOSS) tool Excel as a Spreadsheet tool.

Task 5: Using Excel: Accessing, overview of toolbars, saving excel files, using help and resources, creating a Scheduler: Features to be covered: Gridlines, Formatting Cells, Summation, Auto fill, Formatting Text.

Task 6: Calculating GPA: Features to be covered: Cell Referencing, Sheet referencing, Formulae in excel: Count, Average, Standard deviation etc., Charts, Renaming and Inserting worksheets, Hyper linking, LOOKUP/VLOOKUP, Sorting, Conditional formatting.

Power Point

Task-7: PPT Orientation: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Task-8: Making interactive presentations: Hyperlinks, Inserting Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Visual Basic for Applications:

Task 9: Create sales dashboard (such as Market wise, Product wise, quarter wise sales) in Excel using VBA code.

 Task 10: Create randomized quiz question paper in Excel using VBA code.

Task 11: Design an attendance tracker using login time of the employee in Excel using VBA code to perform the operation like if employee is late, and then lock the system.

B.Sc Computer Science with Cognitive Systems
I SEMESTER
CSCI 1171: PROGRAMMING WITH PYTHON LAB

Hours per week: 2 P

Credits: 1   Continuous Assessment: 100 Marks

1. Construct flowcharts to
   a. Calculate the maximum, minimum and average of given N numbers.
   b. Develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
2. Construct flowcharts with separate procedures to
   a. Calculate simple and compound interest for various parameters specified by the user.
   b. Calculate the greatest common divisor using iteration and recursion for two numbers as given by the user.
3. Construct flowcharts with procedures to
   a. Generate first N numbers in the Fibonacci series.
   b. Generate N Prime numbers.
4. Design a flowchart to perform Linear search on list of N unsorted numbers.
   (Iterative and recursive)
5. Design a flowchart to perform Binary search on list of N sorted numbers. (Iterative and recursive).
6. Design a flowchart to determine the number of characters and lines in a text file specified by the user.
7. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect Number.
8. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
9. Design a Python script to determine if a given string is a Palindrome by using recursion.
10. Design a Python script to sort numbers specified in a text file using lists.
11. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format (0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
12. Design a Python Script to determine the time difference between two given times in HH:MM: SS format. (0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59).
13. Design a Python Script to find the value of (sine, cosine, Log, PI, e) of a given number using infinite series of the function.
14. Design a Python Script to convert a given number to words.
15. Design a Python Script to generate the frequency of words in a text file.
16. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
17. Design a Python Script to implement Gaussian Elimination method.
18. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average, Sum etc) on the given data.
19. Design a Python program that takes command line arguments a paragraph and find the most frequently occurring word in the provided text.
20. Design a python program that takes two filenames (source and destination file) as arguments and copy the contents of one file to another.

BSc Computer Science with Cognitive Systems
I SEMESTER
CSCI 1191: OPERATING SYSTEMS LAB

Hours perweek: 2 P

Credits: 1   Continuous Assessment: 100 Marks

1. Installation of LinuxOS(CentOS)
    o Explain the steps to Install the Linux OS
    o Demonstrate Working with Directories in Linux(pwd,cd,absoluteandrelativepaths,
       ls,mkdir,rmdir,file,touch,rm,cp.mv,rename, head,tail,cat,tac,more,less,strings,chmod)
    o Demonstrate Working with Files in Linux (ps, top, kill, pkill, bg, fg, grep,
       locate,find,date,cal,uptime,whoami,finger,uname,man,df,du,free,whereis,which)
2. Installation of Windows Client OS
    o Explain the steps to Install the Client OS
    o Installa Virtual Machine with Windows Client OS
3. Managing Windows Client OS
    o Explain the steps to Create Users and Groups
    o Demonstrate the usage of Devices and Printers
    o Demonstrate the usage of Disk Management Console
4. Installation of Windows Server OS
    o Explain the steps to Install the Server OS
    o Install a Virtual Machine with Windows Server OS
5. Managing Windows Server OS
    o Demonstrate how to Install Roles and Features
    o Demonstrate the Usage of Server Storage Management
    o Explain various Management and Monitoring requirements
    o Explain the Backup Types and steps to take Backups

References:
- Lab Requirements–Linux
    o CentOS LinuxISO
- Lab Requirements-Windows
    o Windows10Evaluation –90Days
    o WindowsServer2019Evaluation–180Days
    o WindowsServer2016Evaluation–180Days
    o ExtendWindows10orWindowsServerEvaluationPeriod
- CentOSLinux
    o Installation Guide
    o CentOS Overview
    o Basic CentOS Linux Commands
    o File and Folder Management
- Windows10
    o Windows10–TutorialsPoint
    o Windows10Tutorial
- WindowsServer2016
    o WindowsServer–Channel9
    o Windows Server Administration for Beginners
    o Windows Server2016 Tutorial Stepby StepFull
    o WindowsServer2016AdministrationFullCourse
    o Windows Server deployment, configuration, and administration

Hours per week: 2 L + 1 T

Credits: 2   Continuous Assessment : 100 Marks

Preamble: The course involves the study of internal mental processes all of the things that go on inside your brain, including perception, thinking, memory, attention, language, problem-solving, and learning.

Objectives:

- To introduce students to the basic concepts of the field of psychology with an emphasis on applications of psychology in everyday life.
- To understand the concept of Perception.
- To know the theory of emotions.

UNIT – I

Introduction: What is psychology? Perspectives on behavior; Methods of psychology (special emphasis on experimentation); subfields of psychology; Psychology in modern India.   (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Define what Psychology is?(L1)
- Identify the sub fields of Psychology. (L1)

UNIT – II

Perception: Perceptual processing, Role of attention in perception, Perceptual organization, Perceptual sets, Perceptual constancies, depth perception, distance and movement; Illusions.

Thinking and Language: Mental imagery, concepts, decision making; nature of language, language development.   (10)

Learning Outcomes:

After completion of this unit, the student will be able to

- Understand the Role of Perception. (L1)
- Define Perceptual constancies. (L2)
- Identify the importance of thinking and language. (L1)

UNIT - III

Learning and Motivation: Principles and applications of Classical conditioning, operant conditioning, and observational learning; Learning strategies; Learning in a digital world; Self regulated learning; Perspectives on motivation, types of motivation, motivational conflicts.   (10)

Learning Outcomes:

After completion of this unit, the student will be able to

- Understand the Principles and applications of Classical conditioning. (L2)
- Able to explain learning Strategies. (L1)

UNIT – IV

Memory: Models of memory: Levels of processing, Parallel Distributed Processing model, Information processing, Forgetting, Improving memory.   (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Improve decision making process.(L3)

- Know Memory models.(L1)
- Describe Information Processing. (L3)

UNIT - V

Emotions: Components, theories. (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Identify the process of emotions. (L1)
- Understand the benefits of Identifying Emotions. (L1)
- Explore the theories of emotions. (L3)

Suggested Readings:

1. Baron, R. & Misra. G. (2013). Psychology. Pearson.
2. Chadha, N.K. & Seth, S. (2014). The Psychological Realm: An Introduction. Pinnacle Learning, New Delhi.
3. Ciccarelli, S. K., & Meyer, G. E. (2010). Psychology: South Asian Edition. New Delhi: Pearson Education. Passer, M.W. & Smith, R.E. (2010).
4. Psychology: The science of mind and behavior. New Delhi: Tata McGraw-Hill.

Course Outcomes:

At the end of the course, students will be able to

1. Interpret and respond to the world around. (L3)
2. Identify what constitutes our emotions and our behavioral and physical reactions to them.(L2)

B.Sc Computer Science with Cognitive Systems
II SEMESTER
LANG 1021: ADVANCED COMMUNICATION SKILLS IN ENGLISH
(Communication Skills in English - 02)

Hours per week: 4 P   **Continuous Assessment: 100 Marks**
Credits: 2

UNIT-I

Listen to extended lectures, presentations, and discussions on a wide range of contemporary issues and demonstrate understanding of relatively complex lines of argument. (Bloom's Taxonomy Level/s:

UNIT-II

Make presentations using suitable AV aids and engage in formal group discussions on a wide range of topics of contemporary interest, demonstrating awareness of standard/widely accepted conventions. (Bloom's Taxonomy Level/s: 3)

UNIT-III

Read and demonstrate understanding of the writer's stance/viewpoint in articles and reports on a wide range of contemporary issues and discipline-specific subjects. (Bloom's Taxonomy Level/s: 2 & 4)

UNIT-IV

Write analytical essays on a wide range of general topics/subjects of interest, and engage in written communication (emails/concise reports) to exchange relatively complex information, giving reasons in support of or against a particular stance/point of view. (Bloom's Taxonomy Level/s: 3 & 4)

UNIT-V

Complete a mini project that necessitates the use of fairly advanced communication skills to accomplish a variety of tasks and submit a report in the given format. (Bloom's Taxonomy Level/s: 4 & 5)

B.Sc Computer Science with Cognitive Systems
II SEMESTER
VEDC 1001: VENTURE DEVELOPMENT

Hours per week: 2 L   Continuous Assessment : 100 Marks

Credits: 2

Course Description

In this course, you will discover your deeper self in terms of how you might contribute to society by creating exciting new products and services that can become the basis of a real business. Your efforts, creativity, passion, and dedication to solving challenging problems are the future of our society, both in your country and worldwide.

