REGULATIONS AND SYLLABUS
of
Bachelor of Technology
in
Information Technology
(w.e.f 2015-16 admitted batch)

A University Committed to Excellence
VISION
To become a global leader in higher education.

MISSION
To impart futuristic and comprehensive education of global standards with a high sense of discipline and social relevance in a serene and invigorating environment.
REGULATIONS AND SYLLABUS
of
Bachelor of Technology
in
Information Technology
(w.e.f 2015-16 admitted batch)
B.Tech. in Information Technology
REGULATIONS
(w.e.f. 2015-16 admitted batch)

1. ADMISSION
1.1 Admission into B.Tech. in Information Technology program of GITAM University is governed by GITAM University admission regulations.

2. ELIGIBILITY CRITERIA
2.1 A first class in 10+2 or equivalent examination approved by GITAM University with Physics, Chemistry and Mathematics.
2.2 Admission into B.Tech. will be based on an All India Entrance Test (GAT) conducted by GITAM University and the rule of reservation, wherever applicable, will be followed.

3. CHOICE BASED CREDIT SYSTEM
3.1 Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:
   • Student centered learning
   • Cafeteria approach
   • Students to learn courses of their choice
   • Learning at their own pace
   • Interdisciplinary learning
3.2 Learning goals/objectives and outcomes are specified, focusing on what a student should be able to do at the end of the program.

4. STRUCTURE OF THE PROGRAM
4.1 The Program consists of
i) Foundation Courses (compulsory) which give general exposure to a student in communication and subject related area.
ii) Core Courses (compulsory).
iii) Discipline centric electives which
    a) are supportive to the discipline Programme
    b) give expanded scope of the subject Electives
    c) give interdisciplinary exposure Interdisciplinary
    d) nurture the student skills Electives
iv) Open electives are of general nature either related or unrelated to the discipline.

4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorial/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.
• One credit for each Lecture/Tutorial hour per week.
• One credit for two hours of Practicals per week.
• Two credits for three (or more) hours of Practicals per week.

4.4 The curriculum of the eight semester B.Tech. program is designed to have a total of 190 credits for the award of B.Tech. degree.

5. MEDIUM OF INSTRUCTION
The medium of instruction (including examinations and project reports) shall be English.

6. REGISTRATION
Every student has to register himself/herself for each semester individually at the time specified by the Institute/University.

7. ATTENDANCE REQUIREMENTS
7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end-semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his/her juniors.

7.2 However, the Vice-Chancellor on the recommendation of the Principal/Director of the Institute/School may condone the shortage of attendance of the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8. EVALUATION
8.1 The assessment of the student’s performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured
a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical/Project Work/Industrial Training/Viva voce/Seminar etc. course is completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.

**Table 1: Assessment Procedure**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component of Assessment</th>
<th>Marks Alotted</th>
<th>Type of Assessment</th>
<th>Scheme of Evaluation</th>
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<tbody>
<tr>
<td>1</td>
<td>Theory</td>
<td>40</td>
<td>Continuous Evaluation</td>
<td>i) Thirty (30) marks for mid semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration. ii) Ten (10) marks for Quizzes, Assignments and Presentations. Sixty (60) marks for semester-end examinations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>Semester-end Examination</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Practicals</td>
<td>100</td>
<td>Continuous Evaluation</td>
<td>i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the semester. ii) Ten (10) marks for case studies. iii) Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the semester) conducted by the concerned lab Teacher.</td>
</tr>
<tr>
<td>3</td>
<td>Project work (VII &amp; VIII Semesters )</td>
<td>100</td>
<td>Continuous Evaluation</td>
<td>i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor. ii) Thirty (30) marks for mid-term evaluation for defending the Project before a panel of examiners.</td>
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<tr>
<td>4</td>
<td><strong>Industrial Training (VII Semester)</strong></td>
<td>100</td>
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<td></td>
<td><strong>Continuous Evaluation</strong></td>
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<tr>
<td></td>
<td></td>
<td>iii) Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners.</td>
<td></td>
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<tr>
<td>5</td>
<td><strong>Comprehensive Viva-voce (VIII Semester)</strong></td>
<td>100</td>
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<tr>
<td></td>
<td><strong>Continuous Evaluation</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Through five periodic Viva-voce exams for 20 marks each, conducted by a panel of examiners. The course content for Viva exams shall be announced at the beginning of the semester.</td>
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### 9. RETOTALING, REVALUATION & REAPPEARANCE

**9.1 Retotaling**

Retotaling of the theory answer script of the semester-end examination is permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

**9.2 Revaluation**

Revaluation of the theory answer scripts of the semester-end examination is also permitted on request by the student by paying the prescribed fee within fifteen days of the announcement of the result.

**9.3.1 A student who has secured ‘F’ grade in a theory course shall have to reappear at the subsequent semester-end examination held in that course.**

**9.3.2 A student who has secured ‘F’ grade in a practical course shall have to attend Special Instruction classes held during summer.**

**9.3.3 A student who has secured ‘F’ Grade in project work / Industrial Training / Seminar / Comprehensive Viva-Voce etc shall have to reappear at the time of Special Examination to be conducted in the summer vacation.**
10. SPECIAL EXAMINATION

10.1 A student who has completed his/her period of study and still has “F” grade in a maximum of five theory courses is eligible to appear for Special Examination normally held during summer vacation.

11. BETTERMENT OF GRADES

11.1 A student who has secured only a pass or second class and desires to improve his/her class can appear for betterment examinations only in theory courses of any semester of his/her choice, conducted in summer vacation along with the Special Examinations.

11.2 Betterment of Grades is permitted ‘only once’, immediately after completion of the program of study.

12. GRADING SYSTEM

12.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.

Table 2: Grades and Grade Points

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Grade</th>
<th>Grade Points</th>
<th>Absolute Marks</th>
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<tbody>
<tr>
<td>1</td>
<td>O (Outstanding)</td>
<td>10</td>
<td>90 and above</td>
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<td>2</td>
<td>A+ (Excellent)</td>
<td>9</td>
<td>80 to 89</td>
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<td>3</td>
<td>A (Very Good)</td>
<td>8</td>
<td>70 to 79</td>
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<tr>
<td>4</td>
<td>B+ (Good)</td>
<td>7</td>
<td>60 to 69</td>
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<tr>
<td>5</td>
<td>B (Above Average)</td>
<td>6</td>
<td>50 to 59</td>
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<tr>
<td>6</td>
<td>C (Average)</td>
<td>5</td>
<td>45 to 49</td>
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<tr>
<td>7</td>
<td>P (Pass)</td>
<td>4</td>
<td>40 to 44</td>
</tr>
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<td>8</td>
<td>F (Fail)</td>
<td>0</td>
<td>Less than 40</td>
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<tr>
<td>9</td>
<td>Ab. (Absent)</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

12.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, subject to securing a GPA of 5 for a pass in the semester.

13. GRADE POINT AVERAGE

13.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

\[
GPA = \frac{\sum [ C \times G ]}{\sum C}
\]
where,
\[ C = \text{number of credits for the course}. \]
\[ G = \text{grade points obtained by the student in the course}. \]

13.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student’s performance in all the courses taken, in all the semesters up to the particular point of time.

13.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

**Table 3: CGPA required for award of Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>CGPA Required</th>
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<tr>
<td>First Class with Distinction</td>
<td>≥ 8.0*</td>
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<tr>
<td>First Class</td>
<td>≥ 6.5</td>
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<tr>
<td>Second Class</td>
<td>≥ 5.5</td>
</tr>
<tr>
<td>Pass Class</td>
<td>≥ 5.0</td>
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* In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.

14. **ELIGIBILITY FOR AWARD OF THE B.Tech. DEGREE**

14.1 Duration of the program: A student is ordinarily expected to complete the B.Tech. program in eight semesters of four years. However, a student may complete the program in not more than six years including study period.

14.2 However, the above regulation may be relaxed by the Vice-Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the B.Tech. Degree if he/she fulfills all the following conditions:

a) Registered and successfully completed all the courses and projects.

b) Successfully acquired the minimum required credits as specified in the curriculum in the branch of his/her study within the stipulated time.

c) Has no dues to the Institute, hostels, Libraries, NCC/NSS etc, and

d) No disciplinary action is pending against him/her.

15. **DISCRETIONARY POWER**

Not withstanding anything contained in the above sections, the Vice-Chancellor may review all exceptional cases, and give his decision, which will be final and binding.
Department of Information Technology  
Effective from Academic Year 2015-2016

B.Tech - I Sem (IT)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
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**26**
<table>
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<th>Course Code</th>
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<td>EPH121</td>
<td>Engineering Physics Laboratory/Engineering Chemistry Laboratory</td>
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26
### B.Tech- III Sem(IT)

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<th>Course Title</th>
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<th>T</th>
<th>P</th>
<th>C</th>
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<td>Engineering Mathematics-III (Elective)</td>
<td>FC(MT)</td>
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<td>Object Oriented Programming with C++</td>
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### B.Tech- IV Sem(IT)

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<td>EOEXXX</td>
<td>Open Elective –I</td>
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### B.Tech - V Sem(IT)

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### Inter Disciplinary Electives:

#### Inter Disciplinary Elective-I

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Module I 8 hours

**Fundamentals of Remote Sensing:** Introduction, electromagnetic radiation, electromagnetic spectrum, energy interactions with Earth’s surface materials and atmosphere, sensors and platforms, False Colour Composite (FCC) image, image interpretation techniques, satellite remote sensing in Indian context.

Module II 8 hours

**Fundamentals of GIS:** Introduction, elements of GIS, vectorization, rasterization, geo-referencing, map projections, digitization process, database handling, types of data structures, overlay analysis, surface terrain models – Digital Elevation Model (DEM), Triangulated Irregular Network (TIN), and slope models.

Module III 8 hours

**RS and GIS Techniques for Natural Resources Management:** Land use/Land cover classification systems, forest cover, agriculture and wasteland management, Water resources management.

Module IV 8 hours

**RS and GIS Techniques for Infrastructure Planning and Management:** Urban utilities, cadastral mapping and transport network, GPS navigation system for various applications.

Module V 8 hours

**RS and GIS Techniques for Natural Disaster Management:** Earthquakes, landslides, cyclones and floods – hazard zonation, risk assessment, relief and rehabilitation measures.

**Text Book(s)**


**References**

ECY101: ENGINEERING CHEMISTRY

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Module I 9 hours

Water Technology

Module II 9 hours

Energy Sources and Applications

Non-Conventional energy sources: Solar energy, wind energy, photovoltaic cell and applications.

Module III 9 hours

Corrosion Engineering
Definition, theory of corrosion: Dry corrosion and electro chemical corrosion. Factors affecting corrosion: Nature of the metal and nature of the environment.


Module IV 8 hours

Surface Chemistry
Adsorption: Classification, adsorption of gases on solids, adsorption from solutions. Langmuir’s theory and Freundlich’s theory of adsorption, applications of adsorption.

Module V 8 hours

Engineering Materials


Ceramics: Structural clay products, examples. White wares and chemical stone wares.


Text Book(s)

References
ECY102 : CHEMICAL ASPECTS OF ENGINEERING MATERIALS (Elective)

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Module I  8 hours
Analytical Instrumental Techniques

Module II  9 hours
Semiconductors, Solar cells and Storage Devices
Semiconductors: Definition, types of semiconductors: Stoichiometric, non-stoichiometric, controlled valence semiconductors, doping and applications.
Storage devices: Materials used and working of compact disc and flash (pen) drive.

Module III  9 hours
Chemistry of Nanomaterials
Introduction to nonmaterial: Nanoparticles, nano cluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: Sol-gel method, reverse micellar method, electrolytic method.
Characterization: Principle and applications of X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM).

Module IV  8 hours
Solid State Chemistry
Introduction, classification and properties of solids. Crystallographic systems, types of lattices, Brag’s equation, Born-Haber cycle and cohesive energy. Ionic and liquid crystals - properties and applications.

Module V  9 hours
Polymer Chemistry
Types of polymerization, mechanism of addition polymerization, moulding constituents, differences between thermoplastic and thermo setting resins. Preparation and properties of polyethylene, polyvinylchloride,
polystyrene, polyamides (nylon-6,6), polycarbonates and Bakelite. Engineering applications of plastics. Preparation and properties of inorganic polymers: Polysiloxanes and polyphosphazenes.

Text Book(s)

References
Module I

Pollution and Its Control

Module II

Control of Specific Gaseous Pollutants

Module III

Polymer Chemistry
Types of polymerization, mechanism of addition polymerization, moulding constituents, differences between thermoplastic and thermo setting resins. Preparation and properties of polyethylene, polyvinylchloride, polystyrene, polyamides (nylon-6,6), polycarbonates and Bakelite. Engineering applications of plastics. Preparation and properties of inorganic polymers: Polysiloxanes and polyphosphazenes.

Module IV

Concrete Chemistry
Module V

Chemistry of Nanomaterials

Introduction to nanomaterials: Nanoparticles, nano cluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: Sol-gel method, reverse micellar method, electrolytic method.

Characterization: Principle and applications of X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM).

Text Book(s)


References

Module I  9 hours

Semiconductors, Solar cells and Storage Devices

**Semiconductors:** Definition, types of semiconductors: Stoichiometric, non-stoichiometric, controlled valence semiconductors, doping and applications.

**Solar cells:** Introduction, harnessing solar energy, solar water heaters.

**Storage devices:** Materials used and working of compact disc and flash (pen) drive.

Module II  9 hours

Chemistry of Nanomaterials

Introduction to nanomaterials: Nanoparticles, nano cluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: Sol-gel method, reverse micellar method, electrolytic method.

**Characterization:** Principle and applications of X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM).

Module III  9 hours

Fuel technology

Introduction and classifications of fuels. Characteristics of a good fuel, calorific value and units. Determination of calorific value by bomb calorimeter and Dulong’s formula.

**Solid Fuels:** Coal, classification of coal by rank. Analysis of coal: Proximate and ultimate analysis.

**Liquid Fuels:** Refining of petroleum, petroleum products used as fuels, knocking (detonation), octane number of gasoline. Synthetic petrol: Bergius and Fischer tropsch’s methods. Diesel: High speed and low speed diesel, cetane number.
Module IV 8 hours

Analytical Instrumental Techniques


Module V 9 hours

Lubricants

Introduction and classification of lubricants. Principles and mechanism of lubrication: hydrodynamic, boundary and extreme pressure lubrications. Properties of lubricants: viscosity, oiliness, flash and fire points, cloud and pour points, aniline point, saponification number, carbon residue, emulsification number, volatility, precipitation number, specific gravity and neutralization number.

Text Book(s)


References

2. Determination of sulphuric acid in lead-acid storage cell.
3. Determination of hardness of a ground water sample.
4. Estimation of active chlorine content in bleaching powder.
5. Estimation of iron as ferrous iron in an ore sample.
7. Determination of chromium (VI) in potassium dichromate.
8. Determination of copper in a copper ore.
10. Determination of surface tension of a liquid.
11. Determination of Mohr’s salt by potentiometric method.
12. Determination of strength of an acid by pH metric method.
Module I 8 hours
Semiconductor Diodes: Basic structure and operating principle, current-voltage characteristics, applications, rectifier circuits (Half-wave, Full wave, rectifier with filter capacitor), voltage regulator using Zener diode, clipper and clamper, LED, Photo diode.

Module II 8 hours
Bipolar Junction Transistors (BJT): Structure and modes of operation - NPN and PNP transistors in active mode, DC analysis, BJT as an amplifier and switch, small signal equivalent circuit, single stage BJT amplifiers (CE mode).

Module III 8 hours
Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Structure, physical operation of N-type and P-type MOSFET, DC analysis, MOSFET as an amplifier and switch, small signal equivalent circuit, single stage amplifier (CS mode).

Module IV 10 hours
Feedback Amplifiers and Oscillators: Basic concepts of negative feedback, block diagram of negative feedback amplifier, feedback topologies.
Oscillators: Basic principle of sinusoidal oscillation, RC phase shift oscillator, wein bridge oscillator, Hartley, Colpitt’s and crystal oscillator.

Module V 10 hours
Operational Amplifier: Ideal characteristics of Op-Amp, block diagram, inverting and non inverting modes, applications of Op-Amp, summing, averaging, difference amplifier, voltage to current converter, current to voltage converter, instrumentation amplifier, differentiator, integrator.

