

**Integral University Lucknow**  
**Study & Evaluation Scheme**  
**B. Tech. (Computer Science & Engg.)**  
**(w.e.f. 2021-22)**

**YEAR II, Semester- IV**

S. No.	Subject Code	Category	Subject	Periods				Evaluation Scheme				Subject Total
				L	T	P	C	Sessional		Exam.		
								CT	TA	Total	ESE	
1	CS207	DC	Computer Graphics	3	1	0	4	40	20	60	40	100
2	MT206	ESA	Mathematical Analysis	3	1	0	4	40	20	60	40	100
3	CS212	DC	Data Base Management System	3	1	0	4	40	20	60	40	100
4	CS284	DC	Computer Organization & Architecture	3	1	0	4	40	20	60	40	100
5	ES202	ESA	Disaster management	2	1	0	3	40	20	60	40	100
6	CS281	DC	Graph Theory & Applications	3	1	0	4	40	20	60	40	100
7	CS285	DC	Computer Organization & Architecture Lab	0	0	2	1	30	30	60	40	100
8	CS283	DC	Computer Graphics Lab	0	0	2	1	30	30	60	40	100
9	CS282	DC	Advance Java Programming Lab	0	0	2	1	30	30	60	40	100
10	CS220	DC	DBMS Lab	0	0	2	1	30	30	60	40	100
11	CS286	DC	Comprehensive Annual Assessment - I	0	0	0	1	100	0	100	0	100
<b>Total</b>				<b>17</b>	<b>6</b>	<b>8</b>	<b>28</b>	<b>370</b>	<b>210</b>	<b>580</b>	<b>520</b>	<b>1100</b>

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

**Sessional Total (CA) = Class Test + Teacher Assessment**

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

**DC- Departmental Core**

**DE- Departmental Elective**

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

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE) , 2<sup>nd</sup> Year/4<sup>th</sup> Semester**  
**Subject Name: Computer Graphics**  
**Subject Code: CS207**  
**w.e.f. 2020-2021**

**L T P C**  
**3 1 0 4**

<b>CO 1</b>	Know about the concept of Computer Graphics components and their relevance to classical and modern problems.
<b>CO 2</b>	Know about the concept of writing algorithms for Line generation, Curve generation, Display File, Segments and Polygon filling.
<b>CO 3</b>	Know about the concept of mapping from a world coordinate system to device coordinates, clipping, and projections.
<b>CO 4</b>	Know about the concept and principles of Two Dimensional & Three Dimensional Computer Graphics primitive operations (Translation, Scaling, Rotation, Reflection, Shearing and problems based on these).
<b>CO 5</b>	Know about the concept of Curve generation, Hidden line surface removal techniques and concepts on Animation.

**UNIT 1**

Introduction: Representing Pictures, Pixels and Frame Buffers, Vector and Character Generation. Graphics Primitives: Display Devices, Primitive Devices, Display File Structure, Display Control Text. Line Drawing Algorithms: Digital Differential Analyzer, Bresenham's Algorithms. Circle Generation: Bresenham's, Mid Point Algorithm. [8]

**UNIT 2**

Polygon: Polygon Representation, Entering Polygons, Filling Polygons: Flood Fill Algorithm, Boundary-Fill Algorithm and Scan-line Polygon Filling Algorithm.  
Segments: Segments Table, Creating Deleting and Renaming Segments, Visibility, Image Transformations. [8]

**UNIT 3**

Two Dimensional Transformations: Representation of Points, Homogeneous Coordinates. Transformation: Translation, Rotation, Scaling, Reflection, Shearing. Windowing : Introduction, Viewing Transformation- Window to Viewport Coordinate Transformation Multiple Windowing. Clipping: Line Clipping- Cohen-Sutherland, Midpoint Subdivision, Cyrus-Beck Algorithm, Polygon Clipping-Sutherland-Hodgman. [8]

**UNIT 4**

Three Dimensional Transformation: 3-D Geometry Primitives, Transformations: Translation, Rotation, Scaling, Reflection, Shearing. Projection: Orthographic, Axonometric, Oblique, Perspective. [7]