The course is divided into four sections:

1. Personal discovery of your core values and natural skills
2. Ideation and improving the impact
3. Business model design for the innovation
4. Presenting your idea in a professional manner suitable for a new venture pitch

Each section has key frameworks and templates for you to complete, improving your idea step by step until the final presentation.

First, you will discover your personal values and emerging areas of knowledge that are the foundations of any successful company. Next, you will learn how to develop insight into the problems and desires of different types of target customers and identify the design drivers for a specific innovation. Then, you will learn specific design methods for new products and services. And as important as the product or service itself, it is a strategy for monetizing the innovation – generating revenue, structuring the operating costs, and creating the operating profit needed to support the business, hire new employees, and expand forward.

This project is intended to be for teams of students. Innovation and entrepreneurship are inherently team-based. This course will give you that entrepreneurial experience.

This is the beginning of what might be the most important journey of personal and career discovery so far in your life, one with lasting impact. This is not just a course but potentially an important milestone in your life that you remember warmly in the years to come.

Course Objectives

Students will have the opportunity to:

- Discovery who you are – Values, Skills, and Contribution to Society
- Understand how creativity works and permeates the innovation process
- Learn the basic processes and frameworks for successful innovation.
- Gain experience in actually going through the innovation process.
- Conduct field research to test or validate innovation concepts with target customers.
- Understand innovation outcomes: issues around business models, financing for start-ups, intellectual property, technology licensing, corporate ventures, and product line or service extensions.

Course Materials

- Meyer and Lee (2020), Personal Discovery through Entrepreneurship, The Institute for Enterprise Growth, LLC. Boston, MA., USA
- Additional readings
- Additional videos, including case studies and customer interviewing methods.

B.Sc Computer Science with Cognitive Systems
II SEMESTER
General Elective - I
CSCI 1201 : DESIGN THINKING

Hours per week: 3 L   Continuous Assessment : 100 Marks

Credits: 2

Course Objectives:
- To familiarize product design process.
- To introduce the basics of design thinking.
- To bring awareness on idea generation.
- To familiarize the role of design thinking in services design.

UNIT - I

Introduction to design, characteristics of successful product development, product development process, identification of opportunities, product planning, Innovation in product development.   (8)

Learning Outcomes:

After completing this unit, the student will be able to
- Identify characteristics of successful product development.(L3)
- Identify opportunities for new product development.(L3)
- Plan for new product development.(L3)

UNIT - II

Design Thinking: Introduction, Principles, the process, Innovation in Design Thinking, benefits of Design thinking, design thinking and innovation, case studies.   (10)

Learning Outcomes:

After completing this unit, the student will be able to
- Explain the principles of Design Thinking.(L2)
- Identify the benefits of Design Thinking.(L3)
- Use innovations in Design Thinking.(L3)

UNIT - III

Idea generation: Introduction, Techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Synectics etc, Select ideas from ideation methods, case studies. (10)

Learning Outcomes:

After completing this unit, the student will be able to
- Explain the techniques in idea generation.(L2)
- Select ideas from ideation methods.(L3)
- Identify the methods used in idea generation in some case studies.(L3)

UNIT - IV

Design Thinking in Information Technology, Design Thinking in Business process model, Design Thinking for agile software development, virtual collaboration, multi user and multi account interaction, need for communication, TILES toolkit.   (10)

Learning Outcomes:

After completing this unit, the student will be able to
- Use Design Thinking in business process model.(L3)
- Apply Design Thinking for Agile software development.(L3)
- Use TILES toolkit.(L3)

UNIT - V

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.   (10)

Learning Outcomes:

After completing this unit, the student will be able to

- Use principles of service design. (L3)
- Explain the benefits of service design. (L5)
- Apply principles of technology for service design. (L3)

Suggested Readings:

1. Pahl, Beitz, Feldhusen, Grote – Engineering Design: a systematic approach, Springer, 2007.
2. Christoph Meinel and Larry Leifer, Design Thinking, Springer, 2011.
3. Aders Riise Maehlum - Extending the TILES Toolkit – from Ideation to Prototyping
4. Marc stickdorn and Jacob Schneider, This is Service Design Thinking, Wiely, 2011.

Course Outcomes:

At the end of this course, the student will be able to

- Innovate new methods in product development. (L6)
- Apply Design Thinking in developing the new designs. (L3)
- Select ideas from ideation methods in new product development. (L5)
- Use Design Thinking in developing software products. (L3)
- Apply principles of Design Thinking in service design.(L3)

B.Sc Computer Science with Cognitive Systems
II SEMESTER
General Elective - I
CSCI 1211 : E-COMMERCE

Hours per week: 3 L   Continuous Assessment: 100 Marks
Credits: 2

Preamble: The extensive penetration of computer networks, in particular the Internet, into everyday life has changed the way the business is executed and is now changing the way commerce is conducted. The development of the World Wide Web (WWW) has made access to information easy for the common user. It is now common place for businesses to have a "Web presence" in terms of providing product information and customer service. Some amount of commerce activity has already started on the Internet and expectations are high that it will become a major form of trade and commerce in the future.

Course Objectives:
- To inculcate the technology of E-Commerce.
- To understand the real world business in terms of E-Commerce.
- To nourish with EDI standards.
- To introduce knowledgeable on threats and issues and how to overcome them.

UNIT-I
Electronic Commerce: Frame work, anatomy of e-commerce applcations, e-commerce consumer applications, e-commerce organization applications, consumer oriented electronic commerce, mercantile process model.   (8)
Learning Outcomes:
Upon completion of the Unit, the student will be able to
- Introdce the frame work of E-commerce.(L2)
- Explain the applications of e-commerce.(L3)

UNIT-II
E-Commerce – A Consumer Oriented Approach: Traditional v/s E-Retailing, key success factors in E-Ratailing, Models of E-Ratailing, Characteristics of E-Rataling
E-Services: Categories of E-Services, Web-Enabled Services, Information selling on the web, E-Entertainment, Auctions and specialized services.   (8)
Learning Outcomes:
Upon completion of the Unit, the student will able to
- Understands E-retaining. (L2)
- Acquire knowledge on E-Services.(L2)

UNIT-III
Electronic Data Interchange: EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems.
Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment.   (10)
Learning Outcomes:
Upon completion of the Unit, the student will able to
- Memorize the EDI standards and implementations.(L1)
- Illustrate the EDI technology and barriers.(L2)
- Well illustrate the security breaches of EDI.(L2)
- Understand and implement the electronic payment system.(L1)

UNIT - IV
Security in E Commerce Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.   (10)
Learning Outcomes:

Upon completion of the Unit, the student will able to
- Analyze the security threats that are involved in e-commerce.(L4)
- Finds means of how to defend the security threats involved in web-server, network, proxy server. (L3)

UNIT – V

Issues in E-Commerce Understanding- Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles. Privacy and Information Rights: Information collected at E-Commerce Websites, The Concept of Privacy, Legal protections, Intellectual Property Rights: Types of Intellectual Property protection, Governance. (10)

Learning Outcomes:
Upon completion of the Unit, the student will be able to
- Organize the issues.(L2)
- Analyze the ethical dilemmas. (L3)
- Memorize the candidate ethical principles.(L1)
- Understand the privacy and information rights with relation to e-commerce websites. (L2)
- Implement e-commerce legal protections.(L3)
- Memorize the intellectual property rights. (L1)

Suggested Readings:
1. Henry Chan, Raymond Lee, Tharam Dillon and Elizabeth Chang "Ecommerce Fundamentals and Applications" (chapter 1 : Introduction).
2. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.[Latest Edition Chapter: 10]
3. Dave Chaffey, "E-Business and E-Commerce Management – strategy, Implementation and Practice (Fifth Edition) [Chapter 8]
4. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
5. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
6. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A ManagerialPerspective",
7. Addison-Wesley.
8. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3rd Edition, Pearson Education.

