

Integral University Lucknow
Study & Evaluation Scheme
B. Tech. (Computer Science & Engg.)

YEAR III, Semester- VI

S. No.	Subject Code	Category	Subject	Periods				Evaluation Scheme				Subject Total
				L	T	P	C	Sessional		Exam.		
								CT	TA	Total (CA)	ESE	
1	CS-313	DC	Microprocessor and its Applications	3	1	0	4	25	15	40	60	100
2	CS-315	DC	Compiler Design	3	1	0	4	25	15	40	60	100
3	CS305	DC	Computer Networks	3	1	0	4	25	15	40	60	100
		OE	Open Elective-1	3	1	0	4	25	15	40	60	100
4		DE	Departmental Elective-3	3	1	0	4	25	15	40	60	100
5		DE	Departmental Elective-4	3	1	0	4	25	15	40	60	100
7	CS-316	DC	Compiler Design Lab	0	0	2	1	30	30	60	40	100
8	CS-314	DC	Microprocessor Lab	0	0	2	1	30	30	60	40	100
9	CS-306	DC	Computer Networks Lab	0	0	2	1	30	30	60	40	100
			Total	18	6	6	27	240	180	420	480	900

L-Lecture T-Tutorial P-Practical C-Credits CT-Class Test TA-Teacher Assessment

Sessional Total (CA) = Class Test (CT) + Teacher Assessment (TA)

Subject Total = Sessional Total (CA) + End Semester Examination (ESE)

DC- Departmental Core

HM- Humanities

DE- Departmental Elective

ESA- Engineering Sciences & Arts (Foundation Course & Engineering Courses)

Departmental Elective-3	CS-345	Computer Architecture
	CS-320	Real Time System
	CS-346	Concepts in Advanced Database System
Departmental Elective-4	CS-311	Software Project & Quality Management
	CS-347	Green Computing
	CS-348	Human Computer Interaction

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Microprocessor and its Applications, Subject Code: CS-313
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

UNIT 1

Category of Memory, Microprocessor, Microcontroller, Buses, machine Language, Assembly Language, High Level Language, Assembly Language Program Development Tool. 8085 Microprocessor: Architecture, Pin diagram, Instruction Type, Instruction Cycle, Timing Diagram, Addressing Modes, Instruction Set. Assembly Programming based on 8085, Interrupt and Interrupt Service Routine. [8]

UNIT 2

8086 Microprocessor: Architecture, Pin Diagram, Timing Diagram, Addressing Modes, Instruction Set, Instruction Templates, Assembly Language Programming: Based on Procedure, Macros, Number conversion, String operation. [8]

UNIT 3

Interfacing with Peripheral Devices and Memory: Types of Transmission, 8257(DMA), 8255(PPI), Serial Data Transfer (USART 8251), Keyboard- Display Controller (8279), Priority Interrupt Controller(8259). [8]

UNIT 4

Interfacing with Timers and its Applications: Programmable Interval Timer/Counter (8253/8254): Introduction, Modes, Interfacing of 8253, Applications, ADC: Introduction, ADC Converters, ADC IC (0808/0809), Interfacing and Application of ADC. [8]

UNIT 5

Advanced Microprocessors and Micro-Controller: Introduction to Intel 80186, 80286, 80386 and 80486 Microprocessor. Introduction to Embedded System and Microcontrollers, 8051 Micro-controller: Introduction, Architecture. [8]

REFERENCES:

1. R.S. Gaonkar: "Microprocessor architecture, Programming and Applications with 8085/8080", Penram Publication.
2. B.Ram : " Fundamental of Microprocessor and Microcomputer", Dhanpat Rai Publication, 4th edition.
3. R. Singh and B.P. Singh: " Microprocessor Interfacing and its application", New Age International Publishers, 2nd Edition.
4. D.V. Hall: " Microprocessor Interfacing", TMH (Revised 2nd Edition).
5. R. Singh and B.P. Singh: "Advanced Microprocessor and Micro-controllers", New Age International Publishers, 2nd Edition

Recommended Prerequisite – None

Co-requisite - None

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Compiler Design, Subject Code: CS-315
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

UNIT 1

Introduction to Compiler, Phases and Passes, Bootstrapping, Finite State Machines and Regular Expressions and their Applications to Lexical Analysis, Implementation of Lexical Analyzers, Lexical-analyzer Generator, LEX-compiler, Formal Grammars and their Application to Syntax Analysis, BNF Notation, Ambiguity, YACC. [7]

UNIT 2

The Syntactic Specification of Programming Languages: Context Free Grammars, Derivation and Parse Trees, Capabilities of CFG.