**UNIT 5**

Hidden Line and Surface: Back Face Removal Algorithms, Hidden Line Methods: Floating Horizon, Z-Buffer, Painter's Algorithm, Warnock's Algorithm. Introduction to Curve Generation, Bezier, Hermite and B-spline Algorithms and their Comparisons. Surface Rendering: Simple Illumination Model, Phong & Gourad Shading. Animation: Introduction, Design of Animation Sequences, Keyframe System, Parameterized System, Morphing, Motion Specification.. [9]

**REFERENCES :**

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill.
2. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.
3. Newman and Sproul, "Principle of Interactive Computer Graphics", Mc G raw Hill.
4. Steven Harrington, "Computer Graphics", A programming Approach 2nd Edition.
5. Hearn & Baker, "Computer Graphics.

**Integral University, Lucknow**  
**Department of Mathematics**  
**B.Tech: 2<sup>nd</sup> year / 4<sup>th</sup> Semester**  
**Subject: Mathematical Analysis (For CSE only) Subject Code: MT206**  
**(Revised w.e.f. session 2017-18)**

**L T P C**  
**3 1 0 4**

CO 1	Describe the fundamental properties of the real numbers that underpin the formal development of real analysis;
CO 2	Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration;
CO 3	Demonstrate skills in constructing rigorous mathematical arguments;
CO 4	Apply the theory in the course to solve a variety of problems at an appropriate level of difficulty;
CO 5	Demonstrate skills in communicating mathematics.

**Unit-I** **[8]**

**Algebraic & Transcendental Equations**

Bisection Method, Iteration Method, False Position Method, Newton-Raphson Method. Rate of Convergence of Methods. Solution of system of linear equations by LU decomposition method.

**Unit-II** **[8]**

**Interpolation**

Finite differences, Newton's forward & backward formula, Gauss forward and backward formula for equal intervals. Lagrange's and Newton's divided difference formula for unequal intervals, Numerical differentiation.

**Unit-III** **[8]**

**Numerical Integration & Solution of Ordinary Differential Equations**

Numerical Integration by Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Boole's & Weddle's Rule.

Numerical solution of ordinary differential equations by Euler's Method, Modified Euler's Method and Runge-Kutta Method.

**Unit-IV** **[8]**

**Complex Analysis**

Analytic functions, C-R equations, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Conformal mapping, Bilinear transformation.

**Unit- V** **[8]**

**Statistics and Probability**

Correlation and Regression Analysis, Definition of Probability: Classical and Axiomatic, Conditional Probability, Baye's theorem, Binomial Distribution, Poisson distribution and Normal Distribution.

**Reference Books:**

1. Sastry, Introductory method of Numerical Analysis, PHI, New Delhi.
2. Balaguruswamy, Numerical method, TMH, New Delhi.
3. Jain, Iyengar, Jain, Numerical Methods for Scientific & Engineering Computations, New Age International, New Delhi.
4. P. Kandasamy, Numerical Methods, S. Chand & Company, New Delhi.
5. H.K. Dass, Introduction to Engineering Mathematics, S. Chand & Company, New Delhi.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publication.
7. Q.S. Ahmad, Z.Khan & S.A.Khan, Numerical and Statistical Techniques, Ane Books Pvt. Ltd., New Delhi.

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE) , 2<sup>nd</sup> Year/4<sup>th</sup> Semester**  
**Subject Name: Database Management System, , Subject Code: CS-212**  
**SYLLABUS REVISED-2020**  
**w.e.f. session 2020-21**

**L T P C**  
**3 1 0 4**

<b>CO 1</b>	Acquire knowledge on concepts of database management system and ER Model
<b>CO 2</b>	Acquire skills to understand the relational data model and write SQL queries
<b>CO 3</b>	Have knowledge about good database design and normalization
<b>CO 4</b>	Acquire knowledge on implementing database indices and build concepts on database transactions
<b>CO 5</b>	Acquire skills to deal with concurrent transactions in a database management system

#### UNIT 1

**Introduction:** An Overview of Database Management System, Database System Vs File System, Database System Concepts and Architecture, Data Models Schema and Instances, Data Independence and Data Base Language and Interfaces, Data Definitions Language, DML, Overall Database Structure.