Course Outcomes:
Upon completion of the course, the student will be able to
1. Understand the basic concepts and technologies E-Commerce. (L2)
2. Have the knowledge of e-retailing and e-services involved in E-Commerce. (L2)
3. Understand the processes involved in EDI. (L2)
4. Memorizing the security threat implications of professional practice with E-commerce. (L2)
5. Be aware of the ethical and intellectual property rights involved in E-Commerce. (L2)

B.Sc Computer Science with Cognitive Systems
II SEMESTER
MATH 1281 : PROBABILITY AND STATISTICS

Hours per week: 3 L +1 T   End Examination : 60 Marks

Credits: 3   Continuous assessment : 40 Marks

Preamble: This course is an introduction to Probability and Statistics for cognitive sciences. The objective of the course will be to learn the basic probability distribution and statistical distribution and to use statistical principles to evaluate, interpret and quantify uncertainty. The topics will be divided in three main areas: Probability theory, statistical theory and the linear model. Probability theory will cover axioms of probability, discrete and continuous probability models, law of large numbers and the Central limit theorem. Statistical theory will cover estimation, likelihood theory, hypothesis testing, confidence intervals, elementary design of experiments principles and goodness-of-fit. The linear model theory will cover the simple regression model and the analysis of variance. This course will compensate this technical information using examples drawn broadly from current topics in neuroscience, economics, sports and current events.

Course Objectives:
 The students who succeeded in this course will be able to
- Understand the concept of Probability theory, Bayes Theorem and Application of Bayes Theorem.
- Understand and build the concept of Random variable and probability distribution: discrete and continuous random variables.
- Evaluate problems on discrete and continuous probability distributions.
- Understand the concept of testing hypothesis for large and small samples.
- Translate real-world problems into probability models.
- Explore certain statistical concepts in practical applications neuroscience, economics, sports and current events.

UNIT - I
Probability Theory*:* Axioms of Probability Theory, Counting Rules, Conditional Probability, Bayes' Rule and Independence.   (8)

Learning Outcomes:
By the end of this Unit, the student will be able to
- Define probability and basic probability axiom. (L2)
- Solve the problem using rules of multiplication and addition in probability computation. (L3)
- Understand the concept of condition probability and total probability and will solve the problem using Bayes theorem. (L2)

UNIT - II
Random variables: Definition of random variables, continuous and discrete random variables; cumulative distribution function (cdf) for discrete and continuous random variables; probability mass function (pmf); probability density functions (pdf) and properties; expectation: mean, variance and moments of a random variables.   (8)

Learning Outcomes:
  By the end of this Unit, the student will be able to
- List the difference between discrete random variable and continuous random variables. (L3)
- Describe the basic concepts of probability distributions and its properties. (L2)
- Understand the concept of Expectation. (L2)
- Explore the mean and variance and moments of a random variables. (L3)

UNIT - III
Special Distributions: Binomial Distribution, Poisson Distribution, Hypergeometric Distribution, Normal Distribution, Relation between Binomial, Poisson and Normal distributions, Properties of the Normal distribution, The Law of Large Numbers and the Central Limit Theorem.   (8)

Learning Outcomes:

After completion of this unit, the student will be able to
- Explain Binomial and Poisson distributions. (L2)
- Explain difference between Binomial and Poisson distributions. (L3)
- Explain Hypergeometric distribution. (L3)
- Explain the need of Normal distribution. Explain properties of Normal distribution. (L3)
- Evaluate difference between Binomial, Poisson and Normal distributions. (L5)
- Understand the concept of Law of Large Number and Central Limit Theorem. (L3)

UNIT - IV

Testing of Hypothesis: Procedure of Testing Hypothesis, Standard error and Sampling Distribution, confidence intervals, Estimation, Test of significance large samples, Tests of significance for small samples, Student's t-distribution, Chi-square test, goodness of fit.   (8)

Learning Outcomes:
After completion of this unit, the student will be able to
- Explain the procedure of testing of hypothesis and Evaluate standard error. (L3)
- Explain tests of significance for large samples. (L3)
- Explain tests of significance for small samples. (L3)
- Explain tests of significance for small samples using t-distribution.(L3)
- Explain chi-square test and goodness of fit. (L3)

UNIT - V

Linear Regression: Covariance, Correlation, Sum of Least Squares, Simple linear regression, Assumptions of linear regression, Multiple linear regression.   (8)

Learning Outcomes:
After completion of this unit, the student will be able to
- Explain different types of correlation. (L2)
- List the difference between correlation and regression analysis. (L3)
- Discuss basic concepts of regression analysis. (L2)
- Evaluate the problems on regression lines (X on Y and Y on X) . (L5)
- Demonstrate basic concepts of multiple regression analysis). (L3)

Course Outcomes:
After completion of this unit, the student will be able to
- Apply key concepts of probability, including discrete and continuous random variables, probability distributions, conditioning, independence, expectations, and variances. (L3)
- Define and explain the different statistical distributions (e.g., Normal, Binomial, Poisson) and the typical phenomena that each distribution often describes. (L2)
- Apply the basic rules and theorems in probability including Bayes theorem and the Central Limit Theorem. (L3)
- Define and demonstrate the concepts of estimation and properties of estimators. (L2)
- Apply the concepts of interval estimation and confidence intervals. (L3)
- Apply the concepts of hypothesis testing and p-value.(L3)
- Apply the method of least squares to estimate the parameters in a regression model. (L3)
- Use standard software (e.g., R-Programming) to facilitate statistical analysis. (L3)

Suggested Readings :
1. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Academic Press, (2009).
2. Jay L Devore, Probability and Statistics for Engineering and Sciences,8th Edition, Cengage Learning (2012) .

Other Readings:
D. C. Montgomery and G.C. Runger, Applied Statistics and Probability for Engineers", 5th edition, John Wiley & Sons, (2009).
1. Miller and Freund's Probability and statistics for Engineers, 8th Edition, PHI.
2. Anderson, Sweeney and Wiliams, Statistics for Business and Economics , CENAGE learning.

B.Sc Computer Science with Cognitive Systems
II SEMESTER
CSCI 1221: INTRODUCTION TO COMPUTER NETWORKS

Hours per week: 3 L   End Examination: 60 Marks

Credits: 3   Continuous assessment: 40 Marks

Course Objectives:

- To understand the network architecture and protocols.
- To build a foundation in computer network concepts like Bandwidth Utilization and Multiplexing.
- To familiarize the students with IP Addressing concepts .
- To acquaint the student with the Routing algorithms .
- To enable the student to learn the concept of wide area networks and wireless networks.

UNIT – I

Need of Network**:**Network classifications LAN, MAN, WAN, Data and signals analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth, Transmission impairements - attenuation, distortion and noise, Data Communication protocols & standards, Network models - OSI model layers and their functions, TCP/IP protocol suite.   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Understand different types of network technologies. (L1)
- Explain different types of signals and protocols . (L2)
- Illustrate different layered approaches of OSI and TCP/IP models. (L2)

UNIT - II

Bandwidth Utilization and Multiplexing: Multiplexing - FDM, TDM , Spread spectrum Frequency hopping spread spectrum, Direct sequence spread spectrum , Transmission media - guided and unguided media, Switching message, circuit and packet switched networks, Datagram networks and virtual circuit networks.   (8)

Learning Outcomes:

After completion of this unit the student will be able to

- Explain the Multiplexing concepts (L2)
- Explain the different types of spread spectrum and Transmission Media . (L2)
- Describe about different switching and Data Grams. (L2)

UNIT – III

IP Addressing: IP Addressing Version 4 – IP Addressing Version 6, Subnetting Advanced VLSM - Switch Basic, VLAN - VTP /CDP - Subnetting Basic Version 4, Network Quiz - Routing Static.   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Discuss about IP Addressing. (L2)
- Describe about VLSM and related Concepts (L3)

UNIT - IV

Routing algorithms – Congestion Control Algorithms, CISCO IOS / Managing / Password recovery, Routing Dynamic Routing protocols OSPF RIP EIGRP, Network Advanced Routing Dynamic Routing protocols – OSPF RIP EIGRP**.**   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Describe about the Routing Concepts and Protocols. (L2)

- Describe about Congestion Control Algorithms. (L3)

UNIT - V

Overview of Access Control List, Network Address Translation, Wide Area Networks, Wireless Networks .   (10)

Learning Outcomes:

After completion of this unit the student will be able to

- Describe the Access Control List, Network Address Translation. (L2)
- Describe about Wide Area Networks, Wireless Networks. (L3)

Recommend Books:

1.B A Forouzan, Data Communications and Networking, 4th Ed,, M C Graw Hill Publications.
2.David J.Wetherall, Andrew S.Tanenbaum, Computer Networks , 5th Edition, Pearson Education, 2012.