Text Book(s)

References
Module I 8 hours

**Discrete-Time Signals and Systems:** Discrete time signals, linear shift invariant systems, stability and causality, linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. **The Z-Transform:** z-transform, inverse z-transform, z-transform theorems and properties, system function.

Module II 8 hours

**Discrete Fourier Transform:** Representation of periodic sequences, discrete fourier series, properties of discrete fourier series, fourier representation of finite duration sequences-the discrete fourier transform, properties of discrete fourier transform. **Computation of the Discrete Fourier transform:** Decimation-in-time FFT algorithms, decimation-in-frequency FFT algorithms.

Module III 8 hours

**IIR Filter Design:** Design of IIR digital filters from analog filters, design examples- analog-digital transformation.

Module IV 8 hours

**FIR Filter Design:** Properties of FIR digital filters, design of FIR filters using windows, comparison of IIR and FIR digital filters.

Module V 8 hours

**DSP Processors:** DSP architecture for signal processing - Harvard architecture, pipelining, hardware multiplier-accumulator, fixed point digital signal processors, floating point digital signal processors.

**Text Book(s)**

**References**
Module I

The Processor 8086: Register organization of 8086, architecture, signal description of 8086, physical memory organization, I/O addressing capability, minimum mode 8086 system and timings, maximum mode 8086 system and timings.

Module II

Instruction Set and Programming: Machine language instruction format, addressing modes of 8086, instruction set of 8086, assembler directives and example programs (assembly programs).

Module III

Interrupts and Programming: Interrupts and interrupt service routines, interrupt cycle of 8086, non mask able interrupt, maskable interrupt (INTR), interrupt programming, programmable interrupt controller 8259A.

Module IV

Interfacing of Peripherals to 8086: Interfacing I/O ports, PIO 8255, [Programmable I/O ports], modes of operation of 8255, interfacing digital to analog converters- DAC 0800, interfacing analog to digital data converters- ADC 0808/0809, programmable interval timer 8253, programmable communication interface 8251 USART.

Module-V

Modern Microprocessors: Salient features of 80286, internal architecture of 80286, salient features of 80386DX, architecture and signal descriptions of 80386, salient features of 80586, intel MMX architecture, salient features of pentium 4.
Text Books:

Reference Books:
Module I 8 hours

**Amplitude Modulation:** Amplitude modulation, virtues, limitations, and modifications of amplitude modulation, double sideband-suppressed carrier modulation, costas receiver, quadrature-carrier multiplexing, single-sideband modulation, vestigial sideband modulation.

Module II 10 hours


Module III 10 hours

**Pulse Modulation:** Sampling process, pulse-amplitude modulation, pulse-position modulation, completing the transition from analog to digital, quantization process, pulse-code modulation, delta modulation, differential pulse-code modulation, line codes.

Module IV 8 hours

**Baseband Data Transmission:** Baseband transmission of digital data, the inter symbol interference problem, the nyquist channel, raised-cosine pulse spectrum, baseband transmission of M-ary data, the eye pattern, equalization.

Module V 8 hours

**Digital Band-Pass Modulation Techniques:** Binary amplitude-shift keying, phase-shift keying, frequency-shift keying, noncoherent digital modulation schemes, M-ary digital modulation schemes, mapping of digitally modulated waveforms onto constellations of signal points.
Text books

Reference books
Module I

Introduction to MOS Technology: Introduction to integrated circuit technology, basic MOS transistors, enhancement mode MOS transistor, depletion mode MOS transistor, nMOS fabrication, CMOS fabrication, comparison of NMOS, CMOS, BICMOS, GaAs technologies.

Module II

Basic Electrical Properties of MOS and BiCMOS Circuits: Drain-to-source current vs voltage relationships, aspects of MOS transistor threshold voltage, MOS transistor transconductance and output conductance, pass transistor, nMOS inverter, determination of pull-up to pull-down ratio of nMOS transistor driven by another nMOS transistor, CMOS inverter, MOS transistor circuit model, latch up in CMOS circuits.

Module III

MOS and BICMOS circuit design process: MOS layers, stick diagrams, design rules and layout, 2ìmeter, 1.2ìmeter CMOS rules, layout diagrams, symbolic diagrams. Basic Circuit Concepts: Sheet resistance, area capacitance of layers, delay module, wiring capacitances, choice of layers. Scaling of MOS Circuits: Scaling models, scaling function for device parameters, limitation of scaling.

Module IV

Sub system Design and Layout: Architectural issues, switch logic, gate logic, examples of structural design (combinational logic), some clocked sequential circuits. Memory Register and Aspects of System Timing: Some commonly used storage/memory elements. Subsystem Design Process: General arrangement of 4-bit arithmetic processor, regularity, design of an ALU subsystem.

Module V

Test and Testability: System partitioning, layout and testability, reset/initialization, design for testability, testing combinational logic, testing
sequential logic, practical design for test (OFT) guidelines, scan design techniques, Built-In-Self-Test (BIST).

**Text books**

**Reference books**
Module I 9 hours

The 8051 Microcontrollers: Microcontrollers and embedded processors, overview of the 8051 family, 8051 assembly language programming, I/O port programming.

Module II 9 hours

8051 Programming in C: Data types and time delay in 8051C, I/O programming in 8051C, logic operations in 8051C, accessing code ROM space in 8051C.

Module III 9 hours

8051 Hardware Connection and Intel Hex File, 8051 timer programming, 8051 serial port programming.

Module IV 9 hours

Interrupt Programming: ADC, DAC and sensor interfacing, 8051 interfacing to external memory.

Module V 9 hours


Text Book(s)


References

Module I 8 hours
Overview of GPS: Basic concept, system architecture, space segment, user segment, GPS Aided Geo-Augmented Navigation (GAGAN) architecture.

Module II 8 hours
GPS Signals: Signal structure, Anti Spoofing (AS), selective availability, difference between GPS and GALILEO satellite construction.

Module III 8 hours
GPS Coordinate Frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

Module IV 8 hours
GPS Orbits and Satellite Position Determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – observation data and navigation message data parameters, GPS position determination.

Module V 8 hours
GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

Text Book(s)

References
Module I

**Introduction:** Speech signal, signal processing, digital speech processing, digital speech processing.

**Digital Models for Speech Signals:** Process of speech production, acoustic theory of speech production, lossless tube models, digital models for speech signals, hearing and auditory perception.

Module II

**Time-Domain Methods for Speech Processing:** Time-dependent processing of speech, short-time energy and average magnitude, short-time average zero-crossing rate, speech vs silence discrimination, pitch period estimation using the autocorrelation function.

**Digital Representation of the Speech Waveform:** Instantaneous quantization, adaptive quantization, general theory of differential quantization, delta modulation, differential PCM, comparison of systems.

Module III

**Short-Time Fourier analysis:** Fourier transform interpretation, linear filtering interpretation, filter-bank summation method of short-time synthesis, spectrographic displays, analysis-synthesis systems.

**Homomorphic Speech Processing:** Homomorphic systems for convolution, complex cepstrum of speech, pitch detection, formant estimation, homomorphic vocoder.

Module IV

**Linear Predictive Coding of Speech:** Basic principles of linear predictive analysis, computation of the gain for the model, solution of the LPC equations, relations between the various speech parameters, synthesis of speech from linear predictive parameters, applications of LPC parameters.

Module V

**Digital Speech Processing for Man-Machine Communications by Voice:** Voice response systems, speaker recognition systems, speech recognition systems.
Speech Enhancement in Noise: Single channel speech enhancement methods, beam forming with microphone array speech, distortion measurement.

Text Book(s)

References
Module I 9 hours

Introduction
Brief orientation - an integrated approach to LSRW skills- Self assessment of skills at the entry level.
Grammar: Tenses; Articles; Subject-verb agreement.
Writing: Constructing complete and meaningful sentences.

Module II 8 hours

Choices and Implications
Reading: Researching texts for essays; Skimming and scanning; Identifying the sequence of ideas; Understanding implicit meanings; Inferring the meaning of words; Understanding how essay types are organized.
Writing: Drafting the introduction to an essay; Summarizing.
Grammar and Vocabulary (Contextual): Word families -linking words; Verb-noun collocations.

Module III 8 hours

Risks and Hazards
Reading: Selecting and prioritizing what you read; Inferring the meaning of words; Making notes.
Writing: Using claims to plan essays; Supporting claims with evidence; Drafting the body of an essay using the given notes.
Grammar and Vocabulary (Contextual): Countable and uncountable nouns; Word families: adjectives meaning large and important; Adjective+ noun combinations; Prefixes.

Module IV 8 hours

Language and Communication
Reading: Predicting the content of a text; Reading for detail; Scanning for information; Understanding implicit meanings; Making notes.
Writing: Reporting what is read; Writing a paragraph or two using the given notes.
Grammar and Vocabulary (Contextual): Word families: nouns with related adjectives ending -ic and -ical; Reporting verbs.
Module V 9 hours

Difference and Diversity
Reading: Reading in detail; Collecting information for writing tasks.
Writing: Reporting what is read; Writing a paragraph or two using the given notes (compare and contrast).

Grammar and Vocabulary (Contextual): Linking parts of a text: conjunctions and sentence connectors; Single-word verbs and multi-word verbs; Word families: nouns with related adjectives.

Laboratory
Listening: 26 hours
Listening for information; Identifying key terms; Understanding outlines; Identifying main and secondary points; Understanding short presentations and following the logical flow of thought; Taking notes; Understanding short discussions; Making predictions while listening to short talks; Identifying topic change; Following an argument; Making predictions during lectures; Matching phrases to functions such as introducing a topic, sub-topic, clarification/ explanation.

Speaking:
Discuss and decide - key terms, main and secondary points (pair work); Making suggestions in group work; Making mini oral presentations using appropriate discourse markers; Discussing preparation strategies before a lecture starts; Working in small groups - generating ideas and reporting (based on listening materials); Making oral presentations based on prompts given.

Text Book:

Teacher Resource Material:
2. Class Audio CD, DVD, Audio & DVD Pack.

Supplementary material chosen will be from public domain/free resources for classroom use. Sources will be cited wherever available/applicable.
Module I 9 hours
The World We Live In
Reading: Recognizing plagiarism; Identifying the main ideas in a text; Summarizing what is read.
Writing: Using paraphrases; Including quotations in writing.
Grammar and Vocabulary (Contextual): Articles: zero article and complex prepositions. Vocabulary: single-word verbs and multi-word verbs, hedging adverbs.

Module II 9 hours
Behaving the Way We Do
Reading: Organizing information for an essay; Skimming and scanning texts; Taking notes and explaining what is read.
Writing: Writing conclusions in essays; Giving references; Language for writing: hedging.
Grammar and Vocabulary (Contextual): Avoiding repetition: expressions with Wh- noun clauses.
Vocabulary: collocations - verb/ adjective+ preposition combinations.

Module III 9 hours
Bringing about Change
Reading: Reading critically; Finding information and taking notes; Retelling what is read.
Writing: Using an academic style.
Grammar and Vocabulary (Contextual): Relative clauses; It clauses: expressing personal opinions impersonally; Abstract nouns+of+-ing/to-infinitive; Inferring the meaning of words.

Module IV 8 hours
Work and Equality
Reading: Understanding figures and tables; Scanning for information; Understanding the significance of references.
Writing: Structure and content of reports; Describing events in a time sequence; Cause and effect.
Grammar and Vocabulary (Contextual): Passive voice; Past perfect, -ing nouns.

Module V

Writing Formal Letters

Letters of enquiry, seeking permission, complaint and adjustment, job application (cover letter).

Laboratory

Listening:

Listening for gist and detail; Identifying contrasts while listening to lectures/ presentations (pitch, emphasis); Understanding the organization of a talk; Understanding the relationship between parts of a lecture; Listening for a lecture summary; Understanding descriptions of processes.

Speaking:

Reaching a consensus in group work; Referring forward and backward in presentations; Concluding a presentation; Taking part in discussions; Group discussions; Making presentations using Power Point slides.

Text Book:


Teacher Resource Material:

2. Class Audio CD, DVD, Audio & DVD Pack.

Supplementary material chosen will be from public domain/ free resources for classroom use. Sources will be cited wherever available/applicable.
Module I 12 hours

**Introduction to Environment and Natural Resources:** Introduction to environment: Definition, scope and importance, multidisciplinary nature of environment, need for public awareness. Natural Resources: Renewable and non-renewable resources, natural resources and associated problems. Forest resources: Uses, Reasons for over-exploitation, deforestation effects, timber extraction, case studies. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Uses, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, Impacts of overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, use of renewable and non renewable energy sources, case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Module II 9 hours


Module III 8 hours

**Environmental Pollution and Control:** Environmental Pollution: Definition, causes, effects and control measures of :- Air Pollution, Water

Module IV 7 hours


Module V 6 hours


Text Book(s)

References
Module I  8 hours

**Economics:** Utility, value, wealth, consumption, wants necessaries, comforts and luxuries.

**Demand:** law of demand, elasticity of demand, price elasticity of demand, factors affecting elasticity of demand, simple problems.

Module II  8 hours

**Costing:** Cost concepts, elements of cost. Methods of distribution of overhead costs, unit costing, job costing and process costing, simple problems.

**Accounts:** Preparation of profit and loss account and balance sheet (outlines only).

Module III  6 hours

**Break-Even Analysis:** Assumptions, break-even charts, simple problems.

**Depreciation:** Depreciation methods - Simple problems.

Module IV  10 hours

**Forms of Business Organization:** Single trader, partnership and public limited company.

**Principles of Organization:** Types of organization Span of management, Authority, delegation and decentralization, source of formal authority, difference between authority and power, line and staff authority, simple case studies.

Module V  10 hours

**Principles of Management:** Importance of management, definition of management, management process, roles of a manager, Management, a science or art - Management, a profession, functions of management.

**Leadership:** Difference between a leader and a manager, characteristics of leadership, functions of a leader, simple case studies.
Text Book(s)

References
Module I  8 hours
Introduction, organizational behavior, nature, management functions, management roles, management skills, systematic study; foundations of individual behavior, attitudes, types of attitudes.

Module II  8 hours
Perception and motivation, perception, factors, motivation, nature; Theories of motivation, hierarchy needs theory, two-factor theory, expectancy theory; Applications of motivation.

Module III  8 hours
Foundations of group behavior, groups, nature, classification; stages of group development, group structure, group decision making, groups and teams; leadership, nature, theories, trait theories, behavioral theories, contingency theories.

Module IV  8 hours
Organizational structure, nature, work specialization, departmentalization, chain of command, span of control, centralization and decentralization; Organizational designs, the simple structure, the bureaucracy, the matrix structure, the team structure, the virtual organization, the boundary less organization.

Module V  8 hours
Organizational culture and change management, organizational culture, nature, cultures functions, approaches to managing organizational change, Lewin’s model, Kotter’s plan for implementing change, organizational development techniques.

Text Book(s)

References
Module I 8 hours

**Introduction:** Corporation, definition and characteristics, history of corporate form and models, corporate objectives, corporations and government, governance, corporate governance, definition, perspectives.

Module II 8 hours

**Theoretical Foundations of Corporate Governance:** Notion of conflict of interest, property rights theory, nexus of contracts, agency theory, Berle and Means’ theory, concept of separation of ownership and control, shareholder, stakeholder debate.

Module III 8 hours

**Pillars of Governance in Organizations:** Owners, ownership structure, types of owners, ownership vs. control, board of directors, types of directors, board roles and board attributes, board committees, executive management, role of CEO, succession planning, managerial myopia, institutional investors, types, categories, features and role.

Module IV 8 hours

Work ethos, values and ethics, model of management in the Indian socio-political environment. Need for values in global change, Indian perspective, values for managers, holistic approach for managers in decision making.

Module V 8 hours

**Business Ethics and CSR:** Corporation as a social institution, accountability and sustainability, relevance of triple bottom line reporting to CSR, codes of conduct, Applications of ethical theories to decision making, ethical issues related to employment, healthcare and advertisement.

**Text Book(s)**


**References**

EHS401: PROJECT MANAGEMENT (Elective)

Module I 8 hours

Concept of Project: Basic concepts, classification, characteristics of project, project life cycle, project management, tools and techniques of project management, project organization.

Module II 8 hours

Project Identification: Identification, generation of ideas, SWOT analysis, preliminary screening, project rating index.