Basic Parsing Techniques: Parsers, Top Down Parsing, Predictive Parsers, LL(1), Shift Reduce Parsing, Operator Precedence Parsing, Elimination of left recursion. [7]

UNIT 3

Automatic Construction of Efficient Parsers: LR Parsers, the Canonical Collection of LR(O) Items, Constructing SLR Parsing Tables, Constructing Canonical LR Parsing Tables, Constructing LALR Parsing Tables, using Ambiguous Grammars, an Automatic Parser Generator, Implementation of LR Parsing Tables, Constructing LALR Sets of Items. [10]

UNIT 4

Syntax-Directed Translation: Syntax-Directed Translation Schemes, Implementation of Syntax-Directed Translators, Intermediate Code, Postfix Notation, Parse Trees & Syntax Trees, Three Address Code, Quadruple & Triples, Translation of Assignment Statements, Boolean Expressions, Statements that Alter the Flow of Control, Postfix Translation, Translation with a Top Down Parser. More About Translation: Array References in Arithmetic Expressions, Procedures Call, Declarations, Case Statements. [8]

UNIT 5

Symbol Tables: Data Structure for Symbols Tables, Representing Scope Information. **Run-Time Administration:** Implementation of Simple Stack Allocation Scheme, Storage Allocation in Block Structured Language.

Introduction to Code Optimization: Loop Optimization, the DAG Representation of Basic Blocks, Value Numbers and Algebraic Laws, Global Data-Flow Analysis. Introduction to Code Generation. [8]

REFERENCES:

1. Aho, Sethi & Ullman, "Compiler Design", Addison Wesley.

Recommended Prerequisite – Theory of Automata and formal Languages (CS 304)
Co-requisite - None

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Computer Networks, Subject Code: CS-305
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

Recommended Prerequisite – None

Co-requisite - None

UNIT 1

Data communication, Components, Data representation, Data flow. Performance criteria, topologies, category: LAN. MAN & WAN. OSI layered architecture, TCP/IP protocol suite. **Physical Layer:** Transmission Media Guided media, Twisted pair, coaxial cable, fiber optics. Unguided media: radio waves, microwaves & infrared waves. Circuit switching network, Packet Network & Virtual Circuit. Connecting Devices: Repeater, Hub, Switch, Bridge, Router & Gateway. [8]

UNIT 2

Data Link Layer: Error Handling: types of error, Block Coding, Hamming distance, Linear Block Codes, Cyclic Codes. Flow control: Stop & wait, Sliding Window Protocols: Designing and functioning of Go-Back-N, Selective Repeat method. Random Access protocol ALOHA, CSMA, CSMA/CD. Channelization: Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access. Overview of Fast Ethernet: FDDI. [8]

UNIT 3

Network Layer: IPv4 Addressing, Classful addressing, netid, hosted, mask, subnet. Classless addressing, subnetting using classless addressing. Datagram formats for IPv4 and IPv6 addresses. Address mapping protocols: ARP and RARP. Packet delivery and packet forwarding. Unicast routing: Distance vector routing-RIP and Link state routing-OSPF. Path vector routing-BGP. [8]

UNIT 4

Transport Layer: Process to process delivery, Connectionless versus connection oriented services. User data gram protocol, frame format of datagram. Transmission control protocol: TCP services, TCP features, Segment format. Congestion Control: Open loop techniques (Retransmission, window and acknowledgement policies.), Closed loop techniques (Back pressure and choke packet). [8]

UNIT 5

Quality of Service: Flow characteristics: Reliability, Delay, Jitter and bandwidth. Traffic Scheduling: FIFO technique, Weighted fair queuing. Traffic shaping: Leaky bucket and token bucket.

Application Layer: Domain name System: Name space, Domain Name space, Distribution of domain name space. DNS in internet, Resolution. Electronic Mail: SMTP, IMAP, POP3. File Transfer: FTP. Telnet, WWW: architecture, Client, URL, Cookies. [8]

REFERENCES:

1. Forouzen, "Data Communication and Networking", TMH
2. A.S.Tanenbaum, "Computer Networks", 3rd Edition, Prentice Hall India, 1997
3. W.Stallings, "Data and Computer Communication", Macmillan Press, 1989.