Course Outcomes:

After completion of this course the student will be able to

1. Learn about different networks, signals, transmission, data grams and virtual Networks. (L2)
2. Experiment with various multiplexing and Transmission Media Issues . (L4)
3. Develop applications with IP4 addressing and related concepts . (L6)
4. Construct small applications with dynamic routing and congestion control algorithms . (L6)
5. Utilize various wide area networks and wireless networks. (L3)

B.Sc Computer Science with Cognitive Systems
II SEMESTER
CSCI 1241 : PROGRAMMING WITH C++

Hours per week: 3 L

End Examination : 60 Marks

Credits: 3

Continuous assessment : 40 Marks

Course Objectives:
- To teach the student the concepts of object oriented and generic programming.
- To differentiate between object oriented programming and procedural programming.
- To design applications using object oriented features.
- To teach the student to analyze problems and implement simple C++ applications using an object oriented approach.

UNIT - I

Concepts of Object Oriented programming: Object oriented paradigm, Basic concepts of Object Oriented Programming, Differences between Object Oriented Programming and Procedure oriented programming.

Overview of OOP Principles: Encapsulation, Inheritance and Polymorphism. Benefits of OOP. Structure of a C++ program, Program structure, namespace, Data types, identifiers, variables, constants, enum, operators, typecasting, control structures & loops.   (10)

 Learning Outcomes:

After completion of this unit students will be able to
- Understand the differences between object oriented programming and procedure oriented programming. (L2)
- Construct loops in C++. (L3)
- Explain programming fundamentals, including statement and control flow and recursion. (L1)

UNIT - II

Functions, Classes and Objects: Introduction of Classes, Class Definition, Defining a Members, Objects, Access Control, Class Scope, Scope Resolution Operator ,Inline functions, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Default Arguments, Function Overloading, Friend Functions.   (10)

 Learning Outcomes:

After completion of this unit students will be able to
- Program using objects and data abstraction, class, and methods in function abstraction. (L2)
- Apply the concepts of class, method.(L3)
- Program with inline function, friend function.(L4).

UNIT - III

Constructors, Destructors, Inheritance: Introduction to Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic initialization of Objects, Copy Constructors, Dynamic Constructors, Destructors.

Inheritance : Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi-Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Abstract Classes, Constructors in Derived Classes, Operator overloading, Rules for Operator overloading, overloading of binary and unary operators.   (10)

Learning Outcomes:

After completion of this unit students will be able to
- Apply the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading.(L3)

- Identifies base and derived classes.(L2)
- Distinguishes constructors, default constructor.(L3)

UNIT - IV

Pointers, Virtual Functions and Polymorphism: Introduction, Memory Management, new Operator and delete Operator, Pointers to Objects, this Pointer, Pointers to Derived Classes, Polymorphism, compile time polymorphism, Run time polymorphism, Virtual Functions, Pure Virtual Functions, Virtual Base Classes, Virtual Destructors. (10)

Learning Outcomes:

After completion of this unit students will be able to

- Program using memory management concept. (L3)
- Understand polymorphism(compile time and run time) (L3)
- Develop programs with virtual functions. (L4)

UNIT - V

Templates and Exception handling: Introduction, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Member Function Templates.

Basics of Exception Handling, Types of exceptions, Exception Handing Mechanism, Throwing and Catching Mechanism, Re throwing an Exception, Specifying Exceptions. (8)

Learning Outcomes

After completion of this unit students will be able to

- Learn about generic programming. (L1)
- Develop template programming using function and class templates. (L3)
- Understand exception handling concept. (L2)

Suggested Readings:

1. Mastering C++ by K.R.Venugopal., published by Tata McGraw- Hill.
2. Object Oriented Programming in C++ by E.Balagurusamy., published by Tata McGraw-Hill.

Other Readings:

1. C++ Complete reference, Herbart Sheildit

Course Outcomes:

After the completion of the course, students will be able to

- Develop simple C++ programs using object oriented concepts. (L1)
- Understand and apply different concepts like abstraction, encapsulation , inheritance , overloading.(L3)
- Develop generic programming using class and function templates.(L3)
- Utilize exceptional handling methodology while developing C++ programming.(L4)

CSCI 1251 : PROGRAMMING WITH C++ LAB

Hours per week: 2 P   Continuous Assessment : 100 Marks

Credits: 01

1. Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.

2. Write a Program to Implement a Class STUDENT having the Data members Member functions to Assign Initial Values to student name, assign Marks of the student to Compute Total, Average to Display the Data.

3. Write a Program to Demonstrate the Operator Overloading.

4. Write a Program to Demonstrate the Function Overloading.

5. Write a Program to Demonstrate Friend Function and Friend Class.

6. Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.

7. Write a Program to Generate Fibonacci Series by using Constructor to Initialize the Data Members.

8. Write a Program to Demonstrate Multiple Inheritances.

9. Write a Program to Invoking Derived Class Member through Base Class Pointer.

10. Write a Template based Program to Sort the given list of elements.

11. Write a Program to Demonstrate the Catching of all exceptions.

12. Write a Program Containing a possible Exception. Use a Try block to throw it and a catch block to handle it properly.

B.Sc Computer Science with Cognitive Systems
II SEMESTER
CSCI 1231 : COMPUTER NETWORKS LAB

Hours per week: 2 P   Continuous Assessment: 100 Marks

Credits: 1

- Demonstrate Basic Switching Concepts
- Demonstrate VLAN
- Demonstrate Routing
- Demonstrate Dynamic Routing Protocols
- Demonstrate Static Routing Protocols.

Hours per week:3 L

Credits:2   **Continuous Assessment: 100 Marks**

Preamble: This course contains a rich selection from Hindi poetry and prose. Grammar and translations from official language are also included.

COURSE OBJECTIVES

1) To enlighten students about the richness and value of the national language
2) To offer working knowledge of Hindi to the students.

SYLLABUS

गद्य विभाग (Prose Detailed Text)

1. ईर्ष्या, तू न गई मेरे मन से   - रामधारी सिंह 'दिनक   **2. अतिथि**
                                        - राम विलास शर्मा

3. मेरी रुमाल खो गई   - विद्यानिवास मिश्र

                                                                                उपवाचक

विभाग (Non Detailed Text)

1. पुरस्कार   - जयशंकर प्रसाद
2. सदाचार का तावीज   - हरिशंकर परसाई
3. हार की जीत   - सुदर्शन

व्याकरण विभाग

I. निर्देश के अनुसार वाक्यों को बदलकर लिखिए
(Rewriting of sentences as directed)

1. कारक (case)
2. लिंग (gender)
3. वचन (number)
4. वाच्य (voice)

II. वाक्य प्रयोग (make your own sentences)

COURSE OUTCOMES

1) The student learns reading and writing Hindi
2) Understands and learns proper use of Grammar
3) Develops communication Skills.

TEXT BOOK

1. Prose Text: Dr. Ajaya Kumar Patnaik, **Gadya Gaurav**, Sonam Prakashan, Badamdadi, Cuttak.

2. Non, Detailed Text: Dr. Gulam Moinuddin Khan, **Charchit Kahaniyan**, Shabnam Pustak Mahal, Badamdadi, Cuttak.Text: Dr.T.Nirmala & Dr. S. Mohan, Padya Manjari, Rajkamal Prakashan, New Delhi.* Latest Editions

Prepared at: Hyderabad campus

B.Sc Computer Science with Cognitive Systems
III SEMESTER
GERMAN

Hours per week:3 L
Credits:2   **Continuous Assessment: 100 Marks**

Course Objectives:

- To introduce basic knowledge about the German language.
- To encourage preliminary conversation in German.
- To educate basic grammar, speaking & reading skills in German.

UNIT 1: Introduction to the German language, grammar, and pronunciation.
Language: Greetings; introducing oneself,
Grammar: The nouns, gender distinctions, cases, definite and indefinite articles.

UNIT 2: Language: Framing questions Grammar: Conjugation of verbs,
Modal verbs.

UNIT 3: Language: Talking about family and friends;
Grammar: Personal pronouns,

UNIT 4: Language: Talking about places
Grammar: Cases: nominative, accusative, dative.

UNIT 5: Language: Making requests and commands;
Grammar: Imperative sentences

Course Outcomes:
Students are equipped to listen to and understand the German language.
Sufficient skills to converse in the German language are established.

Recommended Books:
1. Deutsch als Fremdsprache IA Grundkurs
2. Ultimate German Beginner - Intermediate (Coursebook), Living Language, 2004.
3. Paulina Christensen, Anne Fox , Wendy Foster: German For Dummies

Prepared at: Hyderabad campus

Hours per week:3 L

Credits:2   **Continuous Assessment: 100 Marks**

Preamble:

This course focuses on educating the learner as to the basic rules of French grammar. The student will be equipped to write grammatically correct sentences with the help of appropriate vocabulary.

