Course Title: System Analysis and Design **Credit: 3**
Course No: CSIT.225 **Number of period per week: 3+3**
Nature of the Course: Theory + Lab **Total hours: 45+45**
Year: Second, Semester: Fourth
Level: B. Sc. CSIT

1. Course Introduction

The course is a blend of understanding of system analysis & design with its practical applications. This course includes understanding of various elements of system analysis and design with emphasis on the application of information technology issues as a business tool. The course covers components of system analysis and design techniques, data modeling, logical process modeling, and object oriented modeling techniques.

2. Objectives

The objective of the course is to

- enable the students to explore opportunity and potential impact of using various strategies for developing information systems, including development, maintenance, and delivery of products and services in commercial markets.
- define various systems analysis and design concepts and terminologies
- describe the stages of the system development life cycle model,
- describe different methodologies and state-of-the-art developments in system analysis and design techniques and methods
- apply process and data modelling techniques
- to introduce the maintenance and support approaches

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand system and its components • Explore about types of information system • Understand building blocks of information system	**Unit I: Introduction to System (4 Hrs)** 1.1. Fundamentals of System Analysis and Design: System, Information System, System analysis and design and its importance 1.2. Types of Information Systems: Management Information System, Transaction Processing System, Decision Support System, Executive Information System, Expert System 1.3. The players or stakeholders of a system, System Analyst, Issues associated with system analyst. 1.4. Information System Building Blocks: Data, Process and Interface, Views of different stakeholders on the

	building blocks of a system
• Understand System Development Lifecycle • Get the knowledge about steps in SDLC • Understand the various development routes • Understand the details of case tools	**Unit II: Information System Development (5 Hrs)** 2.1. Process of System Development, Capability Maturity Model (CMM) Level 2.2. System Life Cycle Vs. Development, Underlying Principles for System Development, System Development Lifecycle (SDLC): Planning and Selection, Analysis, Design, Implementation and Operation, Cross Life Cycle Activities 2.3. Alternate Approaches to Development: Rapid Application Development, Agile Methodology, Commercial Off The Shelf Route (COTS), Maintenance and Reengineering Routes 2.4. Automated Tools and Technology: CASE Tools, Application Development Environments
• Understand the basics of project management • Create schedules of systems project using PERT and GANTT Chart	**Unit III: Managing Information System Project (4)** 3.1. Project Management, Causes of Failed Projects, Project Management Life Cycle: scoping, planning, estimating, scheduling, organizing, directing, controlling, and closing, 3.2. Representing and Scheduling Project Plans using GANTT Chart and PERT Chart, Calculating Expected Time Durations Using PERT Chart, Critical Path Analysis using PERT Chart
• Perform feasibility analysis of system from various dimensions • Understand about details of cost-benefit analysis	**Unit IV: Feasibility Analysis (4 Hrs)** 4.1. Feasibility Analysis: A creeping commitment approach, Four Test of feasibility: Schedule, Technical, Operational, Economic 4.2. Cost-benefit Analysis Techniques: payback analysis, return on investment, break-even analysis, net present value 4.3. Feasibility Analysis of Candidate system: Candidate System Matrix, Feasibility Analysis Matrix
• Understand importance of requirement discovery and analysis • Collect functional non-functional requirements of real world system • Understand various fact finding	**Unit V: Determining System Requirement (5 Hrs)** 5.1. Requirement Discovery, System Requirements: Functional and non-functional requirements 5.2. The Process of Requirement Discovery: Problem Discovery and Analysis, Requirements Discovery, Documenting and Analyzing Requirements, Requirements Management 5.3. Traditional Methods for determining requirements: interview, questionnaire, sampling, survey, Modern