**Data Modeling Using the Entity Relationship Model:**

ER Model Concepts, Notation for ER Diagram, Examples based on E-R diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationships of Higher Degree.

[8]

#### UNIT 2

**Relational Data Model and Language:** Relational Data Model Concepts, Integrity Constraints: Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus.

**Introduction to SQL:** Characteristics of SQL. Advantage of SQL. SQL Data Types and Literals. Types of SQL Commands. SQL Operators and Their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

Queries based on above concepts.

[8]

#### UNIT 3

**Data Base Design & Normalization:**

Functional Dependencies, Normal Forms, First, Second, Third Normal Forms, BCNF, Inclusion Dependences, Loss Less Join Decompositions, Normalization using FD, MVD, and JDs, Alternative Approaches to Database Design.

Storage and File Structure, Overview of Physical Storage Media, File Organization, Organization of Records in File, Data Dictionary Storage.

[8]

#### UNIT 4

**Indexing & Hashing:** Basic Concepts, B+ Tree Index Files, B- Tree Index Files, Static Hashing, Dynamic Hashing.

**Transaction Processing Concepts:** Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling.

[8]

#### UNIT 5

**Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction.

[8]

#### REFERENCES

1. Korth, Silbertz, Sudarshan, "Data base concepts", McGraw-Hili
2. Elmasari, Navathe, "Fundamentals of Database Systems", Addison Wesley
3. Date C.J., "An Introduction to Database Systems", Addison Wesley

**Integral University, Lucknow**  
**Department of Computer Science &**  
**Engineering B.Tech (CSE) , 2<sup>nd</sup> Year/4<sup>th</sup>**

**Subject Name: Computer Organization & Architecture,**  
**Subject Code: CS-284**  
**w.e.f. session 2020-21**

**L T P C**  
**3 1 0 4**

<b>CO 1</b>	Define registers, bus as well as memory and its hierarchy and input/output devices.
<b>CO 2</b>	Explain division based algorithms for different representation of data and discuss I/O interfaces, ports and Data Transfer modes
<b>CO 3</b>	Apply register and stack organization and construct different control units.
<b>CO 4</b>	Classify types of memory and memory mapping of one type with other
<b>CO5</b>	Acquire knowledge on the working of high performance processors

### **Unit 1**

#### **Introduction to Computer Organization & Architecture**

Elements of Digital Computer, Bus Architecture and Bus Arbitration, Micro-operation, Register Transfer, Bus and Memory Transfer, Data Representation, Addition and Subtraction of Signed Numbers, Booth Algorithm.

[09]

### **Unit 2**

#### **Memory and Processor Organization**

Memory: Main, Cache, Auxiliary and Virtual Memory, Concept of Address Mapping, Addressing Modes, Central Processing Unit (CPU): Single Accumulator, General Register, and Stack Organization. RISC and CISC Characteristics.

[08]

### **Unit 3**

#### **Hardwired and Micro Programmed Control**

Instruction Formats, Instruction and Interrupt Cycle, Timing and Control, Hardwired Control Design: Design of Computer Registers, Execution of a Computer Instruction, MicroProgrammed Control Design: Basic Concept of MicroProgrammed Control design, Microprogram Sequencer.

[08]

### **Unit 4**

#### **Parallel and Pipeline Processing**

Introduction to Parallel Processing, Parallel Architecture Classification, Performance of Parallel Processors, Pipelining: Introduction, Arithmetic Pipeline, Instruction Pipeline, Introduction to different types of available computers.

[07]

### **Unit 5**

#### **High Performance Processors**

Superscalar, Vector, and VLIW Architecture, Cache Architecture: Cache Coherence and Synchronization Mechanism, Interconnection Network for Parallel Computers.

[08]

### **References**

1. "Computer System Arch." By- Morris Mano, Prentice Hall India, New Delhi.
2. "Computer Organization." By- Vranesic & Hamacher, Tata Mgraw Hill, New Delhi
3. "Kai Hwang", Advanced Computer Architecture, McGraw Hill International.
4. "Moreswar R. Bhujade", Parallel Computing, New Age International.