Market and Demand Analysis: Collection of data, market survey, market planning, market environment, project risk analysis, demand forecasting techniques.

Module III 8 hours

Technical Analysis: selection of technology, material input and utilities, plant capacity, location and site, machinery and equipment, structures and civil work, environmental aspects, project charts and layouts, PERT, CPM.

Module IV 8 hours

Financial estimation: Project cost, source of finance, cost of production.


Investment Evaluation: Investment decision rule, techniques of evaluation, payback period, accounting rate of return, internal rate of return, discounted payback period.

Module V 8 hours

Social Cost Benefit Analysis: Concept of social cost benefit, significance of SCBA, approach to SCBA.

Project Implementation: Schedule of project implementation, project planning, project control, human aspects of project management, team building, and high performance team.

Text Book(s)

References
EHS402: OPERATIONS AND SUPPLY CHAIN MANAGEMENT (Elective)

L T P C
3 0 0 3

Module I
Introduction to Operations Management: History of operations management, types of manufacturing systems, role and responsibilities of operations manager, services operations.

Module II
Understanding the Logistics and Supply Chain: Introduction to supply chain, supply chain links, role of logistics in supply chain, drivers and metrics in supply chain, designing the supply chain network, online sales and distribution network, factors influencing the network design.

Module III
Impact of Uncertainty in Network: Globalization and supply chain, risk management in global supply chain, demand forecasting in supply chain role of information technology in forecasting.

Module IV
Coordination in Supply Chain: Collaborative planning and replenishment strategies, CPFR, managing uncertainties in inventory.

Module V
Impact of Replenishment Policies in Safety Inventory: Role of information technology in inventory management, transportation in supply chain.

Text Book(s)

References
Module I 8 hours

**Introduction to Disasters:** Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks), Classification causes, impacts (including social, economic, political, environmental, health, psychosocial, etc.), Differential impacts in terms of caste, class, gender, age, location, disability, global trends in disasters, urban disasters, pandemics, complex emergencies, climate change.

Module II 8 hours

**Approaches to Disaster Risk Reduction:** Disaster cycle analysis, phases, culture of safety, prevention, mitigation and preparedness community based DRR, structural and nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, centre, and other stakeholders.

Module III 8 hours

**Interrelationship between Disasters and Development:** Factors affecting vulnerabilities, differential impacts, impact of development projects such as dams, embankments, changes in land use etc., climate change adaptation, relevance of indigenous knowledge, appropriate technology and local resources.

Module IV 8 hours

**Hazard and Vulnerability Profile of India Components of Disaster Relief:** Water, food, sanitation, shelter, health, waste management institutional arrangements (mitigation, response and preparedness, DM Act and policy, other related policies, plans, programmes and legislation)

Module V 8 hours

**Project Work: (Field Work, Case Studies):** The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing
disaster risks and to build a culture of safety, projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located. A few ideas or suggestions are to be discussed.

Text Book(s)

References
Module I

Quality, Strategic Planning and Competitive Advantage: Brief history, definitions of quality, quality in manufacturing and service systems, quality and price, quality and market share, quality and cost, quality & competitive advantages, ISO 9000, 14000.

Module II

Managing and Organization for Quality: Quality policy, quality objectives, leadership for quality, quality and organization culture, cross-functional teams, supplier/customers partnerships.

Module III

Quality Control and Improvement Tools: Check sheet, histogram, pareto chart, cause and effect diagram, scatter diagram, control chart, graph, affinity diagram, tree diagram, matrix diagram, process decision program chart, arrow diagram, acceptance sampling, process capability studies, zero defect program (POKA-YOKE).

Module IV

Quality Circles: Concept and total quality through bench marking, Japanese 5-S, quality management systems QS 9000, ISO 14000.

Statistical Process Control: Control chart – X-R, p, np and c charts, benefits of control charts and applications.

Module V

Customer Focus: The customer – Driven quality cycle, quality function deployment, customer satisfaction measurement techniques, customer relationship management techniques.

Text Book(s)


References

EHS405: ENTREPRENEURSHIP DEVELOPMENT  
(Elective)

L T P C  
3 0 0 3

Module I  8 hours
Introduction, evolution of entrepreneurship, characteristics of entrepreneur, entrepreneurial mindset, theories of entrepreneurship, motivation for entrepreneurship, role of entrepreneurship in economic development, entrepreneurship development programmes, corporate entrepreneurship, meaning and benefits of corporate entrepreneurship.

Module II  8 hours
Sources of innovative ideas, methods of generating ideas, opportunity identification, setting-up new ventures, acquiring existing business, franchising, business model, components of business model, types of business model.

Module III  8 hours
Business plan, contents of business plan, the marketing plan, the organisational plan, the financial plan, sources of finance, institutional support to entrepreneurs, management of business, financial management, human resource management, marketing management, production and operation management.

Module IV  8 hours
Family businesses - importance, types and responsibilities, challenges and issues in family business, succession planning and grooming the successor, best practices in family business, live examples of family businesses.

Module V  8 hours
Social entrepreneurship, introduction, definition, importance, characteristics of social enterprise, funding of social enterprise, significance of social entrepreneurs, measures of success in a social enterprise, live examples of Social entrepreneurs.
Text Book(s)

References
Module I 3 hours
Introduction: Morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty.

Module II 3 hours

Module III 3 hours
Engineering as Social Experimentation: Decomposing the system, overview of system design, system design concepts, system design activities, addressing design goals, managing system design.

Module IV 3 hours
Safety, Responsibilities and Rights: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies. Collegiality and loyalty, respect for authority, conflicts of interest, occupational crime, professional rights.

Module V 3 hours
Global Issues: Multinational corporations, environmental ethics, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership.

Text Book(s)

References
EID101: PROGRAMMING WITH C

Module I

Introduction to Programming, Algorithms and Flowcharts: Programs and programming, programming languages, compiler, interpreter, loader and linker, classification of programming languages, structured programming concept, algorithms and flowcharts.

Basics of C: Developing programs in C, a simple C program, structure of a C program, concept of variable, data types in C, program statement, declaration.

Module II

Tokens: All tokens, operators and expressions, type conversions in C.
Input and Output: Introduction, non-formatted input and output, formatted input and output. Control Statements: Introduction, conditional execution (if, if-else, nested if), and selection (switch), unconditional types (break, continue, go to).

Module III

Loops: Iteration and repetitive execution (for, while, do-while), nested loops.
Arrays and Strings: Introduction, one dimensional array, one dimensional character arrays (strings), two dimensional arrays and character arrays (array of strings).

Module IV

Functions: Concept of function, using functions, call by value and call by references mechanism, working with functions-example programs, passing arrays to functions, scope and extent, storage classes, recursion.
Pointers: Understanding memory addresses, pointer operators (& and *), pointers declaration, initialization, void pointer, null pointer, use of pointers, 1-D arrays and pointers, pointers and strings.

Module V

Structures: Declaring structures and structure variables, accessing members of a structure, arrays of structures, arrays within a structure. Union: Declaring union and its members, accessing and initializing members of
a union, structure versus union. **Files:** Using files in C: declaration of file pointers, opening a file, closing a file, working with text files: reading from and writing into text files.

**Text Book(s)**


**References**

Module I 11 hours

**Data Representation:** Introduction, linear lists, array based representation and operations, indirect addressing and operations, linked representation, comparisons.

**Searching:** Linear search, binary search.

**Arrays:** Arrays, matrices, sparse matrices.

Module II 11 hours

**Linked Lists:** Creation of single linked list, double linked list, circular linked list and operations on it.

Module III 11 hours

**Stacks:** Definitions, operations and applications, array and linked representation of stacks.

**Queues:** Definitions and operations, array and linked representation of queues.

Module IV 11 hours

**Graphs:** Introduction, representation of graphs, graph traversals, applications, spanning trees.

**Introduction to Sorting:** Insertion sort, selection sort, bubble sort, merge sort, quick sort.

Module V 11 hours

**Trees:** Definitions and properties, representation of binary trees, operations, binary tree traversals, binary search tree, AVL trees and operations on AVL trees, heap sort.

**Text Book(s)**


**References**

Module I  8 hours
Number Representation: Positional representation of numbers, decimal, binary, octal, hexadecimal number systems, general radix ‘r’ system, numbers, conversions, complements, binary codes, arithmetic with signed unsigned numbers (addition, subtraction), introduction to error correction and error detection.

Module II  8 hours
Introduction to Logic Circuits: Variables and functions, truth tables, logic gates and networks, Boolean algebra, synthesis using AND, OR and NOT gates, NAND and NOR logic networks.

Module III  8 hours
Optimized Implementation of Logic Functions: Karnaugh map, strategy for minimization, minimization of product of sums forms, incompletely specified functions, multiple output circuits, multilevel synthesis, a tabular method for minimization, cubical technique for minimization.

Module IV  8 hours
Combinational Logic: Design procedures, adders, subtractors, multiplexers, demultiplexers, encoders, decoders, priority encoder, code converters, seven segment display, programmable logic Devices-PAL, PLA.

Module V  10 hours
Sequential Circuits: Flip flops, basic latch, gated SR latch, gated D latch, Master-slave and edge triggered D flip flop, T flip flop, JK flip flop, registers, shift registers, counters-synchronous and asynchronous counters, other types of counters-BCD counter, Ring counter, Johnson counter,.

Text Book(s)

References
LAB CYCLE

Develop the C Programs for the following Problem:

1. Conversion of an upper-case character to a lower-case character.
2. Finding the sizes and ranges of different types.(hint: use sizeof() and limits.h)
3. Roots of a quadratic equation using ‘if’.
4. Print whether the given number is perfect (for a perfect number, the sum of divisors- except the number itself-will be equal to that number; ex: 6,28,496,etc.).
5. First n terms of fibonacci sequence using (i) any loop and (ii) if statement (use ‘switch’ to decide the choice).
6. Print twin primes up to a specified limit.(ex: 3-5,5-7,11-13, 17-19, etc.)
7. Generate one hundred random integers in the range of 1 to 100, store them in an array and print the average. (using any loop)
8. Print the average of the given numbers and also the numbers greater than the average.
9. Converting a decimal value to binary.
10. Program that uses a function to perform multiplication of two matrices.
11. Program that uses a function to perform transpose of a given matrix.
12. Determine if the given string is a palindrome or not (use a function)
13. Sort the given array of strings in dictionary order (use a function).
14. Recursive and non recursive functions for towers of hanoi.
15. Program that performs all the five arithmetic operations using pointers.
16. Print the details of students of a class ( the details may be : roll number, name, department, class, address, marks in five subjects and average of marks) using nested structures(calculate average).
17. Program that demonstrates the memory allocation done by a structure and a union (declare structure and union in the same program).

18. Program to demonstrate member access in a union (declare three different types of variables in union, assign values and print them).

19. Program that illustrates the function fprintf() to write into a text file.

20. Program that illustrates the function fscanf() to read from a text file.

21. Program that accepts the names of two files and copies the first file into the second line by line using fgets() and fputs() functions.
1. Write a program to read a linear list of items and store it in array.
   • Copy the contents from one array to another array
   • Copy the contents from one array to another in reverse order
   • Store the numbers from high index to low index
   • Print the contents in normal order and reverse order

2. Write a program to create an array of pointers and create the records dynamically. What are the observations with respect to experiment no.1?

3. Perform Linear Search and Binary Search on a list stored in array. Compare and contrast.

4. Write programs for:
   • Reading and printing matrices
   • Matrix addition
   • Matrix transpose
   • Matrix transpose into the same matrix
   • Matrix multiplication

5. Write program for
   • Representing sparse matrix
   • Sparse matrix transpose
   • Sparse matrix addition

6. Write a program to
   • Create a singly linked list, traversal, backward printing the content using recursion
   • Insert, delete nodes at various positions in a singly linked list
   • Make the list Circular

7. Write a program to
   • Create a doubly linked list, traversal: forward, backward
   • Insert, delete nodes at various positions in a doubly linked list
8. Write a program to create a stack and perform various operations on it.
   • Evaluate a postfix expression
   • Convert the given expression in infix form to postfix form

9. Write a program to create a queue and perform various operations on it.

10. Represent the graph in adjacency matrix form.

11. Implement DFS, BFS traversals on a graph.

12. Implement various sorting techniques:
    a) Insertion sort,   b) selection,   c) Bubble,

13. Implement various sorting techniques:
    a) Merge,   b) Quick Sort,   c) Heap Sort

14. Write a program to create a binary tree and perform various traversals.

15. Write a program to create a binary search tree and perform search operation.
1. Verification of the truth tables of basic gates and study of pin configuration of the IC’s.

2. Design and construct half adder and full adder circuits and verify the truth tables.

3. Design and construct half subtractor and full subtractor circuits and verify the truth tables.

4. Design and construct any two combinational circuits and verify the truth tables.

5. Design and construct 2x4 Decoder and verify the truth table.

6. Design and construct 4X1 Multiplexer and verify the truth table.

7. Design and construct 4 Bit Up counter and verify the function.

8. Design and construct BCD ripple counter and verify the function.


10. Design and construct register with parallel load and verify the function.

11. Design and construct Unidirectional shift Register and verify the function.

12. Design and construct a 4 Bit Ring counter and verify the function.
Module I 10 hours

**Introduction to OOP:** Procedure oriented programming, object oriented programming, basic concepts of OOP, benefits and applications of OOP, simple C++ program, namespace scope, structure of C++ Program, creating, compiling and linking a file.

**Tokens:** Keywords, identifiers, constants, basic data types, user defined data types, storage classes, derived data types, dynamic initialization of variables, references variables, operators in C++, scope resolution operator, member dereferencing operators, memory management operators.

Module II 9 hours

**Control Structures.**

**Classes and Objects:** Specifying a class, defining member functions, C++ program with class, private member functions, arrays within class, memory allocation for objects, static data members, static member functions, arrays of objects, returning objects.

**Functions in C++:** Main function, function prototyping, call by references, return by references, inline functions, default arguments.

Module III 8 hours

**More about Functions:** Function overloading, friendly functions: friend function, a function friendly to two classes, objects as function arguments.

**Constructors & Destructors:** Constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, copy constructors, dynamic constructors, destructors.

Module IV 9 hours

**Inheritance:** Introduction to inheritance, single inheritance, making a private member inheritable (protected member), multi-level inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance.

**Operator Overloading:** Rules for overloading operators, overloading unary operators, overloading binary operators.
**Pointers:** Introduction to pointers, declaring and initializing pointers, arithmetic operations on pointers, pointers with arrays, arrays of pointers, pointers to objects, ‘this’ pointer.

**Module V**

**Polymorphism and Virtual Functions:** Compile-time polymorphism, run-time polymorphism, virtual functions.

**Managing Console I/O Operations:** Unformatted I/O operations, formatted console i/o operations (width (), precision (), fill()), managing output with manipulators (setw(), endl).

**Templates:** Introduction, function templates, class templates.

**Exception Handling:** Introduction, exception handling mechanism, throwing mechanism, catching mechanism.

**Text Book(s)**


**References**


Module I 10 hours

**Java Evolution & Environment:** Java evolution, overview of java language, java history, features of java, how java differs from C and C++, java and World Wide Web, web browser.

**Java Environment:** Java Development kit (JDK), Application Programming Interface (API), java programming structure, java tokens, constants, variables, expressions, decision making statements and looping, java statements, overview of arrays and strings, machine neutral, Java Virtual Machine (JVM), Command Line Arguments.

**Arrays and Strings:** One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays, string arrays, string methods, string buffer class, vectors, wrapper classes.

**Basic I/O Streams:** Scanner, buffered reader.

Module II 14 hours

**Classes, Objects And Methods:** Introduction, defining a class, creating objects, accessing class members, constructors, methods overloading, static members.

**Inheritance:** Defining a sub class, sub class constructor, multilevel variables, final classes, and finalize methods, abstract methods and classes, visibility control.

**Managing Errors and Exceptions:** Introduction, types of errors: compile time and run time errors, exceptions, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, throwing our own exceptions.

Module III 10 hours

**Interfaces, Package & Multithreaded Programming:** Introduction, defining interfaces, extending interfaces, implementing interfaces.

**Package:** Creation, importing a package and user defined package.

**Threads:** Introduction to threads, creating threads, extending the thread class, implementing the ‘Runnable’ interface, life cycle of a thread, priority of a thread, synchronization, and deadlock.
Module IV 9 hours

**Applet Programming:** Introduction, how applets differ from applications, building applet code, applet life cycle, about HTML, designing a web page, passing parameters to applets, getting input from the user.

