Semester – VI (w.e.f. Session 2017-18)

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1.	IT-302N	Analysis & Design of Algorithms	4	1	-	5	75	25	--	100	3
2.	IT-304N	Software Engineering	4	--	-	4	75	25	--	100	3
3.	IT-306N	Computer Networks	4	--	--	4	75	25	--	100	3
4.	IT-308N	Introduction to Microcontroller	4	--	--	4	75	25	--	100	3
5.	IT-310N	Data Warehouse & Data Mining	4	1	--	5	75	25	--	100	3
6.	IT-312N	Software Engineering Lab	---	--	2	2	---	40	60	100	3
7.	IT-314N	Networking Lab	--	--	2	2	---	40	60	100	3
8.	IT-316N	Visual *Basic.net* Lab	--	--	3	3	---	40	60	100	3
9.	IT-318N	Microcontroller Lab	--	--	2	2	---	40	60	100	3
10.	IT-320N	Colloquium & Professional Proficiency	---	--	2	2	--	100	--	100	--
		Total	20	2	11	33	375	385	240	1000	--

Note: The students will have to undergo another six weeks Industrial Training after VI sem and it will be evaluated during VII sem through submission of certified computerized report to the Head of the Department, followed by viva-voce, seminar/presentation.

IT-302 N			Analysis & Design of Algorithms			
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	1	-	75	25	100	3(Hrs.)
Purpose	To explore fundamentals of algorithm design.					
CO 1	To study the behavior of an algorithm.					
CO 2	To familiarize with dynamic programming.					
CO 3	To focus on back tracking and branch and bound problems.					
CO 4	To learn the computational graph searching and tree traversals.					

Unit – 1

Introduction: Algorithm, Analyzing algorithm, Designing algorithm, Concept of algorithmic efficiency, Run time analysis of algorithms, Asymptotic Notations.

Divide and conquer: Structure of divide and conquer algorithms: examples; binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

Unit – 2

Greedy Method: Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), approximate solution (Knapsack problem), Singles source shortest paths.

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Travelling salesman problem, longest common sequence.

Unit – 3

Back tracking: Overview, 8-queen problem, and Knapsack problem

Branch and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem.

Unit – 4

Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search).

Trees: Review of trees, Binary search tree, Traversal, Insertion & Deletion in Binary Search Tree, B-Trees, B+Trees, Basic operations on B Trees.

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Text Book:
1. E. Horowitz, S. Sahni, and S. Rajsekran, *"Fundamental of Computer Algorithms,"* Galgotia Publication

Reference Books:
1. T. H. Cormen, Leiserson, Revest and Stein, *"Introduction of Somputer algorithm,"* PHI.
2. Sara Basse, A. V. Gelder, *" Computer Algorithms,"* Addison Wesley.

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-304 N	Software Engineering					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	--	--	75	25	100	3(Hrs.)
Purpose	To familiarize the students with the concept of designing the software.					
CO 1	To study different software life cycle model.					
CO 2	To acquaint with requirement analysis and designing phase of software development.					
CO 3	To learn different testing and maintenance in software engineering					
CO 4	To explore quality assurance and reliability of the software.					

Unit – 1

Introduction: Program vs. software products, emergence of software engineering, software life cycle, models: waterfall, prototype, evolutionary and spiral model, Software Characteristics, Applications, Software crisis.

Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO, A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.

Unit – 2

Requirements Analysis and specification: Requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping, Prototyping methods and tools, Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling, The mechanics of structured analysis: Creating entity/relationship diagram, data flow model, control flow model, the control and process specification, The data dictionary, Other classical analysis methods.

System Design: Design concepts and principles: the design process: Design and software quality, design principles, Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure software procedure, information hiding, Effective modular design: Functional independence, Cohesion, Coupling, Design Heuristics for effective modularity; The design model; Design documentation. Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements in to software architecture; Transform flow, Transaction flow; Transform mapping; Refining the architectural design.

Unit – 3

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, Unit testing: white box testing, basic path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Integration testing, Validation testing, alpha and beta testing. System testing: Recovery testing, security testing, stress testing performance testing; The art of debugging process debugging approaches. Software re-engineering: Reverse engineering, restructuring, forward engineering.

Unit – 4

Software Reliability and Quality Assurance: Quality concepts, Software quality assurance, SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability, The ISO 9000 Quality standards, SEI-CMM Capability Maturity Model.