**Integral University, Lucknow**  
**Department of Computer Science &**  
**Engineering B.Tech (CSE) , 2<sup>nd</sup> Year/4<sup>th</sup>**  
**Subject Name: Disaster Management**  
**Subject Code: ES-202**  
**SYLLABUS REVISED-2020**  
**w.e.f. session 2020-21**

**L T P**  
**2 1 0**

<b>CO 1</b>	To familiarize the students with basic management principles relating to disaster management and mitigation techniques.
<b>CO 2</b>	To gain understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
<b>CO 3</b>	To prevent and control Public Health consequences of Disasters
<b>CO 4</b>	To enhance awareness of Disaster Risk Management institutional processes

### **UNIT 1**

Concept of Disaster Management. Types of disaster and their impact: Natural and Man made like- Earthquakes, Floods, Droughts, Cyclones, Avalanches, Forest Fires, Terrorism related disaster etc.

Assessment of Human and Economic Losses.

### **UNIT 2**

Impact of Extensive Industrialization, Impact of Global Warming and Environmental degradation, National and Global Disaster.

### **UNIT 3**

National Policy for Disaster Management, Elementary knowledge of the disaster management Act 2005. Types of Responses: Central, State, District level, People's community participation in Disaster management.

Post Disaster management and Rehabilitation measures.

### **UNIT 4**

Capacity building for meeting disasters. Long- term measures for prevention of Disasters. Mitigation techniques/ Strategies: Early Warning Systems, Data sharing at National and International Levels.

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE) , 2<sup>nd</sup> Year/3<sup>rd</sup> Semester**  
**Subject Name: Cyber Law And Information Security, Subject Code:CS-203**  
**SYLLABUS REVISED-2020**  
**w.e.f. session 2020-21**

**L T P C**  
**2 1 0 3**

<b>CO 1</b>	Understand key terms and concepts in cyber law, intellectual property and cyber crimes( internet security threats), trademarks and domain theft
<b>CO 2</b>	Keep an appropriate level of awareness, knowledge and skill on the disciplines of technology, E-business and law to allow them to minimize the occurrence and severity of information security incidents
<b>CO 3</b>	Understand about Information System and principles of Information Security (as confidentiality, integrity, and availability)
<b>CO 4</b>	Understand about cryptography and techniques used to detect and prevent network intrusions

**Unit1**

Fundamentals of Cyber Law: Jurisprudence of Cyber Law, Object and Scope of the IT Act 2000, Introduction to Indian Cyber Law, Unicitral Model Law, ISP Guideline.

Intellectual property issues and cyber space, Indian perspective, Overview of Intellectual property related legislation in India, Patent, Copy Right, Trademark law, Law related to semiconductor layout & design. [7]

**Unit 2**

E - Commerce: Security Threats to E - Commerce, Virtual Organization, Business Transactions on Web, E-Governance and EDI, Concepts in Electronics payment systems, E-Cash, Credit/Debit Cards, E- Agreement, Legal recognition of electronic and digital records, E- Commerce Issues of privacy, Wireless Computing- Security challenges in Mobile devices.

Digital Signatures - Technical issues, legal issues, Electronic Records, Digital Contracts, Requirements of Digital Signature System. [8]

**Unit 3**

Investigation and Ethics: Cyber Crime, Cyber jurisdiction, Cyber crime and evidence act, Treatment of different countries of cyber crime, Ethical issues in data and software privacy, Plagiarism, Pornography, Tampering computer documents, Data privacy and protection, Domain Name System, Software piracy, Issues in ethical hacking.

Internet security threats: Hacking, Cracking, Sneaking, Viruses, Trojan horse, Malicious Code & logic bombs. Introduction to biometric security and its challenges, Finger prints.

Cyber crime forensic: CASE STUDY in Cyber Crime. [8]

**Unit 4**

Information security- Information Systems and its Importance, Role of Security in Internet and Web Services, Principles of Information Security, Classification of Threats and attacks, Security Challenges, Security Implication for organizations, Security services - Authentication, Confidentiality, Integrity, Availability and other terms in Information Security, Information Classification and their Roles.

