**DEPARTMENT OF TECHNOLOGY**

**SECOND YEAR B.TECH**

**COMPUTER SCIENCE AND TECHNOLOGY**

Scheme of Teaching and Examination
Semester – III

| Subject Code | Subject | Teaching Scheme (Hours / Week) | | | | Examination Scheme (Marks) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | Practical | | |
| | | L | T | P | Credit | Scheme | Max. marks | Min. Passing $ | Scheme | Max. marks | Min. Passing |
| MA211 | Engineering Mathematics-III | 3 | 1 | - | 04 | CIE | 50 | 20 | IOE | 50 | 20 |
| | | | | | | SEE | 50 | 20 | | | |
| CS211 | Discrete Mathematical Structure | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS212 | Digital System and Microprocessor | 4 | - | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS213 | Data Structures with C | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS214 | Data Communication | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS212L | Digital System and Microprocessor Lab | - | - | 2 | 01 | -------- | -------- | -------- | IPE | 50 | 20 |
| | | | | | | | | | EPE | 50 | 20 |
| CS213L | Data Structures Lab | - | - | 4 | 02 | -------- | -------- | -------- | IPE | 50 | 20 |
| | | | | | | | | | EPE | 50 | 20 |
| CS215L | Unix And Shell Programming | 1 | - | 2 | 02 | -------- | -------- | -------- | EOE | 50 | 20 |
| | **Total** | **17** | **4** | **8** | **25** | | **500** | | | **300** | |

| Subject Code | Subjects | Teaching Scheme | | | | Marks | | Total marks |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | Credit | | | |
| Audit Course | | | | | | | | |
| HS211 | Introduction to Performing Arts | 1 | - | 2 | Institute Level | | | |
| HS212 | Environmental Studies | 4 | - | - | - | **Theory** | **70** | **100** |
| | | | | | | **Project** | **30** | |

**Total Credits: 25**
**Total Contact Hours/Week: 29**

**Note:**
$: Minimum 40% marks required in SEE as passing head.

• Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE – Continuous Internal Evaluation, SEE – Semester End Examination,
IPE – Internal Practical Evaluation, EPE–External Practical Examination,
IOE– Internal Oral Evaluation, EOE–External Oral Examination

**DEPARTMENT OF TECHNOLOGY**
**SECOND YEAR B.TECH**

**COMPUTER SCIENCE AND TECHNOLOGY**

Scheme of Teaching and Examination
Semester – IV

| Subject Code | Subject | Teaching Scheme (Hours / Week) | | | | Examination Scheme (Marks) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | | Practical | | |
| | | L | T | P | Credit | Scheme | Max. marks | Min. Passing $ | Scheme | Max. marks | Min. Passing |
| CS221 | Theory of Computation | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS222 | Advanced Microprocessor | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS223 | Computer Organisation | 4 | - | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS224 | Computer Networks | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS225 | Computer Graphics and Multimedia Techniques | 3 | 1 | - | 04 | CIE | 50 | 20 | -------- | ------- | -------- |
| | | | | | | SEE | 50 | 20 | -------- | ------- | -------- |
| CS222L | Advanced Microprocessor Lab | - | - | 2 | 01 | -------- | -------- | -------- | IPE | 50 | 20 |
| | | | | | | | | | EPE | 50 | 20 |
| CS225L | Computer Graphics Lab | - | - | 2 | 01 | -------- | -------- | -------- | IPE | 50 | 20 |
| | | | | | | | | | EPE | 50 | 20 |
| CS226L | Object Oriented Lab | 2 | - | 2 | 03 | -------- | -------- | -------- | IPE | 50 | 20 |
| | | | | | | | | | EPE | 50 | 20 |
| | **Total** | **18** | **4** | **06** | **25** | | **500** | | | **300** | |

| Subject Code | Subjects | Teaching Scheme | | | | Marks | | Total marks |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | Credit | | | |
| HS221 | Introduction to Foreign Languages | 1 | 1 | - | - | | | |

**Total Credits: 25**
**Total Contact Hours/Week: 28**

**Note:**
$: Minimum 40% marks required in SEE as passing head.

• Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE – Continuous Internal Evaluation, SEE – Semester End Examination,
IPE – Internal Practical Evaluation, EPE–External Practical Examination,
IOE– Internal Oral Evaluation, EOE–External Oral Examination

## Detailed Examination Scheme

1. Out of total 100 theory marks, 50 marks are allotted for Continuous Internal Evaluation (CIE). In CIE minimum 20 marks are required to become eligible for Semester End Examination. (SEE).

2. CIE (50 marks) includes :

    - Internal Test – 1, of 25 marks in $5^{th}$ week on $1^{st}$ and $2^{nd}$ unit
    - Internal Test - 2, of 25 marks in $10^{th}$ week on $3^{rd}$ and $4^{th}$ unit

3. For the Semester End Examination (SEE), 100 marks (3 hrs.) paper will be set and finally it will be converted to 50 marks, in which student must secure minimum 40 % i.e. 20 marks as an university examination passing head.
4. Final theory marks (out of 100) will be the addition of CIE (out of 50 marks) and SEE (out of 50 marks).
5. Internal Practical Evaluation (IPE) will be assessed on the basis of Internal Oral/ Practical/Tutorials/seminar in which student must secure minimum 40% i.e. 20 marks.
6. *Semester End Examination duration will be 4 hrs.

## Academic Autonomy:

1. Flexibility in deciding Structure and Contents of Curriculum with reasonable frequency for changes in the same.
2. Continuous Assessment of Students performance with newly adopted - Credit System based on Award of Grade.
3. Credits are quite simply a means of attaching relative values to courses different components. They are a currency of learning, and in general regarded as a measure of the time typically required to achieve a given curricular outcome.
4. All subjects (year-wise) under each course/discipline are unitized.

## Credit system:

Education at the Institute is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programmes are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

## Course credits assignment:

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

**Lectures and Tutorials:** One lecture or tutorial hour per week per semester is assigned one credit.

**Practical/Laboratory:** One laboratory hour per week per semester is assigned half credit.

**Example:** Course: Digital Systems and Microprocessors: 5 credits (4-0-2)

The credits indicated for this course are computed as follows:

3 hours/week lectures = 4 credits

0 hours/week tutorial = 0 credit

2 hours/week practical = 2 × 0.5 = 1 credit

Also, (4-0-2) **5**credit course = (**4** h Lectures + **0** h Tutorial + **2** h Practical) per week

= **6** contact hours per week

For each lecture or tutorial credit, the self study component is 1 hour/week and 2 hours/week. In the above example, the student is expected to devote 4 + 1 = 5 hours per week on self study for this course, in addition to class contact of 5 hours per week.