Computer Aided Software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

Text Books:
1. Roger S. Pressman, *Software Engineering – A Practitioner's Approach,* , 1966, MGH.
2. Rajib Mall , *Fundaments of software Engineering,* , PHI

Reference Books:
1. Pankaj Jalote, *An Integrated Approach to Software Engineering* 1991 Narosa.
2. Ian Sommerville , *Software Engineering* , Pearson Edu, 5th edition, 1999, AW.
3. Ali Behforooz and Frederick J. Hudson. *Software Engineering Fundamentals*, Oxford University,

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-306 N	Computer Networks					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	--	-	75	25	100	3(Hrs.)
Purpose	This course covers the concepts of computer networking and communication.					
CO 1	Introduction to fundamental of networking model.					
CO 2	To study different protocols used for transmitting data.					
CO 3	To explore physical and data link layer of networking model.					
CO 4	To study Network and transport layer of networking model.					

Unit – 1

Introduction: Basics of Computer Networks, need and Evolution of computer networks, description of LAN, MAN, WAN & wireless networks.

Basics terminology of Computer Networks: Bandwidth, physical and logical topologies, media 10 base A, 10base 5, 10 base 5, 10base-T, 100 base FX, 100base LX and wireless.

LAN & WAN devices – Router, Bridge Ethernet switch HUB, Modem SCU/DSU.

OSI Reference Model:

Laying architecture of networks, OSI model, Functions of each layer, Services and Protocols of each Layer.

Unit – 2

TCP/IP: Introduction History of TCP/IP, Layers of TCP/IP, Protocols, Internet Protocol, Transmission control protocol, User Datagram Protocol, IP Addressing, IP address classes, Subnet addressing, Internet control Protocols, ARP, RARP, ICMP, application layer, Domain Name System, Email-SMTP, POP, IMAP, FTP, NNTP, HTTP, SNMP,TELNET, overview of IP version 6.

OSI and TCP/IP model with description of data encapsulation & peer to peer communication, comparison of OSI and wireless.

Unit – 3

Physical Layer: Representation of a bit on physical modem that is in wired network, optical network and wireless network. Encoding/Modulation – TTL, Manchester Encoding, AM, FM and PM. Dispersion, Jitter, Latency and Collision. Different types of media-twisted pair, unshielded twisted pair, coaxial cable, optical Fiber cable and wireless.

Data Link Layer: LLC and MAC sub layer, MAC addressing layer 2 devices, framing error control and flow control. Error detection & correction CRC, block codes parity and checksum, elementary data link protocol, sliding window protocol, channel allocation problem-static and dynamic, Multiple Access protocol- ALOHA, CSMA/CU, Token bus, token ring, FDDI.

Unit – 4

Network Layer: Segmentations and autonomous system path determination, network layer addressing, network layer data gram, IP addressed Classes. Sub netting – Sun network, Subnet Mask, Routing algorithm-optionally principle, Shortest path routing, hierarchical routing, Broadcast routing, Multicast routing, routing for mobile host – tunneling, fragmentation and DHCP, Routing protocol- RIP, IGRP, USPF and EIGRP.

Transport Layer: TCP & UDP. Three way handshaking . ATM AAL layer protocol.

Text Book:
1. Tanenbaum. *"Computer Networks"*, PHI

Reference Books:
1. Darlx, *" Computer Network and their protocols",* DLA Labs.
2. Freer, *"Comp. Communication and Networks*", East – West-Press.
3. Halsall Fred, *Data Communications, Computer Networks & open systems* Addison Wesley
4. Fitzgerald Jerry, *Business data communications*,
5. Larry L. Peterson & Bruce S. Davie *Computer Networks – A system approach*, , 2nd Ed TMH.

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT – 308 N	Introduction to Microcontroller					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	--	--	75	25	100	3 (Hrs.)
Purpose	To learn programming of 8051 microcontroller and its interfacing					
CO 1	To study the Architecture of 8051 microcontroller					
CO 2	Familiarization with the instruction / commands of microcontroller					
CO 3	To study timing delays					
CO 4	To learn how various devices can be interfaced with microcontroller					

UNIT-1

Introduction: - Evaluation of Microcontrollers; Classification of Microcontroller; Comparison between Microprocessor and Microcontrollers; Overview of 8051 microcontroller family. Block Diagram, Architecture and pin description of 8051. ; Types of Registers and flags of 8051.

UNIT-2

Introduction to programming of Microcontroller: - 8051 Instruction Format, Addressing modes, Data transfer instructions; Logical operations, Arithmetic operations, looping, jump and call instructions, Programming in C.