Module V 13 hours

**Graphics Programming:** Introduction, abstract window toolkit class hierarchy, frames, event-driven programming, layout managers, panels, canvases, drawing geometric figures.

**Introduction to Swings:** Introduction to swings, overview of swing components-Jbutton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList.

**Introduction to Networking:** InetAddress class, socket class, URL class.

**Text Book(s)**


**References**


Module I
Register Transfer and Micro Operations: Register transfer language, register transfer, bus and memory transfers, arithmetic microoperations, logic microoperations, shift microoperations, arithmetic logic shift unit

Module II
Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory-references instructions, input-output and interrupt, complete computer description, design of the basic computer, design of accumulator logic.
Microprogrammed Control: Control memory, address sequencing, micro program example, design of control unit.

Module III
Central Processing Unit: Introduction, general registers organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control.
Pipeline and Vector Processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline
Computer Arithmetic: Introduction, addition and subtraction, decimal arithmetic unit, booth multiplication algorithm.

Module IV
Input/output Organization: Accessing I/O devices, interrupts, DMA, buses, interface circuits, standard I/O interfaces.

Module V
The Memory system- Some basic concepts, semiconductor RAM memories, ROM memories, cache memories, performance considerations, virtual memories, secondary storage.

Text Book(s)

References
Module I 8 hours

Introduction: Introduction to operating systems, types of operating systems: batch systems, multi programmed systems, timesharing systems, multiprocessor systems, distributed systems, real-time systems.

Operating System Structures: System components, operating system services, system calls, system programs, system structure.

Module II 10 hours


CPU Scheduling: Scheduling-criteria, algorithms, algorithm evaluation, interprocess communication.

Process Synchronization: Critical section problem, synchronization hardware, semaphores, classic problems of synchronization, monitors.


Module III 8 hours

Deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

File Concepts: File concept, access methods, directory structure, file system interface, implementation, protection.

Module IV 8 hours

Memory Management: Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: Demand paging, process creation, page replacement, algorithms, allocation of frames, thrashing.


Module V 10 hours

I/O Systems: Hardware, application interface, kernel I/O subsystem, transforming I/O to hardware operation, performance.
Case Studies: Unix, Linux, Windows.

Mass Storage Structure: Disk structure, disk scheduling, disk management, goals of protection, domain of protection, access matrix.

Text Book(s)


References

EID205: DATA COMMUNICATIONS

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Module I
10 hours

Data Communication, Data Networking and Internet: A communication model, data communications, networks, internet.

Protocol Architecture: Need for protocol architecture, TCP/IP protocol architecture, OSI model, TCP/IP Vs OSI model.

Module II
11 hours

Data Transmission: Concepts and terminology, analog and digital data transmission, transmission impairments, channel capacity.

Transmission Media: Guided and unguided Media

Module III
12 hours

Signal Encoding Techniques: Digital signals, digital data, analog signals, analog data.

Module IV
10 hours

Digital Data Communication Techniques: Asynchronous and synchronous transmission, types of errors, error detection techniques, error correction techniques.

Data Link Control Protocols: Flow control, error control, high level data link control (HDLC).

Module V
10 hours

Multiplexing: Frequency division multiplexing, characteristics, synchronous time division multiplexing, characteristics, statistical time division multiplexing, characteristics.

Text Book(s)

References
Module I 11 hours

**Introduction:** Uses of the computer networks, references models, network standardization.

**Medium Access Control:** channel allocation problems, multiple access protocols-ALOHA, CSMA, collision free protocols.

Module II 11 hours

**Ethernet:** Ethernet physical layer, ethernet mac sub layer protocol, ethernet performance, switched ethernet, fast ethernet, gigabit ethernet.

**Data Link Layer Switching:** Uses of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

Module III 12 hours

**Network Layer:** Network layer design issues, routing algorithms, optimality principle, shortest path, flooding, distance vector routing, count to infinity problem, link state algorithm, hierarchical routing, congestion control algorithms, quality of service, traffic shaping.

**The Network Layer in the Internet:** IPv4, IP addresses, IPv6 Protocol, CIDR.

**Internet Control Protocols:** ICMP, ARP, RARP and DHCP.

Module IV 12 hours

**Transport Layer:** Transport layer services provided to the upper layers, transport service primitives, Berkeley Sockets, elements of transport protocols.

**The Internet Transport Protocols:** UDP, TCP, the TCP service model, the TCP protocol, the TCP segment header, TCP connection establishment, TCP connection release.

Module V 9 hours

**Application Layer:** The domain name system, electronic mail, world wide web- architectural over view.
Text Book(s)


References


1. Write a program that contains a function to exchange (swap) values of two arguments by using pointers and References parameters.

2. Write a program to check the given string is palindrome or not using a private member function.

3. Write a program to find transpose of 2-D matrix by allocating memory dynamically to the matrix, initialize and display contents of the matrix and deallocate memory.

4. Write a program to find corresponding elements of two 2-D matrices using friend function.

Create two classes each capable of storing one 2-D matrix. Declare the matrices under private access specifier and access them outside the class.

5. Write a program for finding area of different geometric shapes (Circle, Rectangle and Cube) using Function overloading.

6. Write a Program to generate Fibonacci Series by using Constructor to initialize the Data Members.

7. Write a program to add two matrices of same copy. Create two objects of the class and each of which refers to one 2-D matrix. Use constructor to allocate memory dynamically and use copy constructor to allocate memory when one array object is used to initialize another.

8. Write a program to demonstrate Single inheritance distinguishing public and private derivation.

9. Write a program to illustrate the implementation of both Multilevel and Multiple (Hybrid) inheritance.

10. Write a program to find transpose of a given matrix of $m \times n$ size using Unary operator overloading.

11. Write a program to add two matrices of $m \times n$ size using Binary operator overloading.
12. Write a program to demonstrate the usage of Virtual functions.

13. Write a program to sort a given set of elements using Function template.

14. Write a program to search a key element in a given set of elements using Class template.

15. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.
1. Develop a program that will take a string from a command line argument and check whether it is a palindrome or not.

2. Given are two one dimensional arrays A and B which are sorted in ascending order. Write a program to merge them into a single sorted array C that contains every item from arrays A and B in ascending order.

3. Develop a program to implement the following string methods.
   a) equals()   b) compareTo()   c) substring()   d) indexOf()
   e) toLowerCase()

4. Write a java program to find the roots of a quadratic equation using interface and packages.
   • Declare an interface in package quad1
   • Declare another package quad2 and implement the interface

5. Develop a program to demonstrate constructor overloading.

6. Develop a program to demonstrate exception handling by using throw, finally and multiple catch statements.

7. Develop a java program to implement the concept of user defined exception.

8. Design a vehicle class hierarchy in Java, and develop a program to demonstrate polymorphism.

9. Develop a program to demonstrate multiple inheritance through interface.

10. Write a java program to throw a exception (checked) for an employee details
    • If an employee name is a number, a name exception must be thrown.
    • If an employee age is greater than 50, an age exception must be thrown

11. Develop a program to illustrate the concept of multithreading through implementing runnable interface and extending thread class
12. Develop an applet that receives three numeric values as input from the user and then display the largest of the three.

13. Develop an applet that displays different bar charts.

14. Create an applet program for banner; banner text (Your Roll No.) should be passed as parameter. This applet creates a thread that scrolls the message contained in message right to left across the applet’s window & also uses status window.

15. Create an applet program for menu demonstration. Menu bar should contain file, edit, view and its submenus. Draw colour lines, rectangle, filled rectangle, rounded rectangle, filled rounded rectangle, oval, filled oval, arc, fill arc, & polygon every drawing shape should be in different colour, Write a text “hello everyone” at the center.

16. Write JAVA program which handles KeyBoardEvent

17. Write a program that displays the x and y position of the cursor movement using Mouse

18. Develop a program for the demonstration of Button event.

19. Design a HTML page (web page) describing your profile in one paragraph. Design in such a way that it has a heading, a horizontal rule, three links and a photo of your institution. Also, write three HTML documents for the links.

20. Develop a program for the demonstration of the following layout managers: Border layout, flow layout, grid layout, and gridbag layout.
1. Operating System introduction, history, architecture of unix/Linux operating system.

2. File handling utilities (1): the vi editor, security by file permissions, process utilities, disk utilities like: vi, cp, mv, ln, rm, unlink, mkdir, cd, rmdir, du, df, mount, unmount,


4. Text processing utilities: cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, tr, awk, tar, cpio.

5. General purpose utilities: banner, cal, date, calendar, tty, bc, spell, fspell.

6. Write a C program that takes one or more file or directory names as command line input and reports the following information on the file: File type, Number of links, permissions, time of last access (Note : Use stat/fstat system calls)

7. Write a program to remove blank lines from a file using: grep and sed (A blank line may contain either nothing or only whitespace characters).

8. Write a Program to frame regular expressions to match these patterns:
   (i) Jefferies Jeffery jeffreys (ii) hitchen hitchin hitching (iii) Heard herd Hird (iv) dix dick dicks Dickson Dixon (v) Mcgee mcghee magee.
1. Scheduling algorithms, simulation of first cum first serve cpu scheduling algorithm.
2. Simulation of shortest job first cpu scheduling algorithm.
4. Banker’s algorithm for dead locks avoidance.
5. Page replacement algorithms, implement first in first out page replacement algorithm.
6. Page replacement algorithms, implement least recently used page replacement algorithm.
8. Write a program to implement concurrent programming constructs through semaphores –dining philosophers’ problem, consumer-producer, readers-writers etc.
9. Write a C program to implement deadlock avoidance algorithms.
10. Write a program to page replacement algorithms.
11. Write a program to implement virtual memory.
EID301: DATABASE MANAGEMENT SYSTEMS

Module I

Introduction to DBMS: Overview, file system vs DBMS, advantages of DBMS, storage data, queries, transaction management, DBMS structure.

Data Models: Data modeling and data models, the importance of data models, data model basic building blocks, the evolution of data models, degree of data abstraction.

E-R Model: Entities, attributes and entity sets, relationship and relationship sets, mapping cardinalities, keys, features of ER model, conceptual database design with ER model

Module II

Relational Model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views.

Relational algebra and calculus.

Module III

Structured Query Language (SQL): Introduction to SQL, data definition commands, data manipulation commands, SELECT queries, advanced data definition commands-advanced SELECT queries, creating a view, joining database tables.

Advanced SQL: Relational set operators, SQL join operators, sub queries and correlated queries, SQL functions, procedural SQL, embedded SQL, cursors, ODBC and JDBC, triggers and active database, designing active databases.

Module IV

Normalization of Database Tables: Database tables and normalization, the need for normalization, normalization process, improving the design, higher level normal forms, normalization and database design, schema refinement, Functional Dependency(FDs), FDs reasoning normal forms, decomposition, normalization, denormalization.
Module V  

10 hours

**Transaction Management and Concurrency Control:** What is a transaction? transaction state implementation of atomicity and durability, concurrency control serializability, concurrency control with locking methods, concurrency control with time stamping methods, concurrency control with optimistic methods.

**Concurrency Control:** Lock management, specialized locking techniques, concurrency control without locking.

**Crash Recovery:** ARIES, recovering from a system crash, media recovery.

**Text Book(s)**


**References**


EID302: WEB TECHNOLOGIES

Module I

Introduction to HTML Version 5: Basic syntax, HTML document structure, text formatting, images, lists, links, tables, forms, frames, section, article, range and date.

Cascading Style Sheets Version 3: Levels of style sheets, style specification formats, selector forms, font properties, list properties, color properties, alignment of text, background images, span and div tags.

Module II

Introduction to Java Script: Overview of java script, syntactic characteristics, primitives, operator and expression, control statements, arrays, functions, errors in scripts, Document Object Model(DOM), event driven computation, element access in java script, the navigator object.

Dynamic Document with Java Script: Element positioning, moving elements, changing colors and fonts, dynamic content, locating the mouse cursor, slow movements of elements, dragging and dropping elements.

Module III

Introduction to XML: Syntax of XML, document structure, and document type definition, namespaces, XML schemas, document object model, presenting XML using CSS.

Introduction to other XML Technologies: XLink, XPointer, XQuery and XPath, XQuery and XSLT, XQuery processor and FLWOR expression.

Module IV

Introduction to Servlets: Lifecycle of a servelet, the servlet api, the javax.servelet package, the javax.servlet.http package, handling http request & responses, using cookies, session tracking and security issues and servlets with database connectivity.

Introduction to Model View Controller (MVC): Architecture, its structure, components.
Module V

Introduction to JSP: The problem with servlet, the anatomy of a JSP page, JSP processing, JSP applications, JSP components, comments, expressions, scriplets, JSTL tag library, JSP database connectivity.

Introduction to Web Servers: Installing the Java software development kit, tomcat server & testing tomcat, structure of web application, deploying web application, IIS web server, and GWS web server.

Text Book(s)

References
Module I 10 hours

**Introduction to Software Engineering:** Software, software engineering, the changing nature of software, software myths.

**A Generic View of Process:** Software engineering, a layered technology, a process framework, CMMI.

**Process Models:** The waterfall model, incremental process models, evolutionary process models.

Module II 10 hours

**Requirements Engineering:** Requirements engineering tasks, initiating the requirements engineering process, eliciting requirements, negotiating requirements, validating requirements.

**Building the Analysis Model:** Requirements analysis, data modelling concepts, scenario-based modelling, flow-oriented modelling, class-based modelling, creating a behavioural model.

Module III 8 hours

**Design Engineering:** Design process and design quality, design concepts, the design model.

**Creating an Architectural Design:** Software architecture, architectural styles and patterns.

**Performing User Interface Design:** Golden rules.

Module IV 9 hours

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software—unit testing, integration testing, validation testing, system testing.

**Testing Tactics:** Software testing fundamentals, white-box testing—basis path testing, control structure testing, black-box testing methods.
Module V 8 hours

**Product Metrics:** Software quality, measurement principles, product metrics landscape, function based metrics.

**Risk Management:** Reactive vs. proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

**Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews.

**Text Book(s)**


**References**


Module I

Conventional Software Management: The waterfall model, conventional software management performance, evolution of software economics, pragmatic software cost estimation.

Improving Software Economics: Reducing software product size, improving software processes, improving team effectiveness, improving automation, achieving required quality, peer inspections.

Module II

Conventional and Modern Software Management: Principles of conventional software engineering, principles of modern software management, transitioning to an interactive process,

Life Cycle Phases: Engineering and production stages, inception, elaboration, construction, transition phases.

Module III

Artifacts of the Process: The artifact sets, management artifacts, engineering artifacts, programmatic artifacts.

Model based Software Architectures: A management perspective and technical perspective.

Module IV


Checkpoints of the Process: Major mile stones, minor milestones, periodic status assessments.

Interactive process planning: Work breakdown structures, planning guidelines, cost and schedule estimating process, the iterative planning process, pragmatic planning.

Module V

Project Organizations and Responsibilities: Line-of-Business organizations, project organizations, and evolution of organizations, process automation- building blocks, the project environment.
**Project Control and Process Instrumentation:** The seven core metrics, management indicators, quality indicators, life cycle expectations, pragmatic software metrics, metrics automation.

**Text Book(s)**


**References**


Module I 11 hours

**Introduction to Algorithms:** Algorithm specification, performance analysis.

**Divide and Conquer:** The general method, binary search, finding maximum and minimum, merge sort, quick sort, selection, Strassen’s matrix multiplication.

Module II 11 hours

**The Greedy Method:** The general method, knapsack problem, job sequencing with deadlines, optimal storage on tapes, minimum cost spanning trees, single source shortest paths.

Module III 11 hours

**Dynamic Programming:** The general method, multistage graphs, all pair’s shortest paths, optimal binary search trees, reliability design, the travelling salesperson problem.

Module IV 11 hours

**Basic Search and Traversing Techniques:** Techniques for binary trees, techniques for graphs connected components and spanning trees, biconnected components, and depth-first search.

**Back Tracking:** The general method, eight queen’s problem, sum of subsets, graph colouring, Hamiltonian cycle.

Module V 11 hours

**Branch and Bound:** The method, travelling salesperson problem, efficiency considerations. **Algebraic Problems:** The general method, evaluation and interpolation.