## Earning credits:

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

## Features of Credit System at Department of Technology, Shivaji University, Kolhapur:

Every subject is allotted credits based on its academic importance/weight age.

1. All subjects may not have same credits.
2. 25 Credits / Semester.
3. Absolute Grading System with 6 Passing Grades viz. AA, AB, BB, BC, CC, CD, DD and FF for failure.
4. Getting FF grades in 4 heads in the one academic year he/she considered as failed.
5. Continuous Evaluation: Internal Test 1 [25 marks], and Internal Test 2 [25 marks].
6. Standardization of courses; each course is of 6 units. T1 for unit 1 and 2, T2 for unit 3 and 4, SEE for all units.
7. Internal Test 1 & Internal Test 2 handled by internal; SEE mostly by external.
8. Under no circumstances will a request for re-test be entertained after internal test.
9. Re-examination after SEE; No examination for odd sem. courses in even sem. or vice-versa.

## Attendance rule:

All students must attend every lecture, tutorial and practical class. However, to account for late registration, sickness or other such contingencies, the attendance requirement will be a minimum of 75 % of the classes actually held. A student with less than 75 % attendance in a course during the semester, in lectures, tutorials and practicals taken together (as applicable), will be awarded an 'XX' grade in that course irrespective of his/her performance in the tests.

The course coordinator will award 'XX' grade to the student who is deficient in attendance taking into account the consolidated attendance record for the whole semester. For the purpose of attendance calculation, every scheduled practical class will count as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course coordinator will maintain and consolidate attendance record for the course (lectures, tutorials and practicals together, as applicable).

## Evaluation system:

1. Semester Grade Point Average (SGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points})}{\sum (\text{Course credits in registered courses})}$$

2. Cumulative Grade Point Average (CGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points) of all Semesters}}{\sum (\text{Course credits in registered courses) of all Semesters}}$$

3. At the end of B. Tech Program, student will be placed in any one of the divisions as detailed below (According to AICTE Handbook):

   I$^{st}$ Division with distinction: CGPA $\geq$ 8.25 and above

   I$^{st}$ Division : CGPA $\geq$ 6.75 and < 8.25

   II$^{nd}$ Division : CGPA $\geq$ 6.75 and < 6.25

An example of these calculations is given below:

Typical academic performance calculations - I semester

| Course no. | Course credits | Grade awarded | Earned credits | Grade points | Points secured |
|---|---|---|---|---|---|
| Col 1 | Col 2 | Col 3 | Col 4 | Col 5 | Col 6 (col4 *col5) |
| MALXXX | 5 | CC | 5 | 6 | 30 |
| CSLXXX | 4 | CD | 4 | 5 | 20 |
| PHLXXX | 4 | AA | 4 | 10 | 40 |
| PHPXXX | 2 | BB | 2 | 8 | 16 |
| MELXXX | 4 | FF | 0 | 0 | 00 |
| TTNXXX | 2 | AB | 2 | 9 | 18 |
| Total | 21 | | 17 | 38 | 124 |

1. Semester Grade Point Average (SGPA) =

$$\frac{(124)}{(21)} = 5.90$$

2. Cumulative Grade Point Average (CGPA) =

Cumulative points earned in all passed courses = 124 (past semesters) + 124 (this sem.) = 248
Cumulative earned credits = 23 (past semesters) + 21 (this sem.) = 44

$$\frac{\sum (124 + 124)}{\sum (23 + 21)} = 5.63$$

## System of Evaluation

| Grade | Grade Points | Range | Description of Performance |
|---|---|---|---|
| AA | 10 | 91-100 | Outstanding |
| AB | 09 | 86-90 | Excellent |
| BB | 08 | 76-85 | Very Good |
| BC | 07 | 66-75 | Good |
| CC | 06 | 56-65 | Fair |
| CD | 05 | 46-55 | Average |
| DD | 04 | 40-45 | Poor |
| FF | 00 | Below 40 | Fail (Eligible for Re-exam) |
| XX | -- | -- | Insufficient attendance |
| AB | -- | -- | Absent |
| $ | -- | -- | Passed in I$^{st}$ attempt |

**Audit Courses:**

Additional courses shall be included as audit courses from the third semester onwards. While the performance of the student in audited courses shall be included in the Grade Card. These grades are not contributed to SGPA or CGPA of the concerned student.

**Second Year U.G. Program**
**Semester III**
**(Department: Computer Science and Technology)**

**Engineering Mathematics-III (MA211)**

**Teaching Scheme: L: 3hrs/week**
**: T: 1 hrs/week** **Credits: 4**

| **Evaluation Scheme:** | **CIE** | **SEE** | **Minimum Passing Marks** |
|---|---|---|---|
| | **(25 + 25)** | **50** | **40** |
| | **IOE** | | **Minimum Passing Marks** |
| | **50** | | **20** |

**Unit 1 Linear Differential Equations:** (7 Hrs)
Linear Differential Equations with constant coefficients, Homogeneous Linear differential equations, Applications of LDE with constant coefficients to Electrical systems.

**Unit 2 Numerical Analysis:** (6 Hrs)
` Zeroes of transcendental and polynomial equation using Bisection method, Secant method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods.
Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.

**Unit 3 Statistics:** (7 Hrs)
Probability: Random variable, Binomial, Poisson, and Normal distributions.
Fitting of curves: Coefficient of correlation and lines of regression of bivariate data, Fitting of Curves by method of Least-squares.

**Unit 4 Mathematical Programming:** (6 Hrs)
Linear Optimization problems, Standard and Canonical forms, basic solutions and feasible solutions, optimal solutions by simplex method.

**Unit 5 Artificial Variables Techniques**: (7 Hrs)
Artificial Variables, Big M-method, Relation between Primal and Dual L.P.P., Dual simplex method, Solution of Primal L. P. P. using Dual L. P. P.

**Unit 6 Assignment Problems**: (6 Hrs)
Definition, Balanced and Unbalanced assignment problems, Hungarian method of solving assignment problems. Travelling salesmen problem.

**Reference Books:**

1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar & P. N. Wartikar , Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
3. Advanced Engineering Mathematics by Erwin Kreyszig.
4. Operations Research by S. D. Sharma
5. Operations Research by T. A. Taha.

## Discrete Mathematical Structure (CS 211)

**Teaching Scheme: L: 3hrs/week**
**T: 1 hrs/week** **Credits: 4**

| Evaluation Scheme: | CIE | SEE | Minimum Passing Marks |
|---|---|---|---|
| | (25 + 25) | 50 | 40 |

**UNIT 1.Logic & Proofs:**

Introduction, statements and Notation, Connectives - negation, conjunction, disjunction, Conditional, biconditional, statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal & Principle normal forms.