UNIT-3

Timer Programming and interrupts :- 8051 timer Programming ; 8051 Serial port programming; 8051 interrupt programming; External memory interfacing.

UNIT-4

Interfacing of microcontroller :- LCD , Keyboard interfacing ; A/D , D/A and sensor interfacing; Microcontroller interfacing with a) Relays b) opto-isolators , c) stepper motor d) DC motor

Text Books
1. Muhammad Ali Mazidi., "*The 8051 Microcontroller And Embedded Systems Using Assembly And C*" , Pearson , 2nd edition
2. Kenneth J. Ayala , "*The 8051 Microcontroller*" .

Reference Books
1. Mackenzie , "*The 8051 Microcontroller*" , Pearson Education.
2. Ghoshal Subrata , "*8051 Microcontroller: Internals, Programming & Interfacing*", Pearson Education..

Note: The course is introductory in nature. Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-310 N	Data Warehouse & Data Mining					
Lecture	Tutorial	Practical	Major Test	Minor Test	Total	Time
4	1	-	75	25	100	3 (Hrs.)
Purpose	This course provides a way to understand the organization and collection of data.					
CO 1	To study basic concept of data warehouse.					
CO 2	To study the techniques of data warehouse.					
CO 3	To understand the basic concept of data mining.					
CO 4	To study data mining rules.					

UNIT-1

Introduction of Data Warehousing: The evolution of Data Warehousing (The Historical Context). The data warehousing –a brief history, today's development environment. Principles of Data Warehousing (Architecture and Design Techniques): Types of data and their uses, conceptual data architecture, design techniques, introduction to the logical architecture. Creating the Data Asset: Business Data Warehouse Design.

UNIT-2

Unlocking the Data Asset for end users (The use of Business Information) : Designing business information warehouse, populating business information warehouse, user access to information, information data in context. Implementing the Warehouse (Managing the project and environment) : Obstacles to implementation, planning your implementation, justifying the warehouse, organizational implications of data Warehousing, the data warehouse in your organization, data warehouse management, looking to the future.

UNIT-3

Introduction of Data Mining: Motivation, importance, data mining, kind of data, functionalities, interesting patterns, classification of data mining system, major issues. Data warehouse and OLAP technology for data mining : data warehouse, operational database systems and data warehouse architecture, implementation, development of data cube technology, data warehousing to data mining, data warehouse usage.

UNIT-4

Data Preparation: Preprocess data cleaning, data integration and transformation, data reduction, discrimination and concept hierarchy generation. Data Mining Primitives, languages and system architectures, graphical user interfaces. Concept Description: Characterization and comparison data generalization and summarization based characterization, analytical characterization, and analysis of attribute relevance, mining class comparison, and mining descriptive statistical measures in large databases. Mining association rules in large databases, mining single dimensional Boolean association rules from transactional databases, mining multi-dimensional association rules from relational databases and data warehouses, from association to correlation analysis, constraint based association.

Text Books
1. J. Han & M. Kamber, *Data Mining*: *Concepts and Techniques*, Morgan Kaufmann/Elsevier, India, 2001
2. D. Hand, H. Mannila, & P. Smyth. *Principles of Data Mining*, MIT Press, 2001.

Reference books
1. M. Jarke et al. *Fundamentals of Data Warehouses (2nd ed.)*, Springer, 2003, ISBN 3-540-42089-4.
2. C. Seidman, *Data Mining with Microsoft SQL Server 2000* Technical Reference Microsoft Press, ISBN 0-7356-1271-4

NOTE: Eight questions each of 15 marks are to be set in all by the examiner taking two questions from each unit. Students will be required to attempt five questions in all, selecting at least one question from each unit.

IT-312 N	Software Engineering Lab					
Lecture	Tutorial	Practical	Minor Test	Practical Exam	Total	Time
--	--	2	40	60	100	3 (Hrs.)
Purpose	To familiarize the students with the concept of designing the software applications.					
CO 1	To study different software life cycle model.					
CO 2	To study Requirement and designing phase of software development.					
CO 3	To study testing and maintenance phase of software development.					
CO 4	To study quality assurance and reliability of software.					

LIST OF EXPERIMENTS

1. Study and categorize the generic phases of software development and maintenance.

2. Study various software development models.

3. Study various types of feasibility study and steps in doing feasibility study.

4. Study various steps for doing the requirement analysis of any project.

5. Write algorithm and draw flow chart to implement the constructive cost estimation model (COCOMO).

6. Making use of Graphical Design notation, study the concept in developing data flow diagram (DFD) for any selected project.