**Text Book(s)**

**References**
Detailed syllabus:

1. Developing a sample ER model for the specified database.
2. Familiarization of SQL DDL commands-create, alter, drop, rename and truncate
3. Use of DML commands-select, insert, update and delete
4. Use of different operators for nested sub-queries.
5. Creating Views, grouping functions and performing joins.
6. Use of DCL and TCL commands.
7. PL/SQL programming environment
8. Declaring triggers and use of cursors.
9. Implementation of small database project
Experiment-1:
Design the static web pages required for any online services web site.

1) HOME PAGE:
The static home page must contain three frames.
Top frame: Logo and the college name and links to home page, login page, registration page, catalogue page, cart page etc.
Left frame: At least four links for navigation, which will display the catalogue of respective links.
Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

2) LOGIN PAGE:
This page has to contain login form, forgot password, and link to new user registration form, back to home page etc. If the user is authenticated user, can access the web site. Otherwise he has to register.

3) Registration page:
This page has to contain user registration form minimum of 10 fields (use all the form Widgets). If the user is authenticated user, can access the web site.

4) Catalogue PAGE:
The catalogue page should contain the details of all the items available in the web site in a table.

5) Cart page:
Selected list of items has to display in table format & compute cost before submitting. (Use Event Handler functions)

Experiment -2:
Design a web page using CSS (Cascading Style Sheets) which includes the following:
1. Use different font, styles: In the style definition you define how each selector should work (font, color and style etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

2. Set a background image for both the page and single elements on the page. You can define the background image for the page like this:

3. Define styles for links as

4. Work with layers such as Span&Div Tags.

**Experiment-3:**

**VALIDATION:**

1. Write *JavaScript* to validate the following fields of the above registration page.

2. Name (Name should contain alphabets and the length should not be less than 6 characters).

3. Password (Password should not be less than 6 characters length).

4. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)

5. Phone number (Phone number should contain 10 digits only). Note: You can also validate the login page with these parameters.

**Experiment -4:**

Write an XML file which will display the item (your wish) information which includes the following (for example)

1) Title of the book

2) Author name

3) ISBN number

4) Publisher name

5) Edition

6) Price

Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file as follows.

1) The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should
be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.

2) Use XML schemas XSL and CSS for the above purpose. Note: Give at least for 4 books. It should be valid syntactically. Hint: You can use some xml editors like XML-spy

**Experiment -5:**

Install TOMCAT web server and APACHE.

While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.

1. Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.


**Experiment -6:**

**User Authentication:**

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following.

1) Create a cookie and add these four user id’s and passwords to this cookie.

2) Read the user id and passwords entered in the login form and authenticate with the values (user id and passwords) available in the cookies.

3) If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display “ You are not an authenticated user”.

4) Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters () method.
**Experiment -7:**

Install a database (Oracle or MySQL or MS-Access).

1) Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Practice ‘JDBC’ connectivity.

2) Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

3) Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

**Experiment -8:**

Write a JSP which does the following job:

Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (Oracle or MySQL or MS-Access).

**Experiment -9:**

Install a database (MySQL).

1) Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

2) Write a JSP to connect to that database and extract data from the tables and display them. Experiment with various Oracle/MySQL/MS-Access queries.

3) Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

**Experiment -10:**

Airline ticket booking system, develop using HTML5, CSS3, XML and Servlets or JSP with any database (Oracle 10g/MySQL/Ms-Access) mainly it has the below functions:
• Flight Status function
• Finding Deals function

**Simulate: Flight Status**

Click “Flight Status”:

Description: The customer can use this function to check the status of a flight.

Inputs: Confirmation number, date, origin and destination.

Source: The input is provided by the user.

Outputs: Date, departure time, arrival time, origin and destination.

Destination: The outputs are displayed on the screen by retrieving information from the database.

Requires: User needs to have a confirmation number while inside secure website.

Pre-condition: The user is inside the website.

Post-condition: The user has viewed the information about flight status and schedule.

**Stimulus: Finding Deals**

Click: “Finding Deals”

Description: This function allows user to search for deals. The user enters the source, destination, time period that the user wants to go on a vacation, and the price range.

Input: Scheduled flights on the selected date with origin and destination, class (single/double), check-in and check-out date and time.

Outputs: A list of deals satisfying the criteria will be displayed by prices from the lowest to the highest.

Source: All the inputs are provided by the user.

Pre-Condition: The user should be logged in.

Post-Condition: The user has viewed the information about stay schedules and flight schedule
EID 342: MIDDLEWARE TECHNOLOGIES (Elective)

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**Module I**

10 hours

**Client / Server Concepts:** client-server, file server, database server, group server, object server, web server, middleware, general middleware, service specific middleware, client / server building blocks, RPC, messaging, peer-to-peer.

**Module II**

10 hours

**EJB Architecture:** EJB, EJB architecture, overview of EJB software architecture, view of EJB, conversation, building and deploying EJBs, roles in EJB.

**Module III**

15 hours

**EJB Applications:** EJB applications, EJB session beans, EJB entity beans, EJB clients, EJB deployment, building an application with EJB

**Module IV**

10 hours

**CORBA:** CORBA, distributed systems, purpose, exploring CORBA alternatives, architecture overview, CORBA and networking model, CORBA object model, IDL, ORB, building an application with CORBA

**Module V**

15 hours

**COM:** COM, data types, interfaces, proxy and stub, marshalling, implementing server/client, interface pointers, object creation, invocation, destruction, comparison COM and CORBA, introduction to .NET, overview of .NET architecture, marshalling, remoting.

**Text Book(s)**


**References**

EID344: ADVANCED COMPUTER ARCHITECTURE  
( Elective)  

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**Module I**  
8 hours

**Introduction to Parallel Processing:** Trends towards parallel processing, parallel processing mechanisms.

**Parallel Computer Structures:** Pipeline computers, array processors, multiprocessor systems.

**Architectural Classification Schemes:** Multiplicity of instruction data streams, serial vs parallel processing.

**Module II**  
10 hours

**Principles of Pipelining and Vector Processing:** Pipelining: Basic concepts of pipelining, data hazards, control hazards, and structural hazards, techniques for overcoming or reducing the effects of various hazards.

**Vector Processor:** The Architecture of CRAY-1.

**Module III**  
8 hours

**Instruction-Level Parallelism:** Concepts of instruction-level parallelism (ILP), techniques for increasing ILP, superscalar, super-pipelined and VLIW processor architectures, vector and symbolic processors.

**Module IV**  
10 hours

**Multiprocessors Architecture and Programming:** Functional structures, loosely coupled multiprocessors, tightly coupled multiprocessors.

**SIMD Types of Interconnected Networks:** Shuffle- Exchange, omega, cube, barrel shifter,

**Parallel Memory Organization:**-Interleaved memory configurations.

**Module V**  
8 hours

**Non Von Neumann Architectures:** Data flow computers: Static data flow computer, dynamic data flow computers, systolic architectures.

**Text Book(s)**


**References**

EID346: INFORMATION RETRIEVAL SYSTEMS (Elective)

L T P C
3 0 0 3

Module I 9 hours
Introduction To IRS and Cataloguing And Indexing: Definition, objectives, functional overview, relationship to DBMS, digital libraries and data warehouses, information system capabilities-search, browse, miscellaneous, objectives, indexing process, automatic indexing, information extraction.

Module II 9 hours
Data Structure and Automatic Indexing: Introduction, stemming algorithms, inverted file structures, n-gram data structure, PAT data structure, signature file structure, hyper data structure. Classes of automatic indexing, statistical indexing, natural language, concept indexing, and hypertext linkages.

Module III 8 hours
Document and Term Clustering & User Search Techniques: Introduction, thesaurus generation, item clustering, hierarchy of clusters. Search statements and binding, similarity measures and ranking, relevance feedback, selective dissemination of information search, weighted searches of boolean systems, searching the internet and hypertext.

Module IV 8 hours
Information Visualization and Text Search Algorithms: Introduction, cognition and perception, information visualization technologies. Introduction, software text search algorithms, hardware text search systems.

Module V 8 hours
Information System Evaluation and Multimedia Information Retrieval: Introduction, measures used in system evaluation, measurement example – TREC results.

Models and Languages: Data modelling, query languages, indexing and searching.

Text Book(s)

References
EID348: SEMANTIC WEB (Elective)

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Module I 8 hours

**Web Intelligence:** Thinking and intelligent web applications, the information age, the world wide web, limitations of today’s web, the next generation web, machine intelligence, artificial intelligence, ontology, inference engines, software agents, berners-lee www, semantic road map, logic on the semantic web.

Module II 10 hours

**Knowledge Representation for the Semantic Web:** Ontologies and their role in the semantic web, ontologies languages for the semantic web – Resource Description Framework(RDF) / RDF schema, Ontology Web Language(OWL), UML, XML/XML schema.

Module III 12 hours

**Ontology Engineering:** Ontology engineering, constructing ontology, ontology development tools, ontology methods, ontology sharing and merging, ontology libraries and ontology mapping, logic, rule and inference engines.

Module IV 12 hours

**Semantic Web Applications, Services and Technology:** Semantic web applications and services, semantic search, e-learning, semantic bioinformatics, knowledge base, XML based web services, creating an OWL-S ontology for web services, semantic search technology, web search agents and semantic methods.

Module V 12 hours

**Social Network Analysis and semantic web:** What is social networks analysis, development of the social networks analysis, electronic sources for network analysis, electronic discussion networks, blogs and online communities, web based networks, building semantic web applications with social network features.
Text Book(s)

References
Module I 8 hours

Motivation and History: Introduction to parallel computing, modern scientific method, evolution of supercomputing, modern parallel computers, seeking concurrency, data clustering, programming parallel computers.

Parallel Architectures: Interconnection networks, processor arrays, multiprocessors, multicomputer, Flynn’s taxonomy.

Module II 8 hours

Parallel Algorithm Design: The task/channel model, foster’s design methodology, partitioning, communication, agglomeration, mapping, finding the maximum: partitioning, communication, agglomeration, mapping, analysis, adding data input, communication, analysis.

Module III 8 hours

Introduction to Distributed Systems: What is distributed systems? Hardware concepts, software concepts, design issues, communication in distributed systems lay red protocols, ATM networks, the client-server model, remote procedure call, group communication.

Module IV 8 hours

Process and processors in distributed system threads, system models, processors allocation, scheduling in distributed systems, fault tolerance, real time distributed system.

Module V 8 hours

Distributed file systems, distributed file system design, distributed file system implementation, trends in distributed file system, distributed shared memory.

Text Book(s)
1. M.J. Quinn, Parallel Programming in C with MPI and Open MP, TMH Publications, 2008.
References


EID352: SOFTWARE REQUIREMENTS ENGINEERING
AND ESTIMATION (Elective)

L T P C
3 0 0 3

Module I 8 hours

Introduction, requirements, requirement engineering, requirements
document, best way to write requirements, detailed requirements, difference
between functional and nonfunctional requirements, system stakeholders,
requirements engineering process, recognizing requirements engineering
process problems, suggesting a good requirements engineering process.

Practical Process Improvement: Process maturity, process assessment,
process improvement, top ten guidelines.

Module II 8 hours

Requirements Elicitation: Assess system feasibility, identify and consult
system stakeholders, record requirement sources, system’s operating
environment, using business concerns to drive requirements elicitation,
domain constraints, collect requirements from multiple viewpoints, use
scenarios to elicit requirements, operational process.

Requirements Analysis and Negotiation: System boundaries prioritize
requirements, assess requirements risk.

Module III 9 hours

Describing Requirements: Standard templates use language, use
diagrams, supplement natural language requirements, specifying
requirements quantitatively.

Requirements Management: Uniquely identify each requirement, policies
for requirements management, traceability policies, maintaining a
traceability manual, change management policies, identify global system
requirements, identify volatile requirements, record rejected requirements.

Module IV 8 hours

Software Size Estimation: Software estimation, size based estimation,
two views of sizing, function point analysis, mark II FPA, full function
points, loc estimation, and conversion between size measures
Module V 10 hours

Effort, Schedule & Cost Estimation: What is productivity?, estimation factors, approaches for effort and schedule estimation, COCOMOII, Putnam estimation model, algorithmic models, cost estimation tools-desirable features of requirements management tools, some requirements management tools available, rational pro, desirable features in software estimation tools, some software estimation tools.

Text Book(s)


References

2. Ian Graham, Requirements Engineering and Rapid Development, Addison-Wesley, 1998
Module I  
**Introduction:** software testing definition, evaluation of software testing, software testing myths and facts, goals and model of software testing, software testing terminology, software testing life cycle, testing methodology, verification and validation activities.

Module II  
**Dynamic Testing:** Black box testing—Boundary value analysis, equivalence class testing, White box testing—Introduction, basic path testing, loop testing.

**Static Testing:** Inspections, structured walkthroughs, technical reviews.

Module III  
**Validation Activities:** Module validation testing, integration testing, function testing, system testing, accepting testing.

**Regression Testing:** Objectives of regression testing, regression testing types, regression testing techniques.

Module IV  
**Test management:** Test organization, structure of testing group, test planning, test design and test specification.

**Efficient Test Suite Management:** Introduction, minimizing the test suite and its benefits, defining test suite minimization problem, test suite prioritization, types of test case prioritization, prioritization techniques.

Module V  
**Software Quality Management:** Software quality, quality cost, quality control and quality assurance, quality management, QM and project management, quality factors, methods of quality management, software quality metrics, SQA models, measurement and improvement of testing process, test process maturity models.

**Text Book(s)**

**References**
Module I 12 hours

Introduction: What motivated data mining? Why is it important? What is data mining? Data mining-on what kind of data? Data mining functionalities, what kinds of patterns can be mined? Are all of the patterns interesting? Classification of data mining systems, data mining task primitives, integration of a data mining system with a database or data warehouse system. Data pre-processing- types of data sets and attribute values, basic statistical descriptions of data, data visualization, measuring data similarity, data quality, major tasks in data pre-processing, data reduction, data transformation and data discretization, data cleaning and data integration.

Module II 10 hours

Data Warehousing and On-Line Analytical Processing: Basic concepts. Data Warehouse Modelling: Data cube and OLAP, data warehouse design and usage, data warehouse implementation, data generalization by attribute-oriented induction, efficient methods for data cube computation, exploration and discovery in multidimensional databases.

Module III 8 hours

Mining Frequent Patterns, Associations and Correlations: Basic concepts, applications of frequent pattern and associations. Frequent Pattern and Association Mining: A road map, mining various kinds of association rules, apriori algorithm, fp growth algorithm, constraint-based frequent pattern mining.

Module IV 10 hours


Module V 8 hours

Cluster Analysis: Basic concepts and methods, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density-based methods, model-based clustering-the expectation-maximization method.
Text Book(s)

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, 3/e, Morgan Kaufmann Publishers, 2011.

References


EID358: ADVANCED COMPUTER NETWORKS (Elective)

Module I 8 hours

**Introduction:** Building a network, network architecture, layering and protocols, OSI architecture, internet architecture, implementing network software, application programming interface (sockets), protocol implementation issues, performance, bandwidth and latency, delay × bandwidth product, high-speed networks, application performance needs.

Module II 8 hours

**Direct Link Networks:** Reliable transmission, stop-and-wait, sliding window, concurrent logical channels, wireless, Bluetooth (802.15.1), Wi-Fi (802.11), WiMAX (802.16), cell phone technologies, bridges and LAN switches, learning bridges, spanning tree algorithm, broadcast and multicast, limitations of bridges.

Module III 10 hours

**Internetworking:** Simple Internetworking (IP), what is an internetwork? service model, global addresses, datagram forwarding in IP, address translation (ARP), host configuration (DHCP), error reporting (ICMP), virtual networks and tunnels, routing - network as a graph, distance vector (RIP), link state (OSPF), metrics, routing for mobile hosts, subnetting - classless routing (CIDR), inter-domain routing (BGP), routing areas.

Module IV 12 hours

End-to-End Protocols, simple demultiplexer (UDP), reliable byte stream (TCP) - end-to-end issues, segment format, connection establishment and termination, sliding window revisited, triggering transmission, adaptive retransmission, record boundaries, transport for real-time applications (RTP), requirements, RTP details, control protocol, congestion control and resource allocation, issues in resource allocation, network model, taxonomy, evaluation criteria, TCP congestion control, additive increase/multiplicative decrease, slow start, fast retransmit and fast recovery, quality of service - application requirements, integrated services (RSVP), differentiated services (EF, AF).
Module V 7 hours

Applications, web Services, custom application protocols (WSDL, SOAP), a generic application protocol (REST), overlay networks, routing overlays, peer-to-peer networks (Gnutella, Bit Torrent), content distribution networks.