techniques	Methods for determining requirements: Joint Application Design, Using Prototypes for Requirement determination, 5.4. Documenting requirements using Use Case List
• Understand logical data model • Design ERD for real world applications • Construct entities, relationships • Understand basics of data normalization	**Unit VI: Data Modeling (7 Hrs)** 6.1. Data Modeling and Analysis, Introduction to Entity Relationship Modelling, Conceptual Data Modeling using Entity Relationship Diagram (ERD), Crow's-foot Notation of ER Diagram, 6.2. Relationships: Unary, Binary and N-ary, Cardinalities in Relationships, Identifying Relationship, Non-Identifying Relationship, Associative Entity and Non-specific Relationships, Examples of ERD 6.3. The Process of Logical Data Modelling: Context Data Model, Key-based Data Model, Fully Attributed data model 6.4. Data Analysis: 1NF, 2NF and 3NF, Mapping Data Requirements to Locations
• Understand process model • Design DFD for real world applications • Construct DFD at different levels • Understand modeling of process logic	**Unit VII: Process Modeling (6 Hrs)** 7.1. Process Modelling, Data Flow Diagram (DFD), System concepts for process modelling, Components of DFD, Data Flow Diagramming Rules, The Process of Logical Process Modeling 7.2. Decomposition of DFD: Context dataflow diagram, Functional Decomposition Diagram, Level-1 DFD, Level-2 DFD, Level-n DFD, Guidelines for Drawing DFD 7.3. Logic Modeling: Structured English & Decision Tables
• Understand steps of construction and implementation of a system • Understand concepts of system maintenance and support	**Unit VIII: System Implementation and Operation (4 Hrs)** 8.1 System Construction and Implementation: The Construction Phase, The Implementation Phase, Testing: Unit, System and Regression Testing 8.2 System Operation and Support: Systems Development, Operation, and Support Functions 8.3 Program/ System Maintenance, System recovery, System Enhancement
• Understand Object Oriented Approach for building system • Design different UML diagrams for real world	**Unit IX: Object Oriented Analysis and Design (6 Hrs)** 9.1 Object Oriented Development Life Cycle, Unified Modelling Language 9.2 UML Diagrams: Use-Case Diagram, Class Diagram, Object Diagram, Interaction Diagrams: Sequence and

applications • Understand about Object Oriented Analysis and Design	Collaboration Diagram, State Diagram, Activity Diagram, Component Diagram, Deployment Diagram 9.3 Object Oriented Analysis: Requirement Analysis using Use Case Model, Conceptual Modeling 9.4 Object Oriented Design: Defining Interaction Diagrams, Defining Design Class Diagrams

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**	**Practical**	**Weightage**	**Mark**
End semester examination	60	Assignments	20%	20	Practical Report copy	25%	20
(Details are given in the separate table at the end)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

External evaluation

1. **End semester examination:**
   It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

2. **External Practical Evaluation:**
   After completing the end semester theoretical examination, practical examination will be held. External examiner will conduct the practical examination according to the above mentioned evaluation. There will be an internal examiner to assist the external examiner. Three hours time will be given for the practical examination. In this examination Students must demonstrate the knowledge of the subject matter.

Full Marks: 100, Pass Marks: 45, Time: 3 Hrs

Nature of question	Total questions to be asked	Total questions to be answered	Total marks	Weightage
Group A: multiple choice*	20	20	20×1 = 20	60%
Group B: Short answer type questions	7	6	6×8 = 48	60%
Group C: Long answer type questions	3	2	2×16 =32	60%
			100	100%

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Assignments
- Presentation by Students
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam. Unless and until the student clears one semester he/she will not be allowed to study in the following semesters.

Laboratory Work

Student should practice analysis and design of real world applications. Students are recommended to use different CASE tools as a part of lab work. The choice of CASE Tools can range from MS-Visio, MS-Project manager, Rational Rose so as to provide practical exposure for realizing system design issues. Students should design data and process models for real world application using the data and process modeling tools like ER Diagrams, DFD, UML Diagrams. Additionally, students should practice Gantt Charts, PERT Charts using the appropriate CASE Tools. The lab work should be practiced for minimum of 3 lab hours per week.

It is highly recommended that a project work including analysis and design of real world application should be practiced. A group of four or five students can work together. The project should be documented in a proper report structure in such a way that it will reflect the applications of the theories taught in the course.

Prescribed Texts

1. Jeffrey L. Whitten, Lonnie Bentley, **System Analysis and Design methods,** 7th Edition, Mc-Graw Hill

2. Joseph S. Valacich, Joey F. George, Jefferey A. Hoffer, **Essentials of System Analysis and Design**, 5th Edition, Pearson Education.

References

1. Jeffrey L. Whitten, Lonnie Bentley, **System analysis and design methods**, 5th Edition, Mc-Graw Hill

2. Jefferey A. Hoffer, Joey F. George, Joseph S. Valacich, **Modern Systems Analysis and Design**, 7th Edition, Pearson Education

3. Gary B. Shelly, Harry J. Rosenblatt, **System Analysis and Design**, 9th Edition, Shelly Cashman Series

4. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth **System Analysis and Design**, 4th Edition, Wiley Publication

5. V. Rajaraman, **Analysis and Design of Information System**, 2nd Edition, Prentice Hall