(9 Hrs)

**UNIT 2.Set Theory:**

Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian product, representation of discrete structures, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition, POSET and Hasse diagram, Function – types, composition of functions, Inverse function.

(10 Hrs)

**UNIT 3. Algebraic Systems:**

Semigroups and Monoids, properties and examples. (4 Hrs)

**UNIT 4. Groups:**

Definition and examples, subgroups and homomorphism, Group codes, communication model, Generation of codes using checksum, error recovery in group codes.

(5 Hrs)

**UNIT 5. Lattices and Boolean Algebra**:

Lattice as POSETs , definition , examples and properties, Lattice as algebraic systems, Special lattices, Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions

(8 Hrs)

**UNIT 6. Graph Theory:**

Basic concepts of graph theory, Storage representation and manipulation of graphs, Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for fault matrix, PERT and related techniques.

(8 Hrs)

**Text Books:**


1. *"Elements of Discrete Mathematics",* C. L. LIU, Tata McGraw-Hill, 2nd Edition, 2002, ISBN 0-07-043476-X.
2. *"Discrete Mathematics and Its Applications",* Kenneth H. Rosen, Tata McGraw-Hill, 5th Edition, 2003, ISBN 0-07-053047-5.
3. *"Discrete mathematical structures with applications to computer science",* J. P. Tremblay & R. Manohar, MGH International.

**Reference Books:**


1. *"Theory and problems in Abstract algebra",* Schaums outline series, MGH.
2. *"Discrete Mathematics",* Lipschutz, Lipson, Tata McGraw-Hill, 2nd Edition, 1999, ISBN 0-07-463710--X.
3. *"Graph Theory",* V. K. Balakrishnan, TMH (Recommended for Graph) ISBN 0-07-058718-3
4. *"Discrete Mathematical Structures",* B. Kolman, R. Busby and S. Ross, Pearson Education, 4th Edition, 2002, ISBN 81-7808-556-9


## Digital Systems and Microprocessor (CS 212)

**Teaching Scheme: L: 4hrs/week**

**Credits: 4**

| **Evaluation Scheme:** | **CIE** | **SEE** | **Minimum Passing Marks** |
|---|---|---|---|
| | **(25 + 25)** | **50** | **40** |

**UNIT 1. Fundamentals Concepts:**
Logic Families, TTL, TTL sub families, Characteristics of TTL gates, Axioms and laws of Boolean algebra, Practical examples with logic gates IC's. (3 Hrs)

**UNIT 2. Combinational Logic Design:**
Boolean algebra, min and max terms, K-maps and quine –McClusky methods, Solution using K-maps, SOP & POS representation of digital logic and their reduction using K-map, BCD to 7-segment converter, Multiplexer and demultiplexer, encoder, decoder ,Half and Full adder design using gates. (8 Hrs)

**UNIT 3. Sequential Logic Design:**
Various flip flops (R-S, D, J-K, T) using gates, counter using J-K flip-flops, shift Register using flip-flops, study of different ICs (7490, 7495, 74LS138, 7447) Timer IC (555), IEEE / ANSI symbols

**Analog Electronics:**
OP-AMP (741), Basics of OP-AMP, Characteristics, Adder, Substractor, Integrator, Differentiator, Comparator using OP-amp (8 Hrs)

**UNIT 4. 8085 Microprocessor Introduction:**
Introduction to Microprocessor, Features of 8085, 8085-CPU architecture, Demultiplexing of address and data bus, Instruction fetching and execution operation of microprocessor. (4 Hrs)

**UNIT 5. 8085 Instruction Set:**
Instruction formats, Addressing modes, Op-code formats, Classification of Instruction set, Programming technique, Instruction timings, WAIT state, Single step and single cycle execution. (8 Hrs)

**UNIT 6. Interrupt and DMA Transfer:**
Types of Memory, Memory organizations Mapping of I/O 8085 Interrupts RST5.5,RST6.5,RST7.5, TRAP & INTR. Designing hardware for INTR , Interrupt priorities, SIM and RIM instruction, DMA transfer, HOLD and HLDA pins for DMA transfer.
**I/O Operation and interfacing:**
devices, IN & OUT Instruction with timing diagrams study of 8255 PPI, Interfacing Keyboards, Interfacing Thumbwheel switches, 8253. (8 Hrs)

**Text Books:**

1. *"Modern Digital Electronics",* R.P. Jain, TMH
2. *"Microprocessor Architecture Programming & Application",* Ramesh Gaonkar, Willey Estern.
3. *"Digital Systems-Principals and Application*", Tocci, Widmer, Moss, (Pearson Education)
4. *"Design with operational amplifier",* Sergio Franko And book by Ramakant Gaiekwad
5.

**Reference Books:**

1. *"Fundamentals of digital circuits",* B.Anandkumar
2. *"Digital Systems & Microprocessor",* Douglas Hall MGH
3. *"Digital Computer Electronics",* Malvino PHI.
4. *"Digital design",* Morris Mano PHI

## Data Structures with C (CS 213)

**Teaching Scheme: L: 3hrs/week**
**: T: 1 hrs/week** **Credits: 4**

| **Evaluation Scheme:** | **CIE** | **SEE** | **Minimum Passing Marks** |
|---|---|---|---|
| | **(25 + 25)** | **50** | **40** |

**UNIT 1. Stacks and Queues:**
Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Recursion, Priority queue, Doubly Ended Queue. (7 Hrs)

**UNIT 2. Searching & Sorting Technique**
**Search:** Importance of searching, Sequential, Binary, Fibonacci search algorithms
**Sorting:** Quick sort, two-way merge sort, heap sort, shell sort, Radix sort. (9 Hrs)

**UNIT 3. Linked Lists:**
Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as Insertion, deletion, inversion, concatenation, Computation of length, traversal on linked list, Representation & anipulations of polynomials using linked lists.
(7 Hrs)

**UNIT 4. Hashing:**
Definition, Hash functions, Overflow, Collision, Open Hashing, closed hashing, Rehashing Techniques. (6 Hrs)

**UNIT 5. Trees:**
Basic Technology, Binary Tree, Traversal methods, Binary search tree, B tree, B+ tree, Heaps - operations and their applications. (8 Hrs)

**UNIT 6. Graphs:** Basic concepts of graph theory, storage representation and manipulation of graphs, Introduction to Sparse matrix, representation of sparse matrix using linked list. (7 Hrs)

**Text Books:**
1. Data Structure using C -- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein (PHI)
2. Theory and Problems of Data structures -- Lipschutz (MGH International)
3. Data Structure using C -- ISRD Group (TMH) ACE series.