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: COMPUTER ARCHITECTURE, Subject Code: CS-345
SYLLABUS REVISED-2018-19
w.e.f. July-2018

L T P C
3 1 0 4

Unit 1: Introduction to Computer Architecture, Evolution of Computer Architecture, Parallel Computing, Parallel Architectural Classification Schemes: Flynn's, Shores, Feng's Classification; Performance of Parallel Processors: Speedup Performance Laws, Amdahl Law, and Gustafson Law, Performance Metrics and Measures. [8]

Unit 2: Pipeline Processing: Introduction to Pipeline Processing, Arithmetic Pipelines, Pipelined Instruction Processing, Instruction Level Parallelism. Interlocks, Hazards, and Hazards Detentions & Resolution, Scheduling of Pipelines. [8]

Unit 3: Processor Architectures: Superscalar Architecture, Vector Architecture and VLIW Architecture, Super pipeline design, Memory Technology: Cache Architecture; Cache Coherence and Synchronization Mechanisms, Shared-Memory Organizations. [10]

Unit 4: Synchronous Parallel processing, SIMD Architecture and programming principals, SIMD parallel algorithm, DATA mapping and memory in Array Processor. [10]

Unit 5: Interconnection Network, introduction to permutations, group of mapping, decomposition of a permutation into cycles, elementary permutation used in interconnection network, complete non-blocking network, cross bar network, Clos network, Benes's network, shuffle exchange network. [8]

REFERENCES

1. Peterson & Heresy, "Quantitative approach to computer Architecture",
2. Kai Hwang, "Advanced Computer Architecture", McGraw Hill International.
3. "Morgan Kaufman". Quin, "Parallel computing, Theory & Practices", McGraw Hill
4. Bhujde, "Parallel Computing", New Age International Hwang, "Advance Computer Architecture"

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Real Time System, Subject Code: CS-320
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

UNIT 1

Introduction- Introduction to Real Time Systems, Structure of Real Time System, Various Classification of Real Time Systems, Embedded System, Characterizing Real Time System & Task, Various Issues in Real Time System. [6]

UNIT 2

Task Assignment & Scheduling- Classical Uniprocessor Scheduling Algo- Rate Monotonic, EDF. Uniprocessor Scheduling of IRIS Tasks, Identical and Nonidentical Linear & Concave Reward Function, 0/1 Reward Function. Task Assignment Algorithms- Utilization Balancing, A Next-Fit Algorithm for RM Scheduling, A Myopic Offline Scheduling FAB Algorithm & Buddy Strategy. [10]

UNIT 3

Real Time Database: Real Time vs. General purpose Database, Main Memory database, Concurrency Control Issues, Real Time OS- Threads and Tasks, Kernel, Case Study of QNX, VRTX, Vx Works. [8]

UNIT 4

Fault Tolerance Techniques- Introduction Fault, Fault Detection and Error Containment, Redundancy Data Diversity, Reversal Checks, Malicious & Integrated Failure Handling. Clock Synchronization: Introduction Clocks, A Nonfault Tolerant Synchronization Algorithms, Impact of Fault, Fault Tolerant Synchronization in H/Wand S/W. [8]

UNIT 5

Real Time Communication- Introduction, N/W Topologies, Protocols: Internet & Resource Reservation Protocols, Real Time Protocol, Contention-Based Protocol. [8]

REFERENCE

1. C.M. Krishna & Shin, "Real Time Systems", Mc Graw Hill 1985.
2. Jane W.S. LIU, "Real Time Systems", Pearson Education".
3. Levi & Agarwal, "Real Time System", McGraw Hill.

Recommended Prerequisite – None

Co-requisite - None

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Concepts in Advanced Database system, Subject Code: CS-346
SYLLABUS REVISED-2018-19
w.e.f. July-2018

L T P C
3 1 0 4

UNIT 1 Clustering & Indexing, Query Processing, Estimations for Query Processing Cost Algorithms for executing selection Operations, Algorithms for executing Join Operations, Algorithm for executing Project Operations. Query Optimization: Heuristics for Query Optimizations, Query Evaluation Plans, Pipelined Evaluations, System Catalogue in RDBMS.

UNIT 2 Database Tuning: Database Workloads, Tuning Decisions, DBMS Benchmarks, Multiple Attribute Search Keys, Extended Relational Model & Object Oriented Database System: Requirement, Properties, Structured Types, Object Identity, Containment, and Class Hierarchy, Logic Based Data Model, and Nested Relational model.

UNIT 3 Distributed Database System: Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel & Pipeline Join, Concurrency Control in Distributed Database System, Recovery in Distributed Database System, Distributed Deadlock Detection and Resolution, Commit Protocols.

UNIT 4 Database Securities: Database Security, Access Control and Grant & Revoke on Views and Integrity Constraints, Mandatory & Discretionary Access Control, Role of DBA, Security in Statistical Databases.