Text Book(s)

References
EID360: AGILE SOFTWARE PROCESS (Elective)

Module I 10 hours

Module II 8 hours
Extreme Programming: Introduction, core XP values, the twelve XP practises, about extreme programming? planning XP projects, test first coding, making pair programming work.

Module III 8 hours
Agile Modelling and XP: Introduction, the fit, common practises, modelling specific practises, XP objections to Agile modelling, Agile modelling and planning XP projects, XP implementation phase.

Module IV 8 hours
Feature Driven Development: Introduction, incremental software development, Regaining Control: The motivation behind FDD, planning an iterative project, architecture centric, FDD and XP.

Module V 10 hours
Agile Methods with RUP and PRINCE2, Tools and Obstacles: Agile modelling and RUP, FDD and RUP, agile methods and prince2, tools to help with agile development, Eclipse- An agile IDE, obstacles to agile software development, management intransigence, the failed project syndrome, contractual difficulties, familiarity with agility.

Text Book(s)

References
EID362: MOBILE COMPUTING (Elective)

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Module I 8 hours
Introduction to Mobile Communications and Computing: Introduction to mobile computing, novel applications, limitations, and architecture, (Wireless) Medium Access Control, motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Module II 10 hours
GSM: Mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, and new data services.

Module III 9 hours
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunnelling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Module IV 9 hours
Mobile Transport Layer: Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission /time-out freezing, selective retransmission, transaction oriented TCP.

Module V 10 hours
Wireless Application Protocols: Architecture, wireless data gram protocol, wireless transport layer protocol, wireless transaction layer protocol, wireless session layer protocol, wireless application environment.

Text Book(s)

References
EID364: SERVICE ORIENTED ARCHITECTURE
(Elective)

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Module I
8 hours

Fundamentals of SOA: Introduction, defining SOA, evolution of SOA, service oriented enterprise, comparing SOA to client, server and distributed internet architectures, basic SOA architecture concepts, key service characteristics, technical benefits, business benefits.

Module II
10 hours

Combining SOA and Web Services: Web services, service descriptions, messaging with SOAP, message exchange patterns, web service platform, service contract, service level data model, service discovery, service level security, service level interaction patterns, atomic and composite services, service enabling legacy system, enterprise service bus pattern.

Module III
10 hours

Multi Channel Access and Web Services Composition: SOA for multi-channel access, business benefits, tiers, business process management, web service composition, BPEL, RESTFUL services, comparison of BPEL and RESTFUL services.

Module IV
10 hours

Java Web Services: SOA support in J2EE, Java API for XML based Web Services (JAX, WS), Java Architecture For Xml Binding (JAXB), Java API for XML registries (JAXR), Java API for XML based RPC (JAX, RPC), web services interoperability, SOA support in .NET, ASP.NET web services, case studies, Web Services Enhancements (WSE).

Module V
8 hours

Web Services Security and Transaction: Meta data management, advanced messaging, addressing, reliable messaging, policies, WS- policy, security, WS- security, notification and eventing, transaction management.
Text Book(s)


References


Student will be given exposure to the industry standard application development IDEs like:

- Microsoft .NET
- Eclipse
- LAMP

To create applications of various forms like:

- Console
- Windows
- Client/Server
- Web based
- Enterprise applications
- Sharepoint servers
Module I 8 hours
**Introduction:** Learning problems, perspectives and issues, concept learning, version spaces and candidate eliminations, inductive bias, decision tree learning, representation, algorithm, heuristic space search.

Module II 10 hours
**Neural Networks and Genetic Algorithms:** Neural network representation, problems, perceptrons, multilayer networks and back propagation algorithms, advanced topics, genetic algorithms, hypothesis space search, genetic programming, models of evaluation and learning.

Module III 10 hours
**Bayesian and Computational Learning:** Bayes theorem, concept learning, maximum likelihood, minimum description length principle, Bayes optimal classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian belief network, EM algorithm, probability learning, sample complexity, finite and infinite hypothesis spaces, mistake bound model.

Module IV 8 hours
**Instance Based Learning:** K- Nearest Neighbour learning, locally weighted regression, radial basis functions, case based learning.

Module V 10 hours
**Hidden Markov Models:** Introduction, discrete Markov processes, hidden Markov models, three basic problems of HMMs evaluation problem, finding the state sequence, learning model parameters, continuous observations, the HMM with input, model selection in HMM.

**Text Book(s)**

**References**
**Module I**

**Introduction**: Digital image representation, fundamental steps in digital image processing, elements of digital image processing systems.

**Digital Image Fundamentals**: Elements of visual perception, a simple image model, image sensing and acquisition, image sampling and quantization, basic relationships between pixels, mathematical operations used in digital image processing.

**Module II**

**Image Enhancement in Spatial Domain**: Basic intensity transformation, histogram processing, histogram equalization, histogram matching, fundamentals of spatial filtering, smoothing filters, sharpening filters.

**Fourier Transform**: Discrete Fourier Transform (DFT) on one variable and two variables, Properties of DFT.

**Module III**

**Image Enhancement in Frequency Domain**: Basics of filtering in the frequency domain, smoothing filters, sharpening filters, homomorphic filters.

**Color Image Processing**: Color fundamentals, color models, smoothing and sharpening.

**Module IV**

**Other Transforms**: HAAR Transform, discrete cosine transform.

**Image compression**: Fundamentals, basic compression methods: Huffman coding, arithmetic coding, run length coding, LZW coding, contour coding, predictive coding, wavelet coding.

**Module V**

**Morphological Image Processing**: Erosion and dilation, opening and closing, hit or miss transform morphological algorithms, grey level morphological processing.
**Image Segmentation:** Fundamentals, point, line, and edge detection, basic global thresholding, region based segmentation, watersheds, image segmentation based on colour.

**Text Book(s)**


**References**

EID442: STEGANOGRAPHY AND BIOMETRICS
(Elective)

Module I 8 hours
Steganography: Steganographic communication, the channel, the building blocks, notation and terminology, information theoretic foundations of steganography, cachin’s definition of steganographic security, practical steganographic methods, statistics preserving steganography, model-based steganography, masking embedding as natural processing, minimizing the embedding impact, matrix embedding, non shared selection rule.

Module II 8 hours
Steganalysis: Steganalysis scenarios, detection, forensic steganalysis, the influence of the cover work on steganalysis, some significant steganalysis algorithms, LSB embedding and the histogram attack, sample pairs analysis, blind steganalysis of JPEG images using calibration, blind steganalysis in the spatial domain.

Module III 8 hours
Biometrics: Introduction, benefits of biometrics over traditional authentication systems, benefits of biometrics in identification systems, selecting a biometric for a system, applications, Key biometric terms and processes, biometric matching methods, accuracy in biometric systems.

Module IV 10 hours
Physiological Biometric Technologies: Fingerprints, technical description, characteristics, competing technologies, strengths, weaknesses, deployment, facial scan, technical description, characteristics, weaknesses, deployment, iris scan, technical description, characteristics, strengths, weaknesses, deployment, retina vascular pattern, technical description, characteristics, strengths, weaknesses, deployment, hand scan, technical description, characteristics, strengths, weaknesses deployment, DNA biometrics.

Module V 8 hours
Multi Biometrics: Multi biometrics and multi factor biometrics, two factor authentication with passwords, tickets and tokens, executive decision, implementation plan.
Text Book(s)


References

Module I 10 hours
**Introduction to Social Networks:** Fundamental concepts in network analysis, features, social network data: network data, boundary specification and sampling, types of networks, network data, measurement and collection.

Module II 8 hours
**Mathematical Representations of Social Networks:** Notations for social network data, sociometric notation, algebraic notation, two sets of actors, graphs and matrices.

Module III 8 hours
**Network Centrality and Prestige:** Prominence, non directional relations, directional relations structural balance and transitivity: structural balance, clusterability.

Module IV 10 hours
**Cohesive Subgroups:** Sub groups based on complete mutuality, reach ability and diameter, subgroups based on nodal degree, subgroups based on nodal degree, measures of subgroup cohesion, directional relations, valued relations, interpretation of cohesive subgroups.

Module V 10 hours
**Overlapping Subgroups:** Affiliation networks, representing affiliation networks, one, mode networks, properties of affiliation networks, analysis of actors and events.

**Roles and Positions:** Structural equivalence, positional analysis, measuring structural equivalence, representation of network positions.

**Text Book(s)**

**References**
EID444: E-COMMERCE (Elective)

Module I 8 hours

Module II 8 hours
Electronic payment systems: Digital token, based, smart cards, credit cards, risks in electronic payment systems.
Inter Organizational Commerce: EDI, EDI implementation, value added networks.

Module III 8 hours
Intra Organizational Commerce: Work flow, automation customization and internal commerce, supply chain management.
Corporate Digital Library: Document library, digital document types, corporate data warehouses, advertising and marketing, information based marketing, advertising on internet, online marketing process, market research.

Module IV 10 hours
Consumer Search and Resource Discovery: Information search and retrieval, Commerce catalogues, Information filtering.

Module V 10 hours
Multimedia: Key multimedia concepts, digital video and electronic commerce, desktop video processing, desktop video conferencing.

Text Book(s)

References
Module I
8 hours

Understanding Cloud Computing: Cloud origins and influences, basic concepts and terminology, goals and benefits, risks and challenges.

Fundamental Concepts and Models: Roles and boundaries, cloud characteristics, cloud delivery models, cloud deployment models.

Module II
6 hours

Cloud Enabling Technology: Data center technology, virtualization technology, web technology, multitenant technology, service technology.

Module III
6 hours

Cloud Infrastructure Mechanisms: Logical network perimeter, virtual server, cloud storage device, cloud usage monitor, resource replication.

Module IV
10 hours

Fundamental Cloud Architectures: Workload distribution architecture, resource pooling architecture, dynamic scalability architecture, elastic resource capacity architecture, service load balancing architecture, cloud bursting architecture, elastic disk provisioning architecture, redundant storage architecture.

Module V
10 hours

Cloud Delivery Model Considerations: The cloud provider perspective-Building IaaS environments, equipping PaaS environments, optimizing SaaS environments, the cloud consumer perspective, working with IaaS environments, working with PaaS environments, working with SaaS services.

Text Book(s)
References


Module I 10 hours

Review of the Fundamental Principles of Modern Database Management Systems (DBMS): Architecture and functionality, relational databases (the relational data model, the relational algebra), SQL (select, union, minus, intersect, sub queries, in, exists, different types of joins, group by, having clause etc.), views, object oriented databases (ODMG data model and query language), object relational DBMS.

Module II 8 hours

Query Processing and Query Optimization: Overview, measures of query cost, selection operation, sorting, join operation, other operations, evaluation of expressions, types of optimization -heuristic query optimization vs cost based query optimization.

Module III 8 hours

Transaction Management: ACID properties, concurrency control, and recovery.

Module IV 8 hours

Distributed Databases: Study of DDBMS architectures, comparison of homogeneous and heterogeneous databases, analysis of concurrency control in distributed databases, implementation of distributed query processing, distributed data storage, distributed transactions, commit protocols, availability, distributed query processing, distributed data storage and transaction.

Module V 8 hours

Heterogeneous databases: Architecture, schema translation and schema integration, query processing, transaction management, and alternative transaction models.

Text Book(s)

References


Module I  6 hours
Overview of Wireless Sensor Networks: The vision of ambient intelligence, application example, types of applications, challenges for wireless sensor networks, enabling technologies for wireless sensor networks.

Module II  8 hours
Architectures: Single node architecture, hardware components, operating systems and execution environments, network architecture, sensor network scenarios.

Module III  8 hours
Physical Layer: Introduction, wireless channel and communication fundamentals, physical layer and transceiver design considerations in WSNs. MAC protocols, contention based protocols, schedule based protocols.

Module IV  10 hours
Link Layer Protocols: Fundamentals- tasks and requirements, error control, causes and characteristics of transmission errors, ARQ techniques, FEC techniques, framing, adaptive schemes, intermediate checksum schemes, combining packet, size optimization and FEC, link management, link quality characteristics, link, quality estimation.

Module V  8 hours
Advanced Application Support: Advances in network processing, going beyond mere aggregation of data, distributed signal processing, distributed source coding, security, fundamentals security considerations in wireless sensor networks, denial of service attacks.

Text Book(s)

References
Module I 8 hours

Introduction:

**The Internet of Things:** An overview, the flavour of the internet of things, the “internet” of “things”, the technology of the internet of things, enchanted objects, who is making the internet of things?

**Design Principles for Connected Devices:** Calm and ambient technology, magicas metaphor, privacy, web thinking for connected devices, affordances.

Module II 10 hours

**Internet Principles:** Internet communications: An overview (IP, TCP, the IP protocol suite (TCP/IP), UDP), IP addresses (DNS, Static IP Address assignment, dynamic IP address assignment, IPv6), MAC addresses, TCP and UDP ports, application layer protocols.

Module III 10 hours

**Prototyping:**

**Thinking about Prototyping:** Sketching, familiarity, costs versus ease of prototyping, prototypes and production, open source versus closed source, tapping into the community.

**Prototyping Embedded Devices:** Electronics, embedded computing basics, developing on the arduino, raspberry pi, beaglebone black, electric imp, mobile phone and tablets, plug computing, always, on internet of things.

Module IV 10 hours

**Prototyping the Physical Design:** Preparation, sketch, iterate and explore, non, digital methods, laser cutting, 3D printing, CNC milling, repurposing/ recycling.

**Techniques for Writing Embedded Code:** Memory Management, performance and battery life, libraries, debugging.
Module V  

10 hours

Prototype to Reality:

Business Models: A short history of business models, the business model canvas, models, funding an internet of things startup, lean startups.

Moving to manufacture: Designing kits, designing printed circuit boards, manufacturing printed circuit boards, mass producing the case and other fixtures, certification, costs, scaling up software.

Text Book(s)


References

1. Charalampos Doukas, Building Internet of Things with the Arduino, Create space, 2002.


EID449: BIG DATA ANALYTICS (Elective)

Module I

**Introduction:** Big data and its importance, a flood of mythic “start up” proportions, big data is more than merely big why now? A convergence of key trends, relatively speaking, a wider variety of data, the expanding universe of unstructured data, industry examples of big data, digital marketing and the non line world, the right approach, cross channel lifecycle marketing.

Module II

**Big Data Technology:** The elephant in the room - Hadoop’s parallel world, old vs new approaches, data discovery-work the way people’s minds work, open source technology for big data analytics, the cloud and big data, predictive analytics moves into the limelight, a brief history of hadoop, apache hadoop and the hadoop ecosystem.

Module III

**Map Reduce:** Analyzing the data with hadoop, map and reduce, java mapreduce, scaling out, data flow, combiner functions, running a distributed mapreduce job, hadoop streaming, the hadoop distributed file system, the design of HDFS, HDFS concepts, blocks, namenodes and data nodes, HDFS federation, HDFS high, availability, the command, line interface, basic filesystem operations, hadoop filesystems.

Module IV

**Information Management:** The big data foundation, big data computing platforms, big data computation, more on big data storage, big data computational limitations, big data emerging technologies, Business analytics- The last mile in data analysis, geospatial intelligence will make your life better, consumption of analytics, from creation to consumption, visualizing-how to make it consumable? organizations are using data visualization as a way to take immediate action.
Module V  

10 hours

Data Privacy and Ethics: The privacy landscape, the great data grab isn’t new, preferences, personalization, and relationships, rights and responsibility, playing in a global sandbox, conscientious and conscious responsibility, privacy may be the wrong focus can data be anonym zed? Balancing for counter intelligence.

Text Book(s)


References

EID451: OPEN SOURCE SOFTWARE DEVELOPMENT
(Elective)

Module I

Introduction: Overview of open source software: what is software source code? the open source definition, need, applications, examples of OSD, compliant licenses, examples of open source software products, the open source software development process.

A History of Open Source Software: The Berkeley software distribution, tex, the free software foundation, GNU Unix, Linux, Apache.

Module II

Python Programming: Introduction, Features, using the python interpreter, an introduction to python, control statements, functions, input and output, reading and writing files.

Module III

Python Programming: Data structures, modules, standard modules, packages, errors and exceptions, handling exceptions, user, and defined exceptions.