**Reference Books:**

1. Data structures and Algorithms -- Alfred V. Aho, John E. Hopcroft, J. D. Ullman (Addision- Wesely Series)
2. Data structures -- Seymour Lipschutz (MGH) Schaum's Outlines.
3. Introduction to Data Structures in C – Ashok N. Kamthane (Pearson Education).

## Data Communication (CS214)

**Teaching Scheme: L: 3hrs/week**
**: T: 1 hrs/week** **Credits: 4**

| **Evaluation Scheme:** | **CIE** | **SEE** | **Minimum Passing Marks** |
|---|---|---|---|
| | **(25 + 25)** | **50** | **40** |

**UNIT 1. Data Communication Fundamentals:**
Data transmission concepts and terminology, Theoretical basis for data communication, Analog and Digital data transmission, Transmission impairments.
**Transmission Media:** Guided transmission media and wireless transmission physical description, applications and transmission characteristics. Data transmission using telephone & cable network. (7 Hrs)

**UNIT 2. Data Encoding:**
Digital data – digital signals, digital data – analog signals, Analog data – digital signals, analog data – analog signals, spread spectrum. (5 Hrs)

**UNIT 3. Data Communication Interface:**
Asynchronous and synchronous transmission, Line configuration, interfacing. (3 Hrs)

**UNIT 4. Multiplexing and Switching Methods:**
Frequency & Wavelength division multiplexing, Synchronous & Statistical Time division multiplexing; Circuit switching-Circuit switching Networks & Concepts (Routing), Virtual Circuit Switching Networks, Principles of Message & packet switching. (4 Hrs)

**UNIT 5. Computer Network Fundamentals:**
Introduction to Computer Networks, Types of Network, Physical & Logical Topology , Uses of Computer Networks, Hardware Required for LAN- NIC card ,Cables,Hub,etc.. Details of Internetworking, Internet, Hardware required for Internetworking- Bridges( all types),Switch(all types),Routers(all types), Introduction to Network operating System, Introduction to Internet, Reference models, OSI, TCP, ATM, Example networks, IEEE standards, Example: data communication services. (12 Hrs)

**UNIT 6. Data Link Layer: Framing:**
Error detection & Correction-Introduction, Hamming Code ,CRC ,Checksum, Framing –Fixed ,Variable error control, Flow control, Simplest Protocols, Stop & Wait Protocols, GO Back N & Selective Repeat Sliding window protocols, HDLC & other DLC Protocol. (8Hrs)

**Text Books:**
1. *"Data and Computer Communications",* William Stallings, PHI, 6th Edition.(Module 1,2,3,4,5)
2. *"Data communication and Networking",* Behrouz A. Forouzan, TMGH, 4th Edition. (Module 5,6)
3. *"Local Area Networks",* Behrouz A. Forouzan, TMGH.(Module 5)

**References Books:**
1. *"Computer Networks",* A. S. Tanenbaum, PHI, 3rd Edition.

## Digital Systems and Microprocessor Lab (CS 212L)

**Teaching Scheme: P: - 2 hrs/week** **Credits: 1**

**Evaluation Scheme: IPE: 50** **Minimum Passing Marks: 20**
**EPE: 50**

**Lab will consist of minimum of 12 experiments based on following topics.**
1. Study of Basic gates.
2. Study of Universal gates.
3. Study of Boolean algebra & De Morgan's theorem using gates.
4. Study of MUX/DEMUX.
5. Study of 74138.
6. Study of R-S and J-K flip-flops
7. Study of counters
8. Interfacing of counters to seven segment display
9. Realization of 4/5 variable K-maps

10. Study of 8085
11. Assembly language programming for 8085 ( Arithmetic, Logical and data transfer-Minimum 8 programs)
12. Writing subroutine to perform delay operation of 10 ms.
13. Designing & implementing hardware for INTR
14. Study of 8255. Interfacing using 8255.
15. Study of 8253 interfacing

## Data Structures Lab (CS 213L)

**Teaching Scheme: P: - 4 hrs/week** **Credits: 2**

**Evaluation Scheme: IPE: 50** **Minimum Passing Marks: 20**
**EPE: 50**

**Lab will consist of minimum of 15 experiments based on following topics**

1. Implement Tower of Hanoi using recursion.
2. Create new file in write mode & open another file in read mode and copy second file into first file.
3. Write a menu driven program to perform following operations on singly linked list: Create, Insert, Delete, Display, Reverse
4. Create two doubly linked lists. Sort them after creation using pointer manipulation. Merge these two lists into one list so that the merged list is in sorted order. (No new node should be created.)
5. Represent polynomial as a circularly linked list and write a menu driven program to perform addition, multiplication and evaluation.
6. Write a program to create generalized linked list and perform following operations: copy, depth, equivalence.
7. Represent sparse matrix using array and perform simple transpose, fast transpose and matrix addition.
8. Write a program to perform various string operations such as copy, length, reversing, palindrome, and concatenation and to find occurrence of a sub-string using and without using library functions.
9. Implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix – Postfix, Infix-Prefix, Prefix-Infix, Prefix-Postfix, Postfix-Infix, Postfix-Prefix).
10. Implement circular queue and double ended queue using arrays.
11. Create binary tree and perform recursive and non-recursive traversals.
12. Create binary in-order threaded tree and perform traversals.
13. Represent graph using adjacency list or matrix and generate minimum spanning tree using Prim's algorithm.
14. Represent graph using adjacency list and perform DFS and BFS.
15. Implement Sequential, Binary, Fibonacci search algorithms

16. Implement following sorting methods: Quick sort, two-way merge sort, heap sort, shell sort, Radix sort, multi-way sorting
17. Implement simple index file.
18. Implement direct access file. Collision handling to be done by chaining with or without replacement.

## UNIX and Shell Programming (CS 215L)

**Teaching Scheme: L: - 1 hr/week**
**P: - 2 hrs/week** **Credits: 2**

**Evaluation Scheme: EOE: 50** **Minimum Passing Marks: 20**

**UNIT – 1** (2 Hrs)
The Unix Operating System, The UNIX architecture and Command Usage, The File System

**UNIT - 2** (2 Hrs)
Basic File Attributes, the vi Editor

**UNIT - 3** (2Hrs)
The Shell, The Process, Customizing the environment

**UNIT - 4** **(**2Hrs)
More file attributes, Simple filters

**UNIT - 5** (3 Hrs)
Filters using regular expressions,

**UNIT - 6** (3 Hrs)
Essential Shell Programming, awk – An Advanced Filter

**Text Book:**

1. Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.

**Reference Books:**

1. Behrouz A. Forouzan and Richard F. Gilberg: UNIX and Shell Programming**,** Thomson, 2005.
2. M.G. Venkateshmurthy: UNIX & Shell Programming**,** Pearson Education, 2005.