Course Objectives

- To understand basic grammar for sentence formation.
- To introduce basic French vocabulary.
- To enhance pronunciation.
- To encourage sentence formation.
- To encourage practical usage of the language.

UNIT – I

Alphabets, numbers, self-introduction. Grammar: Verbs 'Avoir' and 'Etre', definite and indefinite articles. Vocabulary: Greetings, countries and nationalities.

Learning Outcomes:

After Completion of the unit, the student is able to

- Understand how to state quantity of any objects. (L3)
- Introduce oneself in a formal or informal setting. (L3)
- Tell greetings of courtesy and politeness.(L3)
- Understand the names of countries in French. (L3)
- Understand the gender of nouns.(L3)

Pedagogy tools: Audio clips, Self-reading, Group discussion.

UNIT – II

Asking or telling time, dialogue at shop. Grammar: Conjugation of verbs in present tense, negative sentences. Vocabulary: Fruits and vegetables, family. (14)

Learning Outcomes:

After Completion of the unit, the student is able to

- Understand how to state quantity of any objects. (L3)
- Introduce oneself in a formal or informal setting.(L3)
- Tell greetings of courtesy and politeness. (L3)
- Understand the names of countries in French. (L3)
- Understand the gender of nouns.(L3)

Pedagogy tools: Audio clips, Self-reading, Group discussion.

UNIT – III

Giving directions, expressing wants or needs. Grammar: Reflexive verbs, 'Vouloir', 'Pouvoir', 'Devoir', 'Falloir'. Vocabulary: Prepositions, colours. (14)

Learning Outcomes:

After Completion of the unit, the student is able to

- Understand the conjugation of reflexive verbs. (L3)
- Express dreams and ambitions. (L3)
- Develop an aptitude for finding places in a foreign country. (L3)
- Express needs. (L3)
- Indicate the colour of objects.

Pedagogy tools: Audio clips, Self-reading, Group discussion

UNIT – IV

Expressing feelings, Grammar: Conjugation of 'Aller', conjugation of irregular verbs. Vocabulary: Adjectives of quality, seasons.(5)

Learning Outcomes:

After Completion of the unit, the student is able to

Describe about nature and environment. (L3)

Express thoughts and feelings.(L3)
Increase the possibilities for describing activities.(L3)
Explain about travel plans. (L3)
Describe hobbies.(L3)
Pedagogy tools: Audio clips, Self-reading, Group discussion

UNIT – V

Grammar: Parts of speech, degrees of comparison. Vocabulary: Conjunctions,
Clothes, French music, films and books. (10)
Learning Outcomes:
After Completion of the unit, the student is able to

- Identify different parts of speech in a text. (L3)
- Effectuate a comparison between objects. (L3)
- Describe the clothing and appearance of a person. (L3)
- Increase the range of expression by joining simple sentences. (L3)
- Acquire basic knowledge about popular French media and celebrities. (L3)

Text Books :
Saison 1 Textbook
Saison 1 Workbook

Hours per week: 3 L   **End Examination: 60 Marks**

Credits: 2   **Continuous Assessment : 40 Marks**

Preamble:

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique.

Course Objectives:

- To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
- To state constraint optimization problems.
- To explain linear programming technique to an optimization problem.
- Define slack and surplus variables, by using Simplex method.
- To state transportation and assignment problem as a linear programming problem.
- To determine optimality conditions by using Simplex method.
- To explain optimal solutions for sequencing problems with n jobs.

UNIT-I

Linear Programming: Linear Programming Problem (LPP), Mathematical Formulation, Graphical method of solution of LPP with two variables, Basic solutions, General LPP, Canonical and Standard forms of LPP.(8)

Learning Outcomes:

At the end of the unit, the student is able to

- Define an objective function and constraint functions in terms of design. (L2)
  variables, and then state the optimization problem.(L2)
- State constraint optimization problem.(L2)
- Define basic solutions of a LPP.(L2)

UNIT-II

Simplex Method: Simplex Method, Artificial variables, Big-M and Two-phase simplex Methods, Degeneracy in Linear Programming.(6)

Learning Outcomes:

At the end of the Unit, the student is able to

- Explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.(L3)
- Explain Big-M method. (L3)
- Explain Two-phase simplex method. (L3)
- Explain degeneracy in Linear Programming. (L3)

UNIT-III

Duality in Linear programming: Introduction, Formulation of a dual problem, Properties of duality, Application of duality to solve LPP, Dual simplex method.(6)

Learning Outcomes:

At the end of the Unit, the student is able to

- Formulate dual problem. (L3)

- Explain properties of duality. (L3)
- Explain application of duality to solve Linear programming problem. (L3)
- Explain dual simplex method. (L3)

UNIT-IV

Transportation and Assignment Problems: Introduction and LP formulation of Transportation Problem, Methods to find Initial basic feasible solutions of transportation problem, Transportation Algorithm (MODI Method) to obtain optimal solution. Assignment problem- Mathematical formulation, Hungarian Method of solution. (8)

Learning Outcomes:

At the end of the Unit, the student is able to
- State transportation and assignment problem as a linear programming. (L2)
- Determine optimal assignment using Hungarian method. (L3)
- Determine optimal allocation for transportation problem using MODI algorithm. (L3)

UNIT-V

Sequencing Problem: Introduction, Basic terminology, Algorithms to obtain optimal solutions for sequencing problems with n jobs and two, three and m machines.

Learning Outcomes:

At the end of the Unit, the student is able to
- Explain basic terminology in sequencing problem. (L2)
- Determine optimal sequencing for n jobs and 2/3/m machines. (L3)

Course Outcomes:

On successful completion of this course, students will be able to
- Formulate real world problems into constraint optimization problems.(L4)
- Explain linear constraint optimization using simplex method .(L3)
- Explain Big-M method and Two-phase simplex method.(L3)
- Explain application of duality to solve Linear programming problem.(L3)
- Explain dual simplex method.(L3)
- Model transportation and assignment problem as a linear programming Problem and their optimal solutions.(L4)
- Explain optimal solutions for job sequencing problems.(L3)

Text Book :

1. Operations Research by S.D Sharma, Kedarnath, Ramnath& Co.

Reference books:

1. Operations Research by Kanti Swarup, P.K Gupta and Manmohan, Sultan Chand and Sons.
2. Operations Research: An Introduction by Hamdy A Taha, Pearson Education.
3. Operations Research: An Introduction by H.M. Wagner, Prentice Hall of India.
4. Linear Programming by G. Hadley Narosa Book Distributors.
5. Linear Programming by Gass, McGraw Hill.

III SEMESTER
Generic Elective – II
CSCI2131 Web Technologies

Hours per week: 3 L   **End Examination: 60 Marks**

Credits: 2   **Continuous Assessment : 40 Marks**

Preamble:

This course enables the students to associate with Website Development for hosting via intranet or internet. The web development process includes web design, web content development, client- side scripting, server-side scripting. Web development is the coding or programming that enables website functionality as per the owner's requirements.

Course Objectives:

- Design static web pages using Markup languages.
- Design and implement web applications using style sheets.
- Use of java script for designing web applications with dynamic effects.
- Validations on form input entry and adding dynamic content to web applications.
- Design and implementation of complete applications over the web.

UNIT-I

Internet Basics: Basic Concepts, Communicating on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP address, Transmission Control protocols.

Overview of HTML5 and Other Web Technologies: HTML5 and its Essentials, New Features of HTML5, Structuring an HTML Document-Elements and Attributes, Tags, The DOCTYPE Element, Exploring Editors and Browsers Supported by HTML5, Creating, Saving, Validating ,Viewing a HTML Document, Hosting Web Pages.

Fundamentals of HTML: Understanding Elements, Describing Data Types, Horizontal Rules, Line Breaks, Paragraphs, Citations, Quotations, Definitions, Comments, Working with Text, Organizing Text in HTML, Exploring Hyperlinks, URL, Understanding and Describing the Table Elements, Inserting Images, Exploring Colors. (12)

Learning Outcomes:

After completion of this unit, student will be able to

- Understand how internet works and how connection is established between web browser and server.(L2)
- Understand various steps to design static websites.(L2)
- Identify the importance of HTML tags for designing webpage.(L2)

UNIT – II

Working with Forms: Exploring the FORM element, Types of INPUT Element, Exploring Button, Multiple Choice, Text Area, Label, Fieldset, Legend, Datalist, Keygen, Output elements, submitting a Form.