UNIT 5 Enhanced Data Model for Advanced Applications: Database Operating System, Introduction to Temporal Database Concepts, Introduction to Spatial and Multimedia Databases, Introduction to Data Mining, Introduction to Active Database System & Deductive Databases, Database Machines, Web Databases.

REFERENCES:

1. Majumdar & Bhattacharya, "Database Management System", TMH.
2. Korth, Silberchatz, Sudarshan, "Database Concepts", Addison Wesley.
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.
4. Date C.J., "An Introduction to Database System", Addison Wesley.
5. Ramakrishnan, Hadzilacous, Goodman, "Concurrency Control & Recovery", Addiosn Wesley.
6. Ceri & Palgatti, "Distributed Databases", McGraw Hill.

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Software Project & Quality Management, Subject Code: CS-311
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

UNIT 1

Overview of Software Project Planning Software Project, Categorization of Software Project, Introduction to Stepwise Project Planning: Identify Project Scope and objectives, Identify Project Infrastructure, Project Products and Activities, Activity risks, Resource Allocation, Project Plan Execution. [8]

UNIT 2

Project Evaluation: Strategic Program Management, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost-Benefit Evaluation Techniques: Net profit, Payback Period, Return on Investment, Net Present Value, Internal Rate of Return, Risk Evaluation, Selection of Technologies, overview of software development models. [8]

UNIT 3

Software Effort Estimation an Overview, Project Schedules, Network Planning Models, Activity Duration Estimation, and Risk Management: Identification, Analysis and Abatement of Risk. [8]

UNIT 4

Resource Allocation: Nature of resources, Identifying Resource Requirements, Scheduling Resources, Creating Critical Path, Counting the Cost, Cost Schedules. Monitoring and Control: Visualizing progress, Cost Monitoring, Prioritizing Monitoring, Getting Project Back to Target, Change Control. [8]

UNIT 5

Contract Management, Human Resource Management, Software Quality Definition, Software Quality Assurance, Quality Assurance Plan, Quality Matrices, ISO Standards, CMM, Six Sigma Approach. [8]

REFERENCES

1. Software Project Management by Bob Hughes and Mike Cotterell, Third Edition, TMH.
2. Information Technology Project Management by Kathy Schwalbe, International Student Edition, THOMSON Course Technology, 2003.
3. Software Quality by Mordechai Ben-Menachem/Garry S Marliss. Thomson Learning Publication
4. Software Project Management A Unified Framework by Walker Royce. Pearson Education.

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Compiler Design Lab, Subject Code: CS-316
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
0 0 2 1

1. Write a program to implement TOKENIZER.
2. Write a program using call statement and CASE statement.
3. Write a program to find out FIRST / FOLLOW of grammar.
4. Evaluate POSTFIX and PREFIX expression with the help of stack.
5. Write a program to implement OPERATOR PRECEDENCE PARSER.
6. Design a parser like RECURSIVE DESCENT PARSER.
7. Design PREDICTIVE PARSER.
8. Design I.R(0) PARSER.

Recommended Prerequisite – None

Co-requisite - Compiler Design (CS 315)

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Microprocessor Lab, Subject Code: CS-314
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
0 0 2 1

LIST OF EXPERIMENTS

1. Programming with 8086 8 bit/ 16-bit multiplication/ division arithmetic operation.
2. Programming with 8086- code conversion, decimal arithmetic, bit manipulations.
3. Programming with 8086- arrays manipulation, search, find and replace, copy operations, sorting.
4. Programming for parallel interfacing.
5. Programming for serial interfacing.
6. Programming for verification of interrupts.
7. Programming for interfacing with timer.
8. Other interfacing program based on availability of equipments.
9. Programming for Analog to Digital conversion (ADC) and (DAC)
10. Programming using Look up table (concept of look up table)

Recommended Prerequisite – None

Co-requisite - Microprocessor and its Applications (CS 313)

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Computer Networks Lab, Subject Code: CS-306
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
0 0 2 1

Recommended Prerequisite – None
Co-requisite – Computer Networks (CS 305)

SECTION – A (Study of LAN Trainer Kit)

(A) MAC LAYER

1. Simulate ALOHA protocol for packet transmission between a no. of Nodes connected to a common bus.
2. Simulate CSMA protocol for packet transmission between a no. of Nodes connected to a common bus.
3. Simulate CSMA/CD protocol for packet transmission between a no. of Nodes connected to a common bus.
4. Simulate TOKEN BUS for bus LAN.
5. Simulate TOKEN BUS for ring LAN.