## INTRODUCTION TO PERFORMING ARTS (HS 211)

**Teaching Scheme:L: - 1 hr/week**
**P: - 2 hrs/week**

**Evaluation Scheme:** **Minimum Passing Marks: -**

This course will introduce students to problems of performing arts & theatrical representation. It will include readings from ancient & modern performing arts & engage with some of leading theorists. Students will be exposed to the generic difference between different forms of drama / music / dance. Students will be encouraged to stage scenes from well-known plays / music's / dances as a part of assessments.

## ENVIRONMENTAL STUDIES (HS212)

**Teaching Scheme**
Lectures: 4 Hrs / week

**Examination Scheme**
Theory: 70marks
Project: 30 marks

**Unit I** Nature of Environmental Studies (2Hrs)
Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness.

**Unit II** Natural Resources and Associated Problems (8 Hrs)
a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources.
d) Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
g) Role of an individual in conservation of natural resources.
h) Equitable use of resources for sustainable lifestyle.

**Unit III** Ecosystems (8 Hrs)
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following Ecosystem
a) Forest ecosystem,
b) Grassland ecosystem,
c) Desert ecosystem,
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Unit IV** Biodiversity and its Conservation (8 Hrs)

1.Introduction – Definition: genetic, species and ecosystem diversity.
2.Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
3.Biodiversity at global, National and local levels.
4.India as a mega-diversity nation.
5.Western Ghat as a bio-diversity region.
6.Hot-spots of biodiversity.
7.Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
8.Endangered and endemic species of India.
9.Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**Unit V** Environmental Pollution (8 Hrs)

Definition: Causes, effects and control measures of:
a) Air pollution,
b) Water pollution,
c) Soil pollution,
d) Marine pollution,
e) Noise pollution,
f) Thermal pollution,
g) Nuclear hazards
• Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
• Role of an individual in prevention of pollution.
• Pollution case studies
• Disaster management: Floods, earthquake, cyclone and landslides. Tsunami

**Unit VI** Social Issues and the Environment (8 Hrs)

• From Unsustainable to Sustainable development
• Urban problems related to energy
• Water conservation, rain water harvesting, watershed management
• Resettlement and rehabilitation of people; its problems and concerns.
• Environmental ethics: Issue and possible solutions.
• Climate change, Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
• Wasteland reclamation.
• Consumerism and waste products.

**Unit VII** Environmental Protection (8 Hrs)

• Environment Protection Act.
• Air (Prevention and Control of Pollution) Act.
• Water (Prevention and control of Pollution) Act
• Wildlife Protection Act
• Forest Conservation Act
• Population Growth and Human Health, Human Rights.

**Unit VIII** Field Work (10 Hrs)

• Visit to a local area to document environmental as set river/ forest/grassland/hill/mountain
• Visit to a local polluted site – Urban/rural/Industrial/Agricultural or
• Study of common plants, insects, birds. or

• Study of simple ecosystems-ponds, river, hill slopes, etc.

**REFERENCES:**

1. Agarwal, K. C. 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)
3. Brunner R. C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R. S., Marine Pollution, Clanderson Press Oxford (TB)
Page No. 6
5. Cunningham, W. P. Cooper, T. H. Gorhani, E. & Hepworth, M. T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473p
9. Hawkins R. e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V. H. & Watson, R. T. 1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p.
11. Jadhav, H. & Bhosale, V. M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
12. Mckinney, M. L. & Schocl. R. M. 1996, Environmental Science Systems & Solutions, Web enhanced edition, 639p.
13. Mhskar A. K., Matter Hazardous, Techno-Science Publications (TB)
14. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E. P. 1971, Fundamentals of Ecology, W. B. Saunders Co. USA, 574p.
16. Rao M. N. & Datta, A. K. 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p.
17. Sharma B. K., 2001, Environmental Chemistry, Goel Publ. House, Meerut
18. Survey of the Environment, The Hindu (M)
19. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
20. Trivedi R. K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R)
21. Trivedi R. K. and P. K. Goel, Introduction to air pollution, Techno-Science Publications (TB)
22. Wagner K. D., 1998, Environmental Management, W. B. Saunders Co. Philadelphia, USA 499p.
23. Gholap T. N.Paryavaram Swhastra
24. Gharapure , Paryavaram Shastra .
25. V. R. Ahirrao, Paryavaran Vighyan, Nirali Prakashan, Pune.
26. Jay Kumar Magar, Paryavaram Shastra Parichay ,Vidya Prakashan, Nagpur.
27. Anupam Misra, Desh Ka Paryavaran , Ganolai santi Pratisthan. New Delhi.

**Semester IV**
**(Department: Computer Science and Technology)**

## Theory of Computation (CS221)

**Teaching Scheme: L: - 3 hr/week**
**T: - 1 hrs/week** **Credits: 4**

| Evaluation Scheme: | CIE | SEE | Minimum Passing Marks |
|---|---|---|---|
| | (25 + 25) | 50 | 40 |

**UNIT 1 Proofs and Regular Languages:**
Types of Proofs, Mathematical Induction and Recursive definitions with examples. Regular expressions & corresponding regular languages, examples and applications, unions, intersection & complements of regular languages. (6 Hrs)

**UNIT 2 Finite State Machines:**
Deterministic finite automata definition and representation, Non-deterministic F.A., NFA with ^ transitions, Equivalence of DFAs, NFAs and NFA-^s. Kleene's theorem - part I & II statements & proofs, minimum state FA for a regular language, minimizing number of states in an FA. (10 Hrs)

**UNIT 3 Grammars & Languages:**
Definition and types of grammars and languages, derivation trees and ambiguity, CFL's & Non CFL's., Union, Concatenation and Kleene's operations, Intersection and complements of CFLs, Pumping Lemma & examples. (6 Hrs)

**UNIT 4 Push Down Automata:**
Definition, deterministic PDA, types of acceptance and conversions to each other, CFGs & PDAs., Top-Down, & Bottom-up parsing. (6 Hrs)

**UNIT 5 Chomsky Normal Form:**
BNF and CNF notations, Eliminating ^ production and unit productions from a CFG, Eliminating useless variables from a Context Free Grammar. (3 Hrs)

**UNIT 6 Turing Machines:**
Models of computation, definition of TM as Language Acceptors, Combining Turing machines, computing a function with a TM. Variations in TM, TMs with doubly-infinite tapes, more than one tape, Non-deterministic TM and Universal TM. (8 Hrs)

**Text Books:**

1. *"Introduction to Languages & Theory of Computation",* John C. Martin, TMH.
2. *"Discrete Mathematical Structures with Applications to Computer Science",* J.P.Tremblay & R.Manohar (TMH)

**Reference Books:**

1. *"Introduction to Automata Theory, Languages and Computations",* John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman (Pearson Edition).
2. *"Introduction to Theory of Computations",* Michael Sipser, Thomson Brooks/Cole.