7. Making use of object oriented design, implement a student & employee record system using the concept of inheritance.

8. Select an appropriate programming language & translate the detailed design made in experiment 7 in appropriate programming language.

9. Develop a complete test strategy for the project selected in exp-8. Document it in a test specification.

10. Apply the debugging process to the project selected in exp-9 in accordance with the result generated from its testing in exp-9.

11. Study various concepts involved in cost / benefit analysis.

12. Draw flow chart and write algorithm for designing an editor.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT-314 N	Networking Lab					
Lecture	Tutorial	Practical	Minor Test	Practical Exam	Total	Time
--	--	2	40	60	100	3 (Hrs.)
Purpose	This course covers the concepts of computer networking and communication.					
CO 1	To learn the basic concept and networking model.					
CO 2	To study different protocols used for transmitting data.					
CO 3	To study physical and data link layer of networking model.					
CO 4	To study Network and transport layer of networking model.					

LIST OF EXPERIMENTS

1. Study the physical media of connectivity.

2. Study the pin-structure of cross-over cable.

3. Study the different LAN Technologies.

4. Study the functioning of a Switch.

5. Study the Functioning of a Router.

6. Establishing LAN (Star topology) for your LAB using Hubs (18 ports, 16 ports).

7. Study and install the media converting using optical fiber.

8. Install and configure the LAN card.

9. Install and configure window 200 Server.

10. Study and implement the virtual network.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT-316 N	Visual Basic.net Lab					
Lecture	**Tutorial**	**Practical**	**Minor Test**	**Practical Exam**	**Total**	**Time**
--	--	3	40	60	100	3 (Hrs.)
Purpose	This course covers the concepts of .net programming.					
CO 1	To learn the basic concept of GUI					
CO 2	To study SMTP					
CO 3	To study encryption and decryption					
CO 4	To study how to create drawing application in VB.Net					

LIST OF EXPERIMENTS

1. Create a calculator that can be used for adding, subtracting, multiplication and division.

2. Write an application to use WMI to retrieve information about your PC.

3. Write an application to create a File and Folder browser.

4. Write a program in VB.NET to send an email via SMTP.

5. Write a program to create a MDI web browser.

6. Write an application to access registry in VB.NET.

7. Write a program to retrieve a web page source from the Internet.

8. Create a slot machine game using standard controls and random number generator.

9. Write a program to create a word processor.

10. Write a program for encryption and decryption.

11. Write an application to capture screen.

12. Create a drawing application in VB.NET.

13. Write an application in VB.NET to play MP#3 files.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT-318 N	Microcontroller Lab					
Lecture	Tutorial	Practical	Minor Test	Practical Exam	Total	Time
--	--	2	40	60	100	3 (Hrs.)
Purpose	To train the student on how to use Microcontroller.					
CO 1	To introduce the student to Microcontroller programming					
CO 2	To control LCD module.					
CO 3	Use of microcontroller in controlling stepper motor					
CO 4	Practical approach in interfacing of microcontrollers with different devices.					

LIST OF EXPERIMENTS

1. Introduction to microcontroller trainer and interfacing modules.

2. To display the digital output of ADC on 16*2 LCD Module.

3. To display character 'A' on 8*8 LED Matrix.

4. To display the data and time on LCD Module

5. To interface the seven segment display with microcontroller 8051.

6. To create a series of moving lights using 8051 on LEDs.

7. To interface the stepper motor with microcontroller.

8. To switch on and off relay by using keys.

9. To interface the DC motor using H-Bridge.

10. To interface a keypad with microcontroller.

Note: A student has to perform 10 experiments. At least seven experiments should be performed from the above list. Three experiments may be designed & set by the concerned institution as per the scope of the syllabus.

IT-320 N	Colloquium & Professional Proficiency					
Lecture	**Tutorial**	**Practical**	**Minor Test**	**Practical Exam**	**Total**	**Time**
-	--	2	100	-	100	
Purpose	To enhance holistic view of students so as to improve their employability skills.					
CO 1	To develop inter personal skills and be an effective goal oriented team player.					
CO 2	To develop communication and problem solving skills.					
CO 3	To develop aptitude					
CO 4	To enhance general knowledge of students in various domains of life.					

A practical and activity oriented course with continuous assessment for 100 marks.

The course will comprise of:

a) Class room interaction and activities: Technical Quiz, aptitude tests, extempore speech, general knowledge test etc.
b) Seminars
c) Presentation

The student will submit a course report comprising of credits / results based on the above.