Introduction to Cryptography, Issues in Documents Security, Keys: Public Key, Private Key, Firewalls, Basic Concepts of Network Security, Perimeters of Network protection & Network attack, Need of Intrusion Monitoring and Detection. [9]

**References:**

1. Harish Chander “Cyber Law and IT Protection” , PHI Publication, New Delhi
2. Merkov, Breithaupt,“ Information Security”, Pearson Education
3. “Cyber Law in India” - Farooq Ahmad-Pioneer books.
4. K. K. Singh, Akansha Singh “Information Security and Cyber law”, Umesh Publication, Delhi

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**nd th**  
**B.Tech (CSE), 2 Year/4 Semester**  
**Subject Name: Computer Organization & Architecture Lab**  
**Subject Code: CS-285**  
**w.e.f. session 2020-21**

**L T P C**  
**0 0 2 1**

1. Design & Implementation of various flip flop SR, JK, D and T.
2. Design & Implementation of half adder and full adder circuit.
3. Design & Implementation counters.
4. Design & Implementation Registers.
5. Design of arithmetic and logic unit.
6. Register level design of 4 bit magnitude comparator.
7. Design & Implementation of 2\*2 bit unsigned multiplier.
8. Design & Implementation of associative memory cell.
9. Design & Implementation of MUX & DEMUX.
10. Design & Implementation of ADC & DAC circuit

Note: Some more experiments can be added



**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE), 2<sup>nd</sup> Year/4<sup>th</sup> Semester**  
**Subject Name: Comprehensive Annual Assessment - I: CS-286**  
**w.e.f. session 2020-21**

## Guidelines

Objective	The objective of comprehensive viva-voce is to assess the overall knowledge of the student in 2 years of study in the undergraduate program.
Contents	The viva shall normally cover the subjects taught in 3 <sup>rd</sup> & 4 <sup>th</sup> semester of B.Tech Programme.
Learning Outcomes	Viva will be conducted in 4 <sup>th</sup> semester which will be covering the syllabus of 3 <sup>rd</sup> and 4 <sup>th</sup> semester. In doing so, the main objective of this course is to prepare the students to face interview both in the academic and the industrial sector.
Examination	Every student will be required to undergo comprehensive viva-voce at the end of 4 <sup>th</sup> semester of B.Tech Programme. The duration of the viva will range from 15-30 min. The examination committee will be constituted by the HoD and consist of at least three faculty.
Passing marks	50%

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE) , 2<sup>nd</sup> Year/3<sup>rd</sup> Semester**  
**Subject Name: DBMS Lab, Subject Code: CS-220**  
**SYLLABUS REVISED-2020**  
**w.e.f. session 2020-21**

L T P C  
0 0 2 1

1. Database design using E-R Model and Normalization.
2. Write the queries for DDL, DML & DCL.
3. Write Queries using Logical Operators (=, <, > etc.)
4. Write queries using SQL operators (BETWEEN...AND, IN(list), LIKE, ISNULL and along with Negation expressions.)
5. Write SQL query using Character, Number, Date and Group Functions.
6. Write SQL Queries for Relational Algebra (UNION, INTERSECT and MINUS etc.)
7. Write queries for extracting data from more than one table (Equi-Join, Non-Equi Join, Outer Join)
8. Write SQL Queries for Sub queries, Nested queries.
9. Concept of COMMIT, ROLLBACK and CHECK POINTS.
10. Creation of Views.
11. Write programs by the use of PL/SQL (Procedures and Functions.)
12. High-level language extension with Cursor and with Triggers.
13. Creation of Forms & Reports.
14. Design and Implementation of the Mini Project.

**Integral University, Lucknow**  
**Department of Computer Science & Engineering**  
**B.Tech (CSE) , 2<sup>nd</sup> Year/4<sup>th</sup> Semester**  
**Subject Name: Advance Java Programming Lab: CS-282**  
**w.e.f. session 2020-21**

L T P C  
0 0 2 1

S.No.	List of Experiments
1.	Understanding Concept of Applet and Drawing Methods
2.	Understanding Concept of AWT and Event Handling
3.	Introduction to Java Swing
4.	Understanding the Concept of JDBC
5.	Understanding the concept of RMI
6.	Understanding the concept of Socket Programming
7.	Introduction to Java Servlet,HTTP request and response program
8.	Introduction of Cookies in Servlet
9.	Introduction to JSP
10.	Introduction to Exception Handling and Action Elements in JSP.