## Advanced Microprocessors (CS222)

**Teaching Scheme: L: - 3 hr/week**
**T: - 1 hrs/week** **Credits: 4**

| Evaluation Scheme: | CIE | SEE | Minimum Passing Marks |
|---|---|---|---|
| | (25 + 25) | 50 | 40 |

**UNIT 1. 8086 Architecture:**
8086 CPU Architecture, EU & BIU activities, Segmentation and address transition, 8086 pin description, 8284 clock generation 8286, 8282, configuration of 8086. Accessing even and add address memory with byte/ word. Software and Hardware interrupts.
(8 Hrs)

**UNIT 2. 8086 Instruction Set:**
Addressing modes, data Transfer, arithmetic logical string, i/o instruction, control group of instruction, writing programs using assembler directive and in different module and linking, BIOS / DOS interrupts for Printer, VDU, serial, FDC, Add on cards interface.
(8 Hrs)

**UNIT 3. Minimum & Maximum Mode of 8086:**
Multifunction pins of 8086, 8088-Bus controller, IOB mode of 8288, Minimum & Maximum mode Configuration diagram. Study of 8087 NDP (3 Hrs)

**UNIT 4. Modular Programming:**
Linking and relocation, Stacks, procedures, interrupt and interrupt routines, macros, program design, program design examples. (4 Hrs)

**UNIT 5 .80386, 32-bit Processor (Introductory Level):**
Salient features of 80386DX, Architecture and signal description, Register organization, addressing modes, data types, Real address mode, protected mode, Segmentation, Paging. (5Hrs)

**UNIT 6. Embedded System & Other Microcontrollers:**
PIC Microcontroller 8 bit Microcontroller, architecture, Addressing Modes, Timers, Counters, Interrupts, Serial Communication, Programming Concepts, design of embedded systems with microcontrollers. (11 Hrs)

**Text Books:**


1. *"8086/8088 Microprocessor Family",* Liu Gibson, MGH.
2. *"Microprocessor interfacing and assembly language programming",* Douglas Hall, MGH.
3. *"Advanced Microprocessors & Peripherals",* A. K. Ray, K. M. Bhurchandi, MGH.
4. *"Microcontrollers Architecture, Programming, Interfacing and System Design",* Raj Kamal, Pearson Education.
5. *"Design with PIC Microcontrollers",* John B. Peatman, Pearson Education.
6. *"Embedded systems",* Rajkamal


**Reference Books:**


1. *"8086/8088 Family design programming and interfacing",* John Uffenbeck, PHI.

2. *"The INTEL Microprocessor"*.
3. *"An introduction to 8086/8088 assembly language programming for beginners",* N. M. Morris.

## Computer Organization (CS223)

**Teaching Scheme: L: - 4 hr/week**

**Credits: 4**

| **Evaluation Scheme:** | **CIE** | **SEE** | **Minimum Passing Marks** |
|---|---|---|---|
| | **(25 + 25)** | **50** | **40** |

**UNIT 1. Basic Computer Organization:**
Evolution of computers - Mechanical era, Electronic computers, Generations, VLSI era, CPU organization , communications, user and supervisor modes, accumulator based CPU, System bus, instruction cycle, types of instruction(zero, one, two and three address machines), IO interface, RISC & CISC, definition, comparison and examples. (6 Hrs)

**UNIT 2. CPU design:**
Specifications, (memory, speed, frequency etc.) with example, Instruction fetching, decoding, executing, Case Study (architecture, block diagram, instruction sets etc.), Pentium 4 processor, AMD processor. (4 Hrs)

**UNIT 3. Computer Arithmetic:**
Data Representation, basic formats, storage order, fixed point numbers, binary, signed, decimal, hexadecimal, Floating point numbers, basic formats, normalization, biasing, IEEE754 format, Fixed point arithmetic - Addition and subtraction, overflow, high speed adders, adder expansion, Fixed point multiplication - Two's complement multiplier, Booth's algorithm, Combinational array multiplier, Fixed point division - Restoring, Non restoring algorithm, Combinational array divider, Division by repeated multiplication, Floating point arithmetic - Basic operations, Difficulties, Floating point units, Addition, subtraction, multiplication, division. (12 Hrs)

**UNIT 4. Control Design:**
Introduction, multi cycle operation, implementation methods, Hardwired control, design methods, state tables, GCD processor, Classical method, one hot method, Design example- twos complement multiplier control, CPU control unit design. (6 Hrs)

**UNIT 5. Micro programmed control:**
Basic concepts, control unit organization, parallelism in microinstructions, Microinstruction addressing, timing, Control unit organization, Design example- twos complement, multiplier control, Control field encoding, encoding by function, multiple microinstruction formats.
(6 Hrs)

**UNIT 6. Memory Organization:**
Types of memory, Memory systems, multilevel, address translation, memory allocation, Caches, Associative memory, direct mapping, set associative addressing. (10 Hrs)

**Text Books:**
1. Computer Architecture and Organization - John P Hayes (MGH) 3rd Edition.

2. Computer Systems Organization & Architecture - John D. Carpinelli (Pearson Education)

**References:**

1. Computer Organization - Hamacher Zaky (MGH).
2. http://cse.stanford.edu/class/sophomore-college/projects-00/risc/risccisc/ (RISC vs CISC)
3. http://www.cpu-world.com/sspec/
4. http://www.intel.com/technology/itj/q12001/pdf/art_2.pdf (The Micro architecture of the Pentium 4 Processor)
5.http://www.amd.com/usen/assets/content_type/white_papers_and_tech_docs/30579_AMD_Processor_Evaluation_Guide3.1.pdf (AMD Processor Performance Evaluation Guide).