Module IV

Python Programming: Classes, inheritance, generators, standard library, command line arguments, string pattern matching, internet access, data compression.

Module V

Python Programming: Standard Library, Output formatting, templating, working with binary data record layouts, multithreading, logging.

Text Book(s)

References
1. Mark Pilgrim, Dive into Python, http://www.diveintopython.net/

Web Resources
1. Python Tutorial: http://docs.python.org/tutorial/
Module I

**Introduction:** History and origin of patterns, design patterns in MVC, describing design patterns, how design patterns solve design problems, selecting a design pattern, using a design pattern.

Module II

**Design Patterns-1:** Creational, abstract factory, builder, factory method, prototype, singleton.

Module III

**Design Patterns-2:** Structural Patterns: Adapter, bridge, composite, decorator, façade, flyweight, proxy.

Module IV

**Design Patterns-3:** Behavioural patterns, chain of responsibility, command, interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Module V

**Advanced Patterns:** Pattern catalogs and writing patterns, patterns and case study- designing a document editor anti patterns, case studies in UML, pattern community.

**Text Book(s)**


**References**


Module I 10 hours
Overview of Embedded Systems: Examples of embedded systems, typical hardware.

8051 Microcontroller: Microcontrollers and microprocessors, overview of the 8051, its family, pin description of 8051, inside the 8051, introduction to 8051, assembly program, assembling and running an 8051 program, the program counter and ram space and 8051, data types and directives, flag bits and psw register, register banks and stack.

Module II 8 hours
Jump, Loop and call instructions: Arithmetic instructions, logical instructions addressing modes.
Minimum Circuits of 8051: Power supply, crystal, oscillator, reset circuits, I/O port programming.

Module III 8 hours
8051 Timer Programming: Timer/Counter programming in 8051, Serial communication in 8051, interrupt programming.
Rear World Interfacing I: LCD, ADC and sensors.

Module IV 8 hours
Real World Interfacing II: Keyboard, display, stepper motor, traffic light controller, elevator. Introduction to RTOS: Tasks and task states, tasks and data, semaphores and shared data.

Module V 9 hours
Other Operating System Services: Message queues, mail boxes and pipes, timer functions, events, memory management, interrupt routines in RTOs environment.

Basic Design using RTOs: Principles, semaphores and queues, hard real time scheduling considerations, saving memory and power embedded software development tools, host and target machines, linker/locators for embedded software, getting embedded software into the target system.
Textbook(s)

References
Module I  8 hours
Introduction to computer graphics and graphics systems, overview of CG, pixel storage tubes displays, CRT technologies, raster scan display and frame buffers, vector and character generation, display file structure.

Module II  10 hours
Scan conversion, points and lines, line drawing algorithms, DDA algorithm, Bresenham’s line algorithm, circle generation algorithm, scan-line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module III  8 hours
2D Geometrical Transformations: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

Module IV  8 hours
2D Viewing: The viewing pipeline, viewing coordinate references frame, window to view, port coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithm, Sutherland, Hodgeman polygon clipping algorithm.

Module V  8 hours
Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, projections (parallel and perspective).

Visible Surface Detection Methods: Classification, backface detection, depth buffer, scan-line, area subdivision.

Virtual Reality: Basics, devices for virtual reality, virtual reality languages, applications.

Text Book(s)

References
Week 1, Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 2, Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 3, Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Week 4, Task 5: Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards.

Week 5, Task 6: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Week 6, Task 7: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Week 7, Task 8: The test consists of various systems with Hardware / Software related troubles, formatted disks without operating systems.

Internet & World Wide Web

Week 8, Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the
Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Week 9**, Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug, INS like Macromedia Flash and JRE for applets should be configured.

**Week 10**, Task 3: Search Engines & Netiquette : Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors.

**Week 11**, Task 4: Cyber Hygiene : Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

**Week 12**, Module Test A test which simulates all of the above tasks would be crafted and given to the students.

**Excel**

**Week 13**, Excel Orientation : The mentor needs to tell the importance of MS/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel, Task 1: Gridlines, Format Cells, Summation, auto fill, Formatting Text. Task 2: Cell Referencing, Formulae in excel, average, std.deviation.

**Week 14**, Task 3: Performance Analysis, Features to be covered: ; Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 4: Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation
EIT222: COMPUTER NETWORKS LABORATORY

1. Programs to implement error correction and detection.
2. Programs for IP address conversion function.
3. Client server applications using inter process communication and synchronous mechanisms
   a) FIFO
   b) Message queues
   c) Shared memory
4. Connection oriented Client server applications with TCP.
5. Connectionless Client server applications with UDP.
6. Programs using RPC remote procedure call.
7. Client server applications using concurrent server.
10. Implement a chat and mail server.
Module I 10 hours
**J2ME Overview:** Java 2 Micro Edition and the World of Java, inside J2ME, J2ME and wireless devices, small computing technology, wireless technology, radio data networks, microwave technology, mobile radio networks, messaging, personal digital assistants.

Module II 10 hours
**J2ME Architecture and Development Environment:** J2ME Architecture, small computing device requirements, runtime environment, MIDlet programming, Java language for J2ME, J2ME software development kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless.

Module III 12 hours
**Commands, Items, and Event Processing:** J2ME user interfaces, display class, the palm OS emulator, command class, item class, exception handling, high level display screens, screen class, alert class, form class, item class, list class, text box class, ticker class low level display, the canvas, user interactions, graphics, clipping regions, animation.

Module IV 12 hours
**Record Management System:** Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records.
**Record Listener JDBC Objects:** The concept of JDBC, JDBC Driver types, JDBC packages, overview of the JDBC Process, database connection, statement Objects, result set, transaction processing, metadata, data types, exceptions.
**JDBC and Embedded SQL:** Model programs, tables, indexing, inserting data into tables, selecting data from a table, metadata, updating tables, deleting data form a table, joining tables, calculating data, grouping and ordering data, sub queries, views.

Module V 8 hours
Generic connection framework, the connection, hypertext transfer Protocol, communication management using http commands, session management, transmit as a background process.

Text Book(s)

References
Module I  10 hours

**Formal Language and Regular Expressions:** Languages, definition languages regular expressions, finite automata, DFA, NFA, conversion of regular expression to NFA, NFA to DFA, applications of finite automata to lexical analysis, lex tools.

**Context Free Grammars and Parsing:** Context free grammars, derivation, parse trees, ambiguity LL (K) grammars and LL (1) parsing.

Module II  10 hours

**Bottom up parsing handle pruning, LR grammar parsing, LALR parsing, parsing ambiguous grammars.**

**Semantics:** Syntax directed translation, S attributed and L attributed grammars, intermediate code, abstract syntax tree, translation of simple statements and control flow statements.

Module III  8 hours

**Code Optimization:** Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, data flow analysis of flow graphs.

Module IV  8 hours

**Code Generation:** Machine dependent code generation, object code forms, generic code generation algorithm, register allocation and assignment using DAG representation of Block.

Module V  8 hours

**Run Time Storage:** Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

**Text Book(s)**


**References**

Mini Project I: A Point of Sale (POS) System
A POS system is a computerized application used to record sales and handle payments, it is typically used in a retail store, it includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client, side terminals and interfaces such as browser, PDAs, touch, screens.

Mini Project II: Online Bookshop Example
Following the model of amazon.com or bn.com, design and implement an online bookstore.

Mini Project III: A Simulated Company
Simulate a small manufacturing company. The resulting application will enable the user to take out a loan, purchase a machine, and over a series of monthly production runs, follow the performance of their company.

Mini Project IV: A Multi Threaded Airport Simulation
Simulate the operations in an airport. Your application should support multiple aircrafts using several runways and gates avoiding collisions/conflicts. Landing-an aircraft uses the runway, lands, and then taxis over to the terminal. Take Off- an Aircraft taxies to the runway and then takes off.

Mini Project V: An Automated Community Portal
Business in the 21st Century is above all BUSY. Distractions are everywhere. The current crop of “enterprise intranet portals” is often high noise and low value, despite the large capital expenditures it takes to stand them up. Email takes up 30, 70% of an employee’s time. Chat and Instant Messaging are either in the enterprise or just around the corner. Meanwhile, management is tasked with unforeseen and unfunded leadership and change, agent roles as well as leadership development and succession management. What is needed is a simplified, repeatable process that enhances communications within an enterprise, while allowing management and peers to self, select future leaders and easily recognize high performance team members in a dynamic way. Additionally, the system should function as a general, purpose content management, business intelligence and peer, review application. Glasscode’s goal is to build that system. The software is released under a proprietary.
1. Implement transition diagrams for identifying an identifier and constant and classify the identifier as either variable or array or function or structure and constant as integer or real.

2. Write a program to read CFG productions and store into corresponding data structures.

3. Write a program for eliminating Left, Recursion from the given grammar.

4. Write a program for applying left factoring to a given grammar.
   The following programs are to be implemented using above representation.

5. Implement algorithms for finding First and Follow symbols of a given grammar.

6. Consider the following Expression language that used to describe the Arithmetic expressions in Calculator. The syntax of the language is defined by following grammar

   `<Line> _ _ <exp> \n
   <exp> _ _ _ <exp>+ <exp>| <exp>,<exp>|<exp>*<exp>|<exp>/<exp>

   <exp> _ _ <value>

   <value> _ _ _ <digit><value> | <digit>

   <digit> _ _ _ _ _ >0|1|2|3|4|5|6|7|8|9

   A simple program written in this language is: 2+45*34/17-67+78/6\n
   a) Design a Lexical analyser for the above language. The lexical analyser should ignore redundant spaces, tabs and newlines. Although the syntax specification states that value can be arbitrarily long, you may restrict the length to some reasonable value.

   b) Implement the lexical analyser using JLex, flex or lex or other lexical analyser generating tools.
c) Implement syntax analyser for the Expression language by using Recursive Descent parser which takes output of the lexical analyser and checks whether it follows the syntax or not. (Hint: assume that lexical analyser returns val token for integer constant then grammar is \( E, > E + E | E * E | E / E | \text{val} \) and checking for this words in implementation of recursive descent parsing is like next==v and next+1==a and next+2==l for val)

d) Implement Operator Precedence parser for the above language. Which takes operator precedence matrix and the string as the input and check whether the string is accepted or not. (Hint: take the grammar given in question)

e) Write Yacc code to get final Expression value, for the above simple program output should be 38.

f) Write Yacc code to get three address code for the given expression.

7. Consider the following grammar which is used to describe the X language which might be used in next generation programmable calculators. It supports integer, real and complex numbers. This language uses something called Hungarian notation the name of the variable itself tells you about the type of the data it contains if the starting letter is ‘i’ then integer, ‘r’ then real, ‘c’ then complex number.

\[
\text{<program> } '! \text{ begin<stmts> end}
\]

\[
\text{<stmts> } _ _ _ > \text{<statement>; <stmts>} | \text{<statement>};
\]

\[
\text{<statement> } _ _ _ > \text{<identifier>=<expr> } | \text{<conditional>}
\]

\[
\text{<expr> } _ _ _ > \text{<expr> + <term> | <expr>=<term>|<term>}
\]

\[
\text{<term> } _ _ _ > \text{<term>*<fact> | <fact>}
\]

\[
\text{<fact> } _ _ _ > \text{<identifier><conditional> _ _ _ > if <cexpr> then begin< stmts> end}
\]

\[
\text{<cexpr> } _ _ _ > \text{<identifier><conditional> _ _ _ > if <cexpr> then begin< stmts> end}
\]

\[
\text{<identifier> } _ _ _ > \text{i<letters>|r<letters>|c<letters>}
\]

\[
\text{<letters> } _ _ _ > \text{<letter><letters>|<letter>}
\]

\[
\text{<letter> } _ _ _ > \text{a|b|...|z|A|B|...|Z}
\]

a) Design a Lexical analyser for the above language. The lexical analyser should ignore redundant spaces, tabs and newlines.
Although the syntax specification states that value can be arbitrarily long, you may restrict the length to some reasonable value.

b) Implement the lexical analyser using JLex, flex or lex or other lexical analyser generating tools.

c) Implement Predictive parser for the above language.

d) Implement LALR bottom up parser for the above language.

e) Convert the CFG rules into YACC form and write code to generate abstract syntax tree or three address code.

f) Write program to generate 8086 assembly code from the abstract syntax tree or three address code generated by the parser. The target assembly instructions can be simple move, add, sub, and jump. Also simple addressing modes are used.
EIT392: SEMINAR

Student has to select a topic of his/her interest in consultation with the faculty in charge of seminar. He/She can collect information from the books, journals, internet and prepare a report. Prepare for a power point presentation on the topics and present to a committee to evaluate the seminar.

Seminar is separate for each student.
EIT401: INFORMATION SECURITY

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**Module I**

**Introduction**: Security attacks, security services, security mechanisms, model for network security.

**Classical Encryption Techniques**: Symmetric cipher model, substitution techniques, transposition techniques, steganography, block ciphers and the data encryption standard- block cipher principles, data encryption standard, strength of DES, differential and linear cryptanalysis.

**Module II**

**Design Principles**: Block cipher design principles, block cipher mode operation, triple DES, AES algorithm, stream ciphers, RC4.

**Introduction to Number Theory**: Modular arithmetic, Euclidean algorithm, prime numbers, Fermats and Euler’s theorem, testing for primality, chinese remainder theorem, discrete logarithms.

**Module III**

**Public Key Cryptography**: Principles of public key cryptosystems, RSA algorithm.

**Key management**: Key management, Diffie-Hellman key exchange.

**Message Authentication and Hash functions**: Authentication requirements and authentication functions, MAC, hash functions.

**Module IV**

**Hash Algorithms**: Secure hash Algorithm, whirlpool, HMAC, CMAC.


**Module V**

**Network Security**: Electronic mail security, IP Security, web security.

**Text Book(s)**


**References**

Module I 10 hours
Classifiers Based on Bayes Decision Theory: Introduction, Bayes decision theory, discriminant functions and decision surfaces, Bayesian classification for normal distributions. Estimation Of Unknown Probability Density Functions: Maximum likelihood parameter estimation, maximum a posteriori probability estimation, Bayesian inference, maximum entropy estimation, mixture models, nonparametric estimation, the Naïve Bayes classifier, the nearest neighbor rule, Bayesian networks.

Module II 8 hours
Linear Classifiers: Linear discriminant functions and decision hyperplanes, the perceptron algorithm, least squares methods.
Mean Square Estimation Revisited: Logistic discrimination, support vector machines.

Module III 11 hours
Non Linear Classifiers: The XOR problem, the two layer perceptron, three layer perceptrons, algorithms based on exact classification of the training set, the back propagation algorithm, variations on the back propagation theme, the cost function choice, choice of the network size, a simulation example, networks with weight sharing, generalized linear classifiers, capacity of the l-dimensional space in linear dichotomies, polynomial classifiers.

Module IV 8 hours
Feature Selection: Preprocessing, feature selection based on statistical hypothesis testing.
Feature Generation: Linear Transforms, Regional features, features for shape and size characterization, typical features for speech and audio classification.

Module V 8 hours
Context Dependent Classification: Markov chain models, hidden Markov models, supervised learning vector quantization.

Text Book(s)

References
Module I 8 hours
**Infrastructure Security:** The network level, the host level and the application level security

**Data Security and Storage:** Aspects of data security, data security mitigation, provider data and its Security.

Module II 10 hours
**Identity and Access Management:** Trust boundaries and IAM, why IAM, IAM challenges, IAM definitions, IAM architecture and practice, getting ready for the cloud, relevant IAM standards and protocols for cloud services, IAM practices in the cloud, cloud authorization management, cloud service provider IAM practice.

Module III 12 hours
**Security Management in the Cloud:** Security management standards, security management in the cloud, availability management, SaaS availability management, PaaS availability management, IaaS availability management, access control, security vulnerability, patch, and configuration management.

Module IV 10 hours
**Privacy:** What is privacy, data life cycle, key privacy concerns in the cloud, who is responsible for protecting privacy, changes to privacy risk management and compliance in relation to cloud computing, legal and regulatory implications.

Module V 10 hours
**The Impact of Cloud Computing on the Role of Corporate IT:** Why cloud computing will be popular with business units, potential threats of using CSPs, a case study illustrating potential changes in the IT profession caused by cloud computing, governance factors to consider when using cloud computing.