Working with Multimedia: Exploring Audio and Video File Formats, Describing the Multimedia elements, defining a Multimedia File Using the EMBED, OBJECT Element, Exploring the FIGURE and FIGCAPTION Elements. (8)

Learning Outcomes:

After completion of this unit, student will be able to

- Develop a static web page along with user interactive elements.(L3)

- Design web pages with multimedia elements such as audio, video, etc.(L3)

UNIT – III

Overview of CSS: Evolution, Syntax of CSS, Exploring CSS selectors, Inserting CSS in a HTML Document, Exploring Background, Color, Font Properties of a Webpage, Properties Table: Using the style Attribute, Creating Classes and IDs, Generating External Style Sheets, Typography, Consistency, Types of styles, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: Font Vs CSS, changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning. (8)

Learning Outcomes:

After completion of this unit, student will be able to

- Separate design from content using various levels of Style Sheets. (L4)
- Learn different types of style sheets.(L2)

UNIT – IV

Introduction to JavaScript: JavaScript in web pages, The Advantages of JavaScript, Writing JavaScript into HTML, Basic Programming Techniques, Operators and Expressions in JavaScript, JavaScript Programming Constructs, Conditional Checking, Super controlled-endless loop Functions in JavaScript, User defined functions, Placing text in a Browser, Dialog Boxes. (8)

Learning Outcomes:

After completion of this unit, student will be able to

- Use Java script to validate user input and perform dynamic documents.(L4)
- Design dynamic and interactive web pages by embedding Java script code in HTML.(L3)

UNIT – V

PHP: Introducing PHP, History, Unique Features, Basic Development Concepts, Creating First PHP Script, Mixing PHP with HTML, Escaping Special Characters, Using Variables and Operators, Controlling Program Flow, Working with Arrays.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories. (8)

Learning Outcomes:

After completion of this unit, student will be able to

- Understands the components of PHP.(L2)
- Learn the basic constructs of PHP, built in functions.(L1)
- Learn the importance of PHP for web application development. (L1)

Course Outcomes:

Upon completion of this course, student will be able to:

- Demonstrate the importance of HTML & DHTML tags for designing web pages and separate design from content using Cascading Style Sheet.(L3)
- Understand various steps to design dynamic websites. (L2)
- Design interactive web pages with client and server side scripting.(L3)
- Apply validations on user input using java script.(L3)
- Understands the PHP framework and develop a reusable component. (L2)

Text Books:

1. HTML 5 Black Book , CSS 3, Java Script, XML, XHTML, AJAX, PHP and Jquery by DT Editorial Services, , Dream Tech Press, 2nd Edition,2016.
2. Web Enable Commercial Application Development Using HTML, Javascript, DHTML and PHP by Ivan Bayross, BPB Publications, 4th revised edition, 2010 .
3. PHP: A Beginner's Guide by VikramVaswani, Tata McGraw Hill,2017.

Reference Books:

1. Complete Reference HTML by T. A. Powell, 3rd edition, TMH,2003.
2. The Complete Reference - PHP by Steven Holzner, Tata McGraw Hill,2008.
3. Web Technology and Design by Xavier, C, New Age International,2013.

Hours per week: 3 L   **End Examination: 60 Marks**

Credits:3   **Continuous Assessment : 40 Marks**

Preamble:

The course enables the students to adapt eco-centric thinking and actions rather than human-centric thinking on natural resources, their utilization and conservation. The course also focuses on the importance of ecosystems, biodiversity and their degradation that led to pollution. This course helps in finding solutions through application of control measures to combat pollution and legal measures to achieve sustainable development.

Course Objectives:

- To impart knowledge on natural resources and its associated problems.
- To familiarize learners about ecosystem, biodiversity, and their conservation.
- To introduce learners about environment pollution.
- To acquaint learners on different social issues such as conservation of water, green building concept.
- To make learners understand about the present population scenario, its impacts and role of informational technology on environment and human health.
- To make learners understand about the importance of field visit.

UNIT-I

Multidisciplinary nature of environmental studies & Natural Resources: Multi disciplinary nature of environmental studies Definition, scope and importance. Need for public awareness. Natural resources and problems associated, Use and over exploitation of Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources. Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.

Activity:

1. Planting tree saplings.
2. Identification of water leakage in house and institute-Rectify or report.

Observing any one day of a week as Car/bike/vehicle free day.

3. Planting tree saplings.
4. Identification of water leakage in house and institute-Rectify or report.

Observing any one day of a week as Car/bike/vehicle free day.

Learning Outcomes:

At the end of the Unit, the student is able to

- List different natural resources and their uses. (L1)
- Relate how the over-exploitation of natural resources impact human life .(L1)
- Find the role of an individual in the conservation of natural resources . (L2)
- Recall the demand of potable water in a community.(L1)
- Explain the equitable use of natural resources for sustainable lifestyles.(L2)

Pedagogy tools: Blended learning, Case let, video lectures, self-reading

UNIT-II

Ecosystem and biodiversity Ecosystem: Structure components of ecosystem: Biotic and Abiotic components. Functional components of an ecosystem: Food chains, Food webs, Ecological pyramids, Energy flow in the ecosystem (10% law), Ecological succession. Biogeochemical cycle: (Nitrogen, carbon, Phosphorus cycle).

Biodiversity: Definition, Bio-geographical classification of India, **Values of biodiversity**: consumptive use, productive use, social, ethical, aesthetic and optional values. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching, man wildlife conflicts. Conservation of biodiversity: In – situ and Ex-situ Activity.

1. Visit to Zoological Park-Noting different ecosystem.
2. Biodiversity register- Flora and fauna in the campus.

Learning Outcomes:

- Demonstrate how ecosystem functions.(L2)
- Summarize the structure and function of terrestrial and aquatic ecosystems.(L2)
- Explain the values and threats to biodiversity.(L2)
- Identify the importance of conservation of biodiversity. (L3)

  Pedagogy tools: Blended learning, Case let, video lectures, self-reading.

UNIT-III

Environmental Pollution-Definition Causes, effects, and control measures of Air pollution. Water pollution, Soil pollution, Marine pollution, Noise pollution, Nuclear hazards. Solid waste Management: Causes, effects, and control measure. Role of an individual in prevention of pollution, Pollution case studies.

Activity

1. Visit to treatment plant and documentation.

Documentation of segregation of solid waste-Dry and Wet.

Learning Outcomes:

After completion of this unit, the student will be able to

- Identify causes, effects, and control measures of pollution (air, water & soil). (L3)
- Choose different types of pollutants.(L3)
- Experiment with the pollution related case studies.(L3)
- Solve solid waste issues but appropriate management techniques.(L3)
- Analyse the role of an individual in prevention of pollution.(L4)

  Pedagogy tools: Blended learning, Case let, video lectures, self-reading

UNIT-IV

Social Issues and the Environment-From Unsustainable to Sustainable Development Urban problems related to energy. Water conservation, rainwater harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns related to mining, dams, Case Studies. Environmental ethics: Issues and possible solutions, Green building concept, Role of remote sensing and GIS in ground water exploration.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case Studies, Wasteland reclamation.

Activity:

1. Observing zero hour at individual level-documentation.
2. Eco friendly idols.

Rainwater harvesting-creating storage pits in nearby area.

Learning Outcomes:

- Examine different water conservation methods.(L2)
- Survey remote sensing and GIS methods in exploration of ground water.(L4)
- Function of green building concept.(L4)
- Discover the consequences of global warming, acid rains and ozone layer depletion.(L4)
- Improve wasteland reclamation.(L5)

Pedagogy tools: Blended learning, Case let, video lectures, self-reading

UNIT-V

Human Population and the Environment and Environment Protection Act and Field Work- Population growth, variation among nations, Family Welfare programme, Environment and human health, HIV/AIDS, Human rights, Value Education. Women and Child Welfare, Role of Information Technology in Environment and human health, Environment Legislation, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act. Wildlife Protection Act, Forest Conservation Act, Environmental Protection Act, Issues involved in enforcement of environmental legislation, Public awareness Activity.

1. Visit to a local polluted site-industry/agriculture

Identify diseases due to inappropriate environmental conditions.

Learning Outcomes:

- Predict population growth and variation among nations. (L4)
- Adapt value education. (L5)
- Discuss women and child welfare. (L5)
- Theorize different environmental legislation acts and issues involved in enforcement of legislation. (L5)
- Justify the role of information technology in environment and human health.(L5)
- Theorize different environmental legislation acts and issues involved in enforcement of legislation.(L5)

Pedagogy tools: Blended learning, Case let, video lectures, self-reading.

Text Books:

1. Textbook of environmental studies for undergraduates courses by ErachBharucha, Universities Press, India Private Limited. 2019.
2. Perspectives in Environmental Studies by KaushikA and KaushikC.P.. New Age International Publishers Edition-VI. 2018.
3. Textbook of Environmental Studies by Dave D Katewa S.S., 2nd Edition. Cengage Learning India. 2012.