## Computer Networks (CS224)

**Teaching Scheme: L: - 3 hr/week**
**T: - 1 hrs/week** **Credits: 4**

| Evaluation Scheme: | CIE | SEE | Minimum Passing Marks |
|---|---|---|---|
| | (25 + 25) | 50 | 40 |

**UNIT 1 Data link layer:**
Random Access- CSMA, CSMA/CD, CSMA/CA, Controlled Access-Reservation, Polling, Token Passing, Channelization.-FDMA, TDMA, CDMA (4 Hrs)

**UNIT 2 Networking Concepts:**
Ethernet, Standard Ethernet, Changes in Standards, FAST & GIGABIT Ethernet, Connecting LANS, Backbone Networks & Virtual LANS, Adhoc Networks. (4 Hrs)

**UNIT 3 Wireless LANs:**
IEEE 802.11-Architecture, MAC Sub layer, Addressing, Bluetooth, - Architecture ,Blue Tooth & Radio& Base Band Layer, Wireless WANs –Cellular Telephone-Principal, Transmitting, Receiving, Roaming, First& Second & Third Generation. Satellite Network- Orbits, Footprint, categories, GEO, MEO, LEO Satellites. (4 Hrs)

**UNIT 4 Network Layer:**
IPV4-AddressSpace, Notation, Classful, Classless Addressing, Datagram, Fragmentation, Checksum, Options. IPV6 –Structure, Address Space, Packet Format, Extension, Advantages. Address Mapping, Multicasting, Network Layer –Delivery, Forwarding-Techniques& process & Unicasting & Multi Casting routing Protocols.
(8 Hrs)

**UNIT 5 Transport Layer:**
Process to Process Delivery- Client/Server Concept, MUX/DEMUX, Connection oriented or connection less .TCP-Frame Format, Services, Features, Connection, Flow & Error Control. UDP-Frame Format, operation, User datagram, Checksum ,Congestion control & Quality of Service – data traffic ,Congestion ,Congestion Control ,Examples, quality Of Service ,Improve Q0s , Integrated & Differentiated . Socket Programming using TCP, UDP. (12 Hrs)

**UNIT 6 Application Layer:**
DNS- Name Space, label, Domain Name, Domain, Distribution of Name Space. Remote Login- TELNET, E-Mail- Architecture, POP, IMAP, SMTP. File transfer-FTP, Autonomous FTP, WWW – Architecture ,Web Documents, HTTP (7 Hrs)

**Text Books:**
1. *"Data communication and Networking",* Behrouz A. Forouzan, TMGH, 4th Edition.
2. *"Unix network programming",* Richard Steven (PHI) for Socket Programming (Second Edition.)
3. *"Local Area Networks",* Behrouz A. Forouzan, (TMGH)

**Reference Books:**
1. *"Computer Networks",* A.S. Tanenbaum, PHI, 3rd Edition.
2. *"TCP/IP protocol suite",* Behrouz A. Forouzan, TMGH.

## COMPUTER GRAPHICS AND MULTIMEDIA TECHNIQUES (CS225)

**Teaching Scheme: L: - 3 hr/week**
**T: - 1 hrs/week** **Credits: 4**

| Evaluation Scheme: | CIE | SEE | Minimum Passing Marks |
|---|---|---|---|
| | (25 + 25) | 50 | 40 |

**Unit 1 Introduction to Graphics Devices:**
Display Devices and Adapters, Working of Printers, LCD Display. (3Hrs)

**Unit 2 Transformations:**
Basic 2D & 3D transformations - Translation, Scaling, Rotation, Reflection, Shearing, Multiple Transformations, Rotation about an axis parallel to a coordinate axis, Rotation about an arbitrary axis in space, Affine and Perspective Geometry, Orthographic projections and Axonometric projections. (8Hrs)

**Unit 3 Raster Scan Graphics:**
Bresenham's line and circle drawing algorithms, Scan Conversion techniques: RLE, Frame Buffer, Scan converting polygons: Edge fill and Seed fill algorithms, Anti-aliasing and Half-toning. (7Hrs)

**Unit 4 Viewing and Clipping:**
Introduction, Windowing and View-porting, Introduction to clipping, Point clipping, Line clipping: Sutherland - Cohen line clipping algorithm. (5Hrs)

**Unit 5 Curves and Surfaces**
Curve Representation, Non-parametric and parametric curves, representation of space curves, Cubic Spline, Parabolic Blended curves, Bezier curves and B-spline curves, Z- buffer, Warnock algorithm.

(8Hrs)

**Unit 6 Multimedia Applications**

Media preparation, composition, integration, communication, entertainment using commercial tools (7Hrs)

**Text Books**

1."Mathematical elements for Computer Graphics" - David F. Rogers, J. Alan Adams (MGH Int.) (For chapters 1, 2, 5)
2."Procedural elements for Computer Graphics" - David F. Rogers, (MGH Int.) (For chapters 3, 4)
3. *"Multimedia Making it Work",* Tay Vaughan, TMGH, 5th Edition.
4. *"Multimedia Communication",* Fred Halsall, Pearson Education.

**References Books**

1. Newman Sproul, "Principles of Interactive Computer Graphics" - (MGH) (chapters 1,4)
2. Prof. Rajesh Maurya, "Computer Graphics" (Wiley India Pvt. Ltd.) (Chapter 4)
3. Hearn & Baker, "Computer Graphics".
4. Ranjan Parekh, *"Principles of Multimedia",* TMGH

## Advanced Microprocessors Lab (CS222L)

**Teaching Scheme: P: - 2 hrs/week** **Credits: 1**

**Evaluation Scheme: IPE: 50** **Minimum Passing Marks: 20**
**EPE: 50**

**Lab will be based on following topics**

1. Assembly language programming for 8086-Study of instruction set, Use of MUL/DIV instructions, Use of string processing instruction, use of XLAT instruction for code conversion.
2. Assembly language programming for 8086/8087- · Study of NDP instruction set, Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.
3. Use of ROM-BIOS services
4. Use of DOS interrupts services.
5. Programs based on 386 addressing modes.
6. Programs based on bit manipulation instructions using assembly language or C.
7. Programs to find square-root of 16-bit number.

## Computer Graphics and Multimedia Techniques Lab (CS225L)

**Teaching Scheme: P: - 2hrs/week** **Credits: 1**

**Evaluation Scheme: IPE: 50** **Minimum Passing Marks : 20**
**EPE: 50**

**Lab will consist of minimum of 16 experiments based on following topics**

1. Study of Computer graphics devices adapters and multimedia storage devices
2. Two Dimensional transformations
3. Three Dimensional transformations and animations
4. Generalized Bresenham's line drawing algorithm
5. Bresenham's circle drawing algorithm
6. Polygon filling algorithm
7. Clipping algorithms like two dimensional clipping, Sutherlan_Cohen Clipping
8. Windowing
9. Hidden line and surfaces
10. Bezeir curve
11. Compression technique algorithms for text, image and video
12. Study of mm file formats and conversions (BMP-JPG,WAV-MP3,DAT-MPEG)
13. Application software/animation using multimedia concepts
14. GIF animator / Flash /3D Max/Maya etc.