(B) DATA LINK LAYER

6. Simulate PACKET TRANSMISSION from one Node to another Node.
7. Simulate SLIDING WINDOW protocol to provide reliable data transfer between two nodes over an unreliable Network.
8. Simulate STOP & WAIT protocol for packet transmission between a no. of nodes.

(C) APPLICATION LAYER

9. Simulate FILE TRANSFER protocol to check transfer of file and receiving of file between two nodes.

SECTION – B (Study of Packet Tracer Simulator)

10. Simulation of setting up router name and password.
11. Simulation of setting up telnet, MOTD banner, etc.
12. Simulation of testing telnet connection.
13. Simulation of Cisco Password Encryption.
14. Simulation of switch configuration.
15. Simulation of basic router configuration.
16. Simulation of Cisco port security.
17. Simulation of Static Route.
18. Simulation of default Route.
19. Simulation of Rip Configuration
20. Simulation of Spanning Tree Protocol

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Green Computing, Subject Code: CS-347
SYLLABUS REVISED-2022
w.e.f. July-2022

L T P C
3 1 0 4

UNIT I: FUNDAMENTALS:

[8]

Green IT Fundamentals: Business, IT, and the Environment –Environmental Impacts of IT, Green IT, Holistic Approach to Greening IT, Greening IT, Applying IT for enhancing Environmental sustainability, Green IT Standards and Eco-Labeling of IT, Enterprise Green, IT strategy, Green IT: Burden or Opportunity?

UNIT II: Green Devices and Hardware with Green Software

[9]

Green Devices Hardware/Software: Introduction, Life Cycle of a device or hardware, Reuse, Recycle and Dispose, Energy-saving software techniques, Evaluating and measuring software Impact to platform power

UNIT III GREEN ASSETS AND MODELING and GRID FRAMEWORK

[9]

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration –Green Information Systems: Design and Development Models.

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV: GREEN COMPLIANCE and Social Aspects

[9]

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future. Introduction, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social media.

UNIT V: Regulating the Green IT and CASE STUDIES

[9]

Introduction, The regulatory environment and IT manufacturers, Non regulatory government initiatives, Industry associations and standards bodies, Green building standards, Green data centers, Social movements and Greenpeace.

Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

OUTCOMES:

- Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
- Enhance the skill in energy saving practices in their use of hardware.
- Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
- Understand the ways to minimize equipment disposal requirements .

Reference Books:

1. Bhuvan Unhelkar, —Green IT Strategies and Applications-Using Environmental Intelligencel, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, —Green Home computing for dummiesl, August 2012.
3. Harnessing Green IT Principles and Practices , San Murugesan, G.R. Gangadharan, Wiley Publication, ISBN:9788126539680

Integral University, Lucknow
Department of Computer Science & Engineering
Subject Name: Human Computer Interaction, Subject Code: CS-348
SYLLABUS REVISED-2017
w.e.f. July-2017

L T P C
3 1 0 4

Unit 1: Introduction to user-centric design – case studies, historical evolution, issues and challenges and current trend, Engineering user-centric systems – relation with software engineering, iterative life-cycle, prototyping, guidelines, case studies.

Unit 2: User-centric computing – framework, introduction to models, model taxonomy, Computational user models (classical) – GOMS, KLM, Fitts’ law, Hick-Hyman’s law.

Unit 3: Computational user models (contemporary) 2D and 3D pointing, constrained navigation, mobile typing, touch interaction, Formal models – case study with matrix algebra, specification and verification of properties, formal dialog modeling.

Unit 4: Empirical research – research question formulation, experiment design, data analysis, statistical significance test. Case Study 1- Multi-Key press Hindi Text Input Method on a Mobile Phone.

Unit 5: User-centric design evaluation – overview of evaluation techniques, expert evaluation, user evaluation, model-based evaluation with case studies. Case Study 2 – GUI design for a mobile phone based Matrimonial application.

References:

1. Samit Bhattacharya (July, 2019). Human-Computer Interaction: User-Centric Computing for Design, McGraw-Hill India, Print Edition: ISBN-13: 978-93-5316-804-9; ISBN-10: 93-5316-804-X, E-book Edition: ISBN-13: 978-93-5316-805-6; ISBN-10: 93-5316-805-8.
2. Dix A., Finlay J., Abowd G. D. and Beale R. Human Computer Interaction, 3rd edition, Pearson Education, 2005.
3. Preece J., Rogers Y., Sharp H., Baniyon D., Holland S. and Carey T. Human Computer Interaction, Addison-Wesley, 1994.
4. B. Shneiderman; Designing the User Interface, Addison Wesley 2000 (Indian Reprint).