Additional Reading

1. Textbook of Environmental Studies by Benny Joseph, 3rd edition, McGraw Hill Publishing company limited. 2017.

Reference Book(s):

1. Environmental Science: Systems and Solutions by McKinney M.L., Schoch R.M., Yonavjak L. MincyG.. Jones and Bartlett Publishers. 6th Edition. 2017.
2. Environmental Science: Earth as a Living Planet byBotkin D.B. John, Wiley and Sons. 5th edition. 2005.

Journal(s):

1. https://www.tandfonline.com/loi/genv20
2. https://library.lclark.edu/envs/corejournals

Website(s):

https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

	Programme Objectives (POs)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												2		
CO2		2				1							2		
CO3			1						1					1	
CO4				2							2				1
CO5	1													1	
CO6					2							1			1

1-Low, 2-Medium and 3-High Correlation

CSCI2141 Data Structures with C++

Hours per week: 3 L   **End Examination: 60 Marks**

Credits:3   **Continuous Assessment : 40 Marks**

Preamble:

Data Structures aids the students to implement real world problems that will be used in operating systems, compliers design, computer networks, cyber security etc. Students will learn about different data structures and perform operations on data structures like insertion, deletion, updation and retrieval data. This course will master the implementation of stacks, queues, linked lists, binary trees, graph algorithms such as shortest path and minimum spanning tree.

Course Objective:

- To understand the linear and nonlinear data structures available in solving problems.
- To know about the sorting and searching techniques and its efficiency.
- To use the data structures and algorithms in real time applications.
- To be able to design own data structure according to the application need.

UNIT–I

Introduction to Data Structures: Introduction to Data Structures, Types of Data Structures, Space Complexity, Arrays and Operations on arrays (Insert, Delete, Update Elements).

Analysis of Algorithms: Time Complexity and its notation, Algorithm Analysis, Structured Approach to Programming, Recursion. (10)

Learning Outcomes:

After completion of this unit, the student will be able to

- Understand the concept of Dynamic memory management. (L2)
- Understand different types of Data Structures. (L2)
- Understand algorithms, Different Time Complexity notations, Recursion Techniques. (L2)

UNIT–II

Stacks: Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Applications of Stacks.

Queues: Introduction, Queue as an Abstract data Type, Representation of Queues through arrays, Circular Queues, Application of Queues. (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Define the concept of Stack. (L1)
- Develop a stack using an array. (L3)
- Develop a stack using a linked list. (L3)
- Define the concept of queue. (L1)
- Compare pros and cons of arrays and linked lists to implement stacks and queues. (L4)

UNIT-III

Linked Lists: Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Single Linked List and its Operations(insert, deletion, updation), Representation of Stacks, queues through Linked Lists. (8)

Learning Outcomes:

After completion of this unit, the student will be able to

- Define Linked List. (L1)
- Implementation of Dynamic Memory Allocation. (L3)

- Design programs using a variety of data structures such as Linked List. (L3)

UNIT– IV

Binary Trees: Introduction to Non- Linear Data Structures, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Binary Search Tree, Representation of Binary Search Trees, Operations on a Binary Search Tree, Binary Tree Traversals.

Learning Outcomes: (10)

After completion of this unit, the student will be able to

- Understanding of Tree Structures. (L1)
- Types of Trees and Implementations. (L2)
- Implementation of Tree Traversals. (L3)

UNIT–V

Searching and sorting: Searching – An Introduction, Linear or Sequential Search, Binary Search. Sorting – An Introduction, Bubble Sort, Insertion Sort, Selection Sort.

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, and Application of Graphs. (10)

Learning Outcomes:

After completion of the unit, the student is able is

- Understanding Searching and Sorting Algorithms. (L1)
- Implementation of Search and Sorting Algorithms. (L2)
- Understanding Graphs. (L1)
- Implementation of Graph Applications. (L3)

Course Outcomes:

Upon completion of the course, the student is able to

- Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. (L2)
- Perform operations on Array. (L3)
- Understand and implementing basic data structures stacks and queues. (L2)
- Design programs using a variety of data structures Linked List. (L3)
- Design programs using a variety of data structures such as binary trees, binary search trees, (L3)
- Analyze and implement of Sorting and Searching Techniques. (L4)
- Analyze and implement graph algorithms. (L4)

Text Books:

1. Data Structures using C++ by Varsha H.Patil, Oxford University Press, 2012.

Reference Books:

1. Data Structures Algorithms and Applications in C++ by Sartaj Sahani, University Press, 2nd Edition, 2011.

2. Data Structures Using C and C++ by Yedidyah Langsam, Moshe J Augenstein and Aaron M Tenenbaum, PHI, 2nd Edition, 2009.

3. Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss, Pearson Education, 3rd edition, 2007.

4. Data Structures and Algorithms in C++ by Adam Drozdek, Cengage Learning, 4th Edition, 2013.

III SEMESTER

CSCI2161 Fundamentals of Cloud and Virtualization

Hours per week: 3 L	**End Examination: 60 Marks**
Credits:3	**Continuous Assessment : 40 Marks**

Preamble:

This course will help the students to get familiar with Cloud Computing Fundamental concepts, architecture and different services in Cloud Computing and know about the challenges, virtualization and security in cloud computing.

Course Objectives:

- To understand the architecture of cloud computing.
- To learn the services provided by cloud computing.
- To understand the benefits and challenges in cloud computing.
- To understand the concepts of virtualization in cloud computing.
- To learn the concepts of security in cloud computing.

UNIT - I

Introduction: What is a cloud? Hype cycle, Implementation gap, Common Definition, Metaphorical Interpretation, Attributes.

Cloud Architecture: Stack Management Layers, Standards and Interoperability, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Maturity. (8)

Learning Outcomes:

By the end of the unit the student will be able to

- Define cloud computing. (L1)
- Describe cloud architecture and various types of clouds. (L2)
- Understand the difference between private cloud and community cloud. (L2)

UNIT - II

Infrastructure as a Service: Infrastructure Stack, Servers, Storage, Network, Integration, Management, Payment and Billing, IAAS Landscape. Platform as a Service: Web Application Frameworks, Web Hosting Services, Google App Engine, Microsoft Windows Azure, Force.com, Additional Platforms. Software as a service: Customer Relationship Management, Human Resources, Financial, Collaboration, Backup and Recovery, Industry Solutions. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Explain the cloud as infrastructure as service and its related concepts. (L2)
- Describe the cloud as platform as service and its related concepts. (L2)
- Demonstrate the cloud as software as service and its related concepts. (L2)

UNIT - III

Benefits and Challenges: Benefits, Challenges, Recommendations.

Strategic Impact: What is Strategy? Strategic Analysis, External Analysis, Internal Analysis, Strategic Realignment.

Risk Impact: Notion of Risk, Risk Management, Cloud Impact, Enterprise Wide Risk Management.

Financial Impact: Resource Costs, Return on Investment, Cash Flow, Financial Visibility, Return on Assets. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Discuss various benefits and challenges of cloud. (L6)
- Explain strategic impact and its related concepts of cloud. (L2)
- Discuss risk impact and its related concepts of cloud. (L6)
- Elaborate financial impact and its related concepts of cloud. (L6)

UNIT – IV

Virtualization: Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples, Xen: Para-virtualization, VMware: Full Virtualization, Microsoft Hyper-V. (8)

Learning Outcomes:

By the end of the unit the student will be able to
- Explain the basic features of virtualization. (L2)
- Identify the different types of virtualization. (L1)
- Describe the concept of VMware. (L2)
- Explain the relation between virtualization and cloud computing. (L2)

UNIT – V

Connectivity: Network connectivity, Content delivery networks, Application connectivity, Information Connectivity.

Security: 10 Security Domains, Access Control, Application Security, Cryptography, Physical (Environmental) Security, Security Architecture and Design, Telecommunications and Network Security. (8)

Learning Outcomes:
- By the end of the unit the student will be able to
- Explain the concept of content delivery networks. (L2)
- List the security domains. (L4)
- Explain the need of physical security. (L2)

Course outcomes:

Upon completion of the course, the student will be able to
- Understand the need of cloud computing. (L2)
- Identify different types of services in cloud computing. (L4)
- Discuss various benefits and challenges in cloud computing. (L6)
- Understand various features of virtualization. (L2)
- Discuss network connectivity and its related concepts of cloud. (L6)

Text Books:
1. Cloud Computing Explained by John Rhoton, Recursive Press, 2013.
2. Mastering Cloud Computing by Rajkumarv Buyya, Christian Vecchiola, S Thamarai Selvi, Morgan Kaufmann, 2013.

Reference Books:
1. Cloud Computing Concepts Technology Architecture by Thomas Erl, Pearson Education,2014
2. Cloud Computing, Principles, Systems and Applications by Nick Antonopoulos and Lee Gilliam Springer International Edition, 2015.