## Object Oriented Lab (CS226L)

**Teaching Scheme: L:2 hrs/week**
**P: 2 hrs/week** **Credits: 3**

**Evaluation Scheme: IPE: 50** **Minimum Passing Marks: 20**
**EPE: 50**

**UNIT 1. Fundamentals of C++:**
The Origins of C++, Encapsulation, Polymorphism, Inheritance, Function Overloading, Operator Overloading, Constructors & Destructors, C++ key words. (2 Hrs)

**UNIT 2. Classes & Objects:**
Relation of Classes, Structures & Union, Friend Functions, Friend Classes, Inline Functions, Parameterized constructors, Static class members, Scope resolution operators, Passing objects to functions, nested classes, and local classes. (2 Hrs)

**UNIT 3. Arrays, Pointers, Dynamic Allocation Operators**:
Arrays of objects, Pointers to objects, Type checking C++ Pointers, This Pointer, Pointers to derived types, Pointers to class members, Dynamic allocation operators- new & delete operators.
(3 Hrs)

**UNIT 4. Function**
**Function:** Reference arguments, overloaded functions, inline functions, default arguments, returning by reference, friend functions and static functions.
**Virtual Functions**: Accessing Normal and Virtual member functions, late binding, pure virtual functions, Abstract classes, Virtual base classes. (6 Hrs)

**UNIT 5. Operator Overloading & Inheritance:**
Overloading unary and binary operators, Overloading extraction and insertion operators, data Conversion.
**Inheritance**: Derived class and base class, derived class constructors, over riding member functions, public and private inheritance, multiple inheritance. (6 Hrs)

**UNIT 6. File and Streams:**
Streams, String I/O, Character I/O, Object I/O, I/O with multiple objects, File pointers and redirections.
(3 Hrs)

**UNIT 7.Advanced C++ features:**
Templates, Exception handling, Library organisation and containers. (3 Hrs)

**Lab will consist of minimum of 16 experiments based on following topics**

**List of Assignments**

1. Write a program to demonstrate concept of class. For example: create class matrix, class string, class car, class date, class time, class person etc.

2. Write a program to demonstrate following Function concepts
    a. Function overloading
    b. Constructors of all types
    c. Default parameters, returning by reference
    d. Demonstration of friend function
    e. Demonstration of static function

3. Write a program to demonstrate
    a. Operator overloading –for unary as well as binary operation.
    b. Apply above concept on matrix and string classes created above.

4. Write a program to demonstrate $C^{++}$ s capability of all types of inheritance
    a. Single, multiple, multivalued
    b. Virtual function.
    c. Abstract class
    d. Runtime polymorphism

5. Write a program for new and delete operators, pointers to objects.

6. Write a program for pointers to pointers, this pointer.
7. Write a program for Templates, Exception handling.
8. Write a program for Stack and Queue.
9. Write a program for the linked list,
10. Write a program for Binary tree, Traversal of a Binary tree.

**Text Books:**

1. *"Object oriented programming in Turbo C++"*, Robert Lafore, Galgotia.
2. *"C++ programming language"*, Bjarne Stroustrup, AT & T.

**Reference Books:**

1. *"C++ Programming"*, John Thomas Berry, PHI.
2. *"Programming with C++"*, D. Ravichandran, TMGH.

## Introduction to Foreign Language (HS 221)

**Teaching Scheme: L: - 1 hr/week**
**T: - 1 hrs/week**

**Evaluation Scheme:** **Minimum Passing Marks: -**

**General Information:**

This is a special introductory course of Foreign Language meant for the regular Engineering students of **B. Tech** (3rd Semester) of Shivaji University, Kolhapur.

This course builds the skill sets needed to understand the basics of both language and communication. It is also interested in exploring the relationship between the two categories (language and communication) in order to work out how they relate to each other, it will include introductory concepts in semantics, semiotics, syntax, lexicography, and discourse analysis. It will also include an analysis of philosophical problems of reference, representation, rhetoric, sense, speech acts, and taxtuality. Students will have to submit a term paper and make an oral presentation on any aspect of language and/or communication that they wish to explore at length. Workshops are also included to help students internalize the concepts of communication to which they have been introduced.

**Aims & objectives:**

1. Introduction of Foreign alphabet, basic Foreign Grammar & Phonetic rules.
2. The Course is aimed at developing the listening, reading and writing skills in the learners.
3. The learner must be able to translate simple texts from and into foreign language.
4. Exposing the learners to simple aspects of life and culture of the foreign people.

**SYLLABUS :**

1. **Translation:** A passage (approx. 100 words) from Foreign into English/Marathi. Separate sentences from English into Foreign Language
2. **Composition**:
3. **Simple Grammatical Exercises: Topics**: Recognising ***gender*** of noun, Formation of ***Plural*** noun, Inserting ***pronouns*** in correct forms, ***Conjugation*** of Verbs, Correct use of foreign ***adjectives***, Use of correct **C*ase forms.***

## Equivalence of S.Y B. Tech (Computer Science and Technology) Semester III & IV

The above detailed syllabus is a revised version of the S. Y. B. Tech (Computer Science and Technology) course being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2012.

The Equivalence for the subjects of Computer Science and Technology at S.Y.B. Tech Semester III and IV pre-revised course under the faculty of Engineering and Technology is as follows.

### S.Y.B Tech Semester III (Computer Science and Technology)

| Sr. No | S. Y. B. Tech (Computer Science and Technology) Semester III Pre-revised syllabus | S. Y. B. Tech (Computer Science and Technology) Semester III&IV Revised syllabus | Remark |
|---|---|---|---|
| 1 | Applied Mathematics | Engineering Mathematics-III | Syllabus is the same only title is changed |
| 2 | Discrete Structures | Discrete Mathematical Structure | No change in the subject content |
| 3 | Digital Systems and Microprocessor | Digital System and Microprocessor | No change in the subject content |
| 4 | Data Structure | Data Structure with C | No change in the subject content |
| 5 | Data Communication | Data Communication | No change in the subject content |
| 6 | Programming Lab-I | Data Structure Lab | No change in the subject content |
| 7 | | Unix and Shell Programming | |
| 8 | | Performing Arts | |

## S.Y.B Tech Semester IV (Computer Science and Technology)

| Sr. No | S. Y. B. Tech (Computer Science and Technology) Semester III Pre-revised syllabus | S. Y. B. Tech (Computer Science and Technology) Semester III&IV Revised syllabus | Remark |
|---|---|---|---|
| 1 | Theory of Computation | Theory of Computation | No change in the subject content |
| 2 | Advanced Microprocessor | Advanced Microprocessor | No change in the subject content |
| 3 | Computer Organization | Computer Organisation | No change in the subject content |
| 4 | Computer Network | Computer Networks | No change in the subject content |
| 5 | Database Management | ---------- | Shifted to V semester |
| 6 | ---------- | Computer Graphics and Multimedia Techniques | Shifted from V semester |
| 7 | Programming Lab-II | Object Oriented Lab | No change in the subject content |
| 8 | | Introduction to Foreign Languages | |