CSCI2181 Database Management Systems

Hours per week: 3 L   **End Examination: 60 Marks**

Credits:3   **Continuous Assessment : 40 Marks**

Preamble:

This course provides need for efficient storage and manipulation of data which will be used world wide and exposed to different applications**.**

The course also introduces the concepts related to information systems in organisational usage and considers the different models of information modelling.

Course Objectives:

- To introduce concepts of databases, database systems, architecture and classification. (L1)
- To define constraints on the relational model. (L3)
- To design Relational Data model and perform relational model operations. (L3)
- To demonstrate the creation, altering and modification of database with SQL, Learning the techniques for evaluating relational schemas for design quality. (L2)

UNIT - I

Introduction and Conceptual Modelling, Databases and Database Users: Introduction, Characteristics of Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of using DBMS Approach. Database System, Concepts and Architecture: Data Models, Schemas and Instances, Three Schema Architecture and Data Independence, Database Language and Interfaces, The Database System Environment, Centralized and Client/Server Architecture of Database Management Systems, Classification of Database Management Systems. (10)

Learning Outcomes:

By the end of this unit, the student will be able to

- Learn the introductory concepts of databases. (L1)
- Analyze the characteristics of database approach. (L4)
- Understand the database system environment. (L2)
- Know the three schema architecture. (L1)
- Find the different database architectures. (L1)

UNIT-II

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship. classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, constraints on specialization and generalization, aggregation and composition, entity clusters, advantages of ER modelling.(10)

Learning Outcomes:

By the end of this unit, the student will be able to

- Understand the introductory concepts: Entity, Attributes and Relationship. (L2)
- Draw an Entity Relationship diagram. (L6)
- Summarize relational model concepts, constraints and database schema. (L2)

UNIT-III

Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra. (8)

Learning Outcomes:

By the end of this unit, the student will be able to
- Understand the Relational Database Model. (L2)
- Learn relational algebra operations. (L1)
- Transform ER to Relational Model. (L4)

UNIT-IV

Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Table Truncation, Imposition of Constraints, Join Operation, Set Operation, View, Sub Query. Correlated Sub-queries.

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of 2nd and 3rd Normal Forms, Boyce-Codd Normal Form. (10)

Learning Outcomes:

By the end of this unit, the student will be able to
- Learn Database Language –SQL. (L1)
- Practice DDL, DML and DCL commands. (L3)
- Demonstrate all built in arithmetic, aggregate, string, date and conversion functions. (L3)
- Understand the concepts of functional dependencies. (L1)
- Define Normalization and its normal forms. (L1)

UNIT-V

PL/SQL: Introduction, Shortcoming in SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create aPL/SQL, Program, Iterative Control, Cursors, Steps to create a Cursors, Procedure, Function, Packages, Exceptions Handling, Database Triggers, Types of Triggers. (8)

Learning Outcomes:

By the end of this unit, the student will be able to
- Understanding the basic concept of PL/SQL. (L1)
- Learn creation of Cursors , Triggers. (L3)
- Implement Functions and Packages. (L3)

Course Outcomes:

At the end of course student will be able to
- Understand the introductory concepts of databases and its architecture. (L1)
- Define program-data independence, data models for database systems, database schema and database instances. (L1)
- Analyze database requirements and determine the entities involved in the system and their relationship to one another. (L3)
- Develop the logical design of the database using data modelling concepts such as entity-relationship diagrams, Enhance Entity Relationship modelling. (L4)
- Convert the ER-model to relational tables, populate relational database &formulate relational algebra queries to extract information to satisfy business reporting requests. (L6)

Reference Books:

1. Fundamentals of Database Systems by Ramez Elmasri and Shamkant B. Navathe, Pearson education, 5th edition, 2009.
2. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, 2010.
3. Database Management Systems by Raghu Ramakrishnan, McGrawhill, 2002,

4. Fundamentals of Relational Database Management Systems by S. Sumathi, S. Esakkirajan, Springer Publications.

5. An Introduction to Database Systems by Bipin C Desai.

6. Principles of Database Systems by J. D. Ullman.

B.Sc Computer Science with Cognitive Systems
III SEMESTER
CSCI2151 Data Structures with C++ Lab

Hours per week: 2

Credits: 1   **Continuous Assessment : 100 Marks**

Objectives:

- To teach efficient storage mechanisms of data for an easy access.
- To design and implement various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To develop applications using data structures.
- To teach the concept of protection and management of data.
- To improve the logical ability

List of Programs

1. Implementation of Array operations.
2. To search an element from a list. Give user the option to perform Linear and Binary search.
3. Perform Stack operations using Array.
4. Perform Queue operations using Array.
5. Implement singly Linked List Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List.
7. Perform Queue operations using Linked List.
8. Input polynomial using linked list and add two polynomials.
9. Give user the option to perform sorting using Insertion sort, Bubble sort and Selection sort.
10. Create a Binary Search Tree and include following operations in tree:
    (a) Insertion (b) Deletion (c) Search a no. in binary search tree.

Course Outcomes

Upon completion of this course the students will be able to:

- Choose appropriate data structure as applied to specified problem definition. (L3)
- Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Apply concepts learned in various domains like DBMS.
- To use linear and non-linear data structures like stacks, queues, linked list etc.

Hours per week: 2

Credits: 1   **Continuous Assessment : 100 Marks**

Objective: The aim of this course is to make the student to learn the concepts of SQL. Demonstrate on various DDL, DML and DCL statements.

 Student also will learn PL/SQL

1. Creation, altering and dropping of tables using SQL.
2. Implementing integrity Constraints on tables.
3. Implementing DML Operations using SQL-Insert, Delete, Update.
4. Simple Queries to access data from Tables using Select Statement and where condition using Distinct, And, Or, Not and Order By Operators.
5. Queries using Built in Functions:
    i. Arithmetic Functions: Sign, Abs, Ceil, Floor, Exp, Power, Log, Sqrt,
    ii. StringFunctions:Concat,Lpad,Rpad,Ltrim,Rtrim,Lower,Upper,Initcap,Length,Substr and Instr.
    iii. Aggregate Functions: Count, Sum, Avg, Max and Min, Group by, Having
6. Queries using Set Operators: Union, Intersect, Minus
7. Queries using Joins, Natural Join, Inner join, Outer Join.
8. Queries along with Sub Queries and Correlated Queries using Any, All, In, Exists, Not exists.
9. Creating other Schema Objects**:** Defining Views, Creating Views, using Views to Change Data, Dropping Views, Creating Indexes and Sequences
10. Using DCL Commands: Commit and Rollback.
11. Creation of Simple PL/SQL Program which includes Declaration Section, Executable Section, Select ... into Clause.
12. Develop Programs that include Features of Nested If and Case.
13. Develop Programs using While Loop, For Loop, Nested Loops
14. Develop PL/SQL Program to demonstrate Cursor and Triggers
15. Develop PL/SQL Program to demonstrate Procedures and Functions

 Text Books:

1. SQL,PL/SQL The Programming language of ORACLE by Ivan Bayross, BPB publications, 4th edition,2009.
2. Programming Oracle triggers and Stored Procedures by Kevin Owens, PHI, 3rd Edition, 2003.

 Course outcomes:

 At the end of the course students will be able to

- Experiment with DDL,DML, DCL commands. (L3)
- Apply entity integrity(primary key) and referential integrity(foreign key)concepts. (L3)
- Practice all arithmetic, string, date and aggregate functions. (L3)
- Construct simple queries, sub-queries and complex queries. (L4)
- Create other schema objects like views, indexes and sequence. (L2)
- Develop PL/SQL programs. (L3)

CSCI2171 Cloud and Virtualization Lab

Hours per week: 2

Credits: 1   **Continuous Assessment : 100 Marks**

1. **Cloud Virtualization Lab**

List of Practical Experiments:
   1. Choose a real life example of a Business application that you have used and apply these technologies and concepts to solution it.
   2. Cloud Architecture design .
   3. Micro-service Architecture design .
   4. API development use case and deployment.
   5. Micro-service development and deployment.
   6. Devops Tools - usages for Automation in development/Testing/Deployment.
   7. AWS features use cases -ex, Lambda Functions.
   8. Azure features Use cases.
   9. GCP Features Use cases.
   10. Creating an API and API Documentation.
   11. Cloud scaling.

Text Book:

1.Cloud Computing Principles and Paradigms by Rajkumar Buyya, James Broberg, AndrzejGoscinski , Wiley Publishers, 2011.

References:

1. Cloud Computing by Barrie Sosinsky, Bible, Wiley Publishers,2010.

2. Cloud Computing : Web-based Applications that change the way you work and collaborate online by Michael Miller, Pearson Education,2008.

3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance by Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly,2010.