**Text Book(s)**

**References**
EIT443: CYBER LAWS AND DIGITAL FORENSICS  
(Elective)  

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Module I  

Module II  
*Cyber Crime Issues*: Unauthorized access to computers, computer intrusions, white collar crimes, viruses and malicious code, internet hacking and cracking, virus attacks, pornography, software piracy, intellectual property, mail bombs, exploitation, stalking and obscenity in internet, digital laws and legislation, law enforcement roles and responses.

Module III  
*Cybercrime in Mobile and Wireless Devices*: Introduction to mobile and wireless devices, proliferation of mobile wireless devices, trends in mobility, credit card frauds in mobile and wireless computing era, types and techniques of credit card frauds, authentication service security, security for mobile devices, attacks on mobile/cell phones, mobile phone theft, mobile viruses, phishing, laptops, physics security countermeasures.

Module IV  
*Tools and Methods used in Cybercrime*: Introduction to tools and methods, password cracking, keyloggers and spywares, virus and worms, DoS and DDoS attacks.

Module V  
*Phishing and Identity Theft*: Introduction, phishing, methods of phishing, phishing techniques, spear phishing, types of phishing scams, Identity Theft (ID Theft), Personally Identifiable Information (PII), Types of identity theft, techniques of ID theft, Identity Theft Countermeasures.

Text Book(s)  

References  
EIT444: NATURAL LANGUAGE PROCESSING (Elective)

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Module I 8 hours

Overview and Language Modeling Overview: Origins and challenges of NLP language and grammar, processing Indian languages, NLP applications, information retrieval.

Language Modeling: Introduction, various grammars based language models, statistical language model.

Module II 9 hours

Word Level and Syntactic Analysis Word Level Analysis: Introduction, regular expressions, finite state automata, morphological parsing, spelling error detection and correction, words and word classes, part of speech tagging.

Syntactic Analysis: Introduction, context free grammar, constituency parsing, probabilistic parsing.

Module III 8 hours


Discourse Processing: Introduction, cohesion, references, resolution, discourse coherence and structure.

Module IV 10 hours

Natural Language Generation and Machine Translation Natural Language Generation: Introduction, architecture of NLG systems, generation tasks and representations, application of NLG.

Machine Translation: Introduction, problems in machine translation, characteristics of Indian languages, machine translation approaches, translation involving Indian languages.

Module V 10 hours

Information Retrieval and Lexical Resources Information Retrieval: Introduction, design features of information retrieval systems, classical, non classical, alternative models of information retrieval, evaluation.
Lexical Resources:  Introduction, wordnet, framenet, stemmers, POS tagger, research Corporation.

Text Book(s)

References
1. Daniel Jurafsky and James H Martin, Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, 2/e, PHI, 2008.
EIT445: INTRODUCTION TO BIOINFORMATICS (Elective)

Module I 8 hours
Introduction: Basic biology, genetic material, genes, what molecules code for genes, structure of DNA, what carries information between DNA and proteins, proteins, analysis of DNA, why Bioinformatics?

Module II 8 hours
Exhaustive Search: Restriction mapping, impractical restriction mapping algorithm, practical restriction mapping algorithm, regulatory motifs in DNA sequences, profiles, the motif finding problem, search trees, finding motifs, finding a median string.

Module III 10 hours
Greedy Algorithms: Genome rearrangement, sorting by reversals, approximation algorithm, breakpoints, greedy approach for motif finding.

Module IV 10 hours
Dynamic Programming Algorithm: Edit distance and assignments, longest common subsequence, global sequence alignment, scoring alignment, local sequence alignment, alignment with gap penalties, multiple alignments, gene prediction, statistical approach to gene prediction, similarity based approach to gene prediction.

Module V 10 hours
Clustering and Trees: Gene expression analysis, hierarchical clustering, k-mean clustering, clustering and corrupted cliques, evolutionary tree, distance based tree construction, reconstructing tree for additive matrices, evolutionary tree and hierarchical clustering, character based tree clustering.

Text Book(s)

References
EIT447: OBJECT ORIENTED SOFTWARE ENGINEERING (Elective)

Module I 8 hours
Design Objects, class hierarchy, inheritance, polymorphism, object relationships and associations, aggregations and object containment, object persistence, meta classes, object oriented systems development life cycle. Software development process, object oriented systems development-a use case driven approach.

Module II 8 hours
Object modeling technique as software engineering methodology, Rumbaugh methodology, Jacobson methodology, Booch methodology, patterns, frameworks, the unified approach, unified modeling language (UML).

Module III 10 hours
Analysis process, use case driven object oriented analysis, use case model, object classification, theory, different approaches for identifying classes, responsibilities and collaborators, identifying object relationships, attributes and methods, super sub class relationships, a part of relationships, aggregation, class responsibilities, object responsibilities.

Module IV 10 hours
Object oriented design process, corollaries, design axioms, design patterns, object oriented design philosophy, UML object constraint language.
**Designing Classes:** The process, class visibility, refining attributes, designing methods and protocols, packages and managing classes, designing interface objects, view layer interface design, macro and micro level interface design process.

Module V 8 hours
**Testing Object Oriented Systems:** Introduction, testing activities & techniques, the testing process, managing testing case studies.

**TextBook(s)**

**References**
Mini Project is a short project intended to train students to identify a problem of practical significance related to

i) Software design process

ii) Various Tools used in the industry

iii) Application/ software development

Study of literature related to any of the above and works for a solution and submits a report.

The mini project can be individual or maximum of four persons.
Comprehensive viva is intended to train students to face interviews. Students are expected to prepare fundamentals in all core subjects of their branch for taking comprehensive viva.
Summer internship is planned to expose students to industrial practices. Students have to correlate the theory learnt in classroom to the procedures adopted in industry. Students have to maintain a dairy on the work carried out in industry and submit a detailed report of her/his experience at the industry.
A graduate is expected to contribute to the industry in design, development, testing, maintenance of software projects and managing the employees as soon as joining the industry. Hence it is essential to have training in any of the above areas by taking up a project work. The project work can be an extension of mini project or can be an independent.
EMA101: ENGINEERING MATHEMATICS-I

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**Module I**


**Module II**

*Equations Reducible to Linear Differential Equations and Applications:* Cauchy’s and Legendre’s linear equations, simultaneous linear equations with constant coefficients, applications of linear differential equations like mass-spring systems and LCR – circuits.

**Module III**

*Partial Differentiation I:* Euler’s theorem, total derivative, differentiation of implicit functions, change of variables, Jacobians, tangent plane and normal to a surface.

**Module IV**

*Partial Differentiation II:* Taylor’s theorem for functions of two variables, maxima and minima of functions of two variables, Lagrange’s method of multipliers, differentiation under integral sign, Leibnitz rule.

**Module V**

*Laplace Transforms:* Transforms of elementary functions, properties of Laplace transforms, existence conditions, inverse transforms, transforms of derivatives, transforms of integrals, multiplication by $t^n$, division by $t$, convolution theorem, applications to ordinary differential equations, periodic functions, unit step function, unit impulse function (without proofs).

**Text book(s)**


**References**

Module I
Matrices: Solution to system of linear simultaneous equations, Gauss elimination method, eigenvalues and eigenvectors of a matrix, Cayley-Hamilton theorem, reduction to diagonal form, quadratic forms and canonical forms.

Module II
Multiple Integrals I: Double integrals, change of order of integration, double integrals in polar coordinates, area enclosed by plane curves.

Module III
Multiple Integrals II: Triple integrals, volume of solids, change of variables, Beta and Gamma functions, relation between Beta and Gamma function.

Module IV
Vector Differentiation: Scalar and vector fields, gradient, divergence, curl, directional derivative, vector identities, irrotational and solenoidal fields.

Module V
Vector Integration: Line integral, surface integral, Green’s theorem in plane, Stoke’s theorem and Gauss divergence theorem (without proofs).

Text Book(s)

References
EMA201: COMPLEX VARIABLES AND TRANSFORMS
(Elective)

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Module I 8 hours
**Calculus of Complex Functions:** Analytic functions, Cauchy-Riemann equations, Harmonic functions, applications to flow problems, some standard transformations, bilinear transformation, conformal mappings, special conformal transformations (\( w = z^2 \), \( w = z + 1/z \), \( w = e^z \), \( w = \cosh z \)).

Module II 8 hours
**Complex Integration:** Cauchy’s theorem, Cauchy’s integral formula, series of complex functions, Taylor’s series, Laurent’s series, Cauchy residue theorem, calculation of residues.

Module III 8 hours
**Fourier Series:** Periodic functions, Fourier series, conditions for a Fourier expansion, functions of any period, even and odd functions, half range expansions.

Module IV 6 hours
**Fourier Transforms:** Fourier integrals, Fourier cosine and sine integrals, Fourier transforms.

Module V 10 hours
**Z - Transforms and Difference equations:** Definition of Z transform, linearity property, damping rule, Shifting un to the right and left - multiplication by n, initial value theorem, final value theorem, inverse Z transforms, convolution theorem, evaluation of inverse Z transforms, formation of difference equations, solving difference equations using Z transforms.

Text Book(s)

References
EMA202: NUMERICAL METHODS
(Elective)

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Module I 8 hours


Module II 10 hours

Interpolation: Difference operators and relations, difference tables, Newton’s forward and backward interpolation formulae, divided difference formula, Lagrange’s interpolation formula.

Module III 6 hours

Linear System of Algebraic Equations: Iteration method, Jacobi method, Gauss - Seidal method, power method.

Module IV 10 hours

Numerical Differentiation: Derivatives using forward, backward and central difference formulae.

Numerical Integration: Newton-cotes quadrature formula, trapezoidal rule, Simpson’s 1/3rd rule, Simpson’s 3/8th rule.

Module V 8 hours


Text Book(s)


References

Module I 8 hours

**Probability:** Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye’s theorem, random variables (discrete and continuous), probability density laws, properties, mathematical expectation.

Module II 8 hours

**Probability Distributions:** Probability Distribution-Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Module III 10 hours

**Correlation - Regression Sampling Distribution and Estimation:** Correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, working procedure, regression lines, curvilinear regression, fitting of other curves,

**Estimation:** Types of sampling, sample, populations, statistic, parameter, sampling distribution and standard error.

Module IV 8 hours

**Testing of Hypothesis:** Formulation of null hypothesis, critical regions, level of significance and power of the test.

**Large Sample Tests:** Test for single proportion, difference of proportions, test for single mean and difference of means.

Module V 8 hours

**Small Sample Tests:** Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), ÷2 - test for goodness of fit, ÷2 - test for independence of attributes

**Text Book(s)**


References


EMA205: LINEAR ALGEBRA (Elective)

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Module I 10 hours

**Vector Spaces:** Vector space definition, general properties of vector spaces, vector subspaces, algebra of subspaces, linear combination of vectors, linear span, linear sum of two subspaces, linear independence and linear dependence of vectors, basis of a vector space, finite dimensional vector spaces, dimension of a vector space, dimension of a sub space.

Module II 8 hours

**Homomorphism of vector Spaces:** Homomorphism of vector spaces or linear transformations, isomorphism, quotient spaces, direct sum of spaces.

Module III 10 hours

**Linear Transformations:** Linear transformations, linear operator, range and null space of linear transformation, rank and nullity of a linear transformation, linear transformations as vectors, product of linear transformations, algebra or linear algebra, invertible linear transformation, singular and non singular transformations.

Module IV 8 hours

**Inner product spaces:** Inner product spaces, definition, euclidean and unitary spaces, norm or length of a vector, Schwartz’s inequality, orthogonality, orthonormal set, complete orthonormal set, Gram - Schmidt orthogonalization process.

Module V 8 hours

**Bilinear Forms:** Bilinear forms, definition, bilinear forms as vectors, matrix of bilinear form, symmetric bilinear forms, skew - symmetric bilinear forms.

Text Book(s)

References
Module I 8 hours

Mathematical Logic: Connectives, negation, conjunction, disjunction, conditional and bi-conditional, well formed formulae, tautologies, equivalence of formulae, duality, tautological implications, functionally complete set of connectives, principal disjunctive and conjunctive normal forms, inference calculus, rules of inference, indirect method of proof, conditional proof, automatic theorem proving.

Module II 10 hours

Recurrence Relations: Recurrence relations, solving linear recurrence relations by characteristic roots method, system of recurrence relations, non-linear recurrence relations.

Module III 8 hours

Groups: Groups, subgroups, Lagrange’s theorem on finite groups, normal subgroups, group codes.

Module IV 8 hours

Graph Theory: Definitions, finite and infinite graphs, incidence and degree, isolated pendant vertices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler graph theorem, operations on graphs, decomposition of Euler graphs into circuits, arbitrarily traceable Euler graphs, Hamiltonian paths and circuits, number of edge disjoint Hamiltonian circuits in complete graph with odd number of vertices, travelling salesman problem.

Module 5 8 hours

Trees: Some properties of trees, pendant vertices, distance and centers, rooted and binary trees, spanning trees, fundamental circuit, shortest spanning trees, Kruskal’s algorithm.
Text Book(s)


3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006. (Modules 4 and 5).

References


Module I 9 hours
Fuzzy Sets: Introduction, t-norms, t-co norms, algebra of fuzzy sets, mixed fuzzy logic, alpha cuts, distance between fuzzy sets, fuzzy numbers, introduction, fuzzy numbers, fuzzy arithmetic, fuzzy Max. and Min., defuzzification.

Module II 9 hours
Fuzzy equations: Linear equations, classical solution, extension principal solution, alpha cut and interval, arithmetic solution, fuzzy inequalities, introduction, solving $\overline{A.X + B} \leq \overline{C}$.

Module III 8 hours

Module IV 8 hours

Module V 8 hours
Fuzzy Optimization: Introduction, maximum / minimum of fuzzy functions, fuzzy problems.

Text Book(s)

References
EME121 : WORKSHOP

Wood Working: 3 hours
Familiarity with different types of woods used and tools used in wood working and make following joints
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint.

Sheet Metal Working: 3 hours
Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal jobs from GI sheets
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe.

Fitting: 3 hours
Familiarity with different types of tools used in fitting and following fitting exercises
   a) V – fit
   b) Dovetail fit
   c) Semi-circular fit

Electrical Wiring: 3 hours
Familiarity with different types of basic electrical circuit connections and make the following connections
   a) Parallel and series
   b) Two way switch
   c) Godown lighting
   d) Tube light
   e) Three phase motor
Manual Drawing

Module I 2L+6P
Lettering, line types, dimensioning and scales. General construction method for polygons. Construction of pentagon and hexagon by special methods.

Conic Sections: Ellipse, parabola, hyperbola with eccentricity method, tangent and normal to these curves.

Cycloidal curves: Cycloid, epicycloid, hypocycloid, inferior and superior trochoid. Involute of a circle.

Module II 3L+9P
Projections of Points: Projections of points in different quadrants.

Projections of Straight lines: Line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line inclined to one plane and parallel to the other, line inclined to both the planes, inclinations, true length of the line and its traces.

Projections of Planes: Types of planes, plane perpendicular to one plane and parallel to other plane, perpendicular to one plane and inclined to other plane.

Module III 2L+6P
Projections of Solids: Types of solids, projection of prism, pyramid, cylinder and cone in simple positions, and axis inclined to one plane and parallel to other, axis inclined to both the planes.

Computer Based Drawing:

Module IV 5L+15P
Introduction to CAD package software commands.

Free Hand Sketching: Free hand sketches of 2D.

Computer Aided Sketching: Creation of 2D sketches by CAD package.

Module V 2L+6P

**Free Hand Sketching:** Free hand sketches 3D of simple solids.

**Isometric Views:** Pictorial drawing, isometric views of plane figures and simple solids represented by multi-view drawings.

**Text books:**

**References:**
Module I 10 hours
Introduction to Optimization: Engineering applications of optimization, statement of an optimization problem-design vector, design constraints, constraint surface, objective function, classification of optimization problems, optimization techniques. Classical optimization techniques: introduction, single variable optimization, multi variable optimization with no constraints, multi variable optimization with equality and inequality constraints-kuhn-tucker conditions, constraint qualification.

Module II 8 hours

Module III 8 hours
Non-linear programming II: Classification of unconstrained minimization methods, random search methods, univariate method, pattern direction, Hooke’s and Jeeve’s method, Powell’s method, indirect search methods-steepest descent method (Cauchy’s method).

Module IV 8 hours
Non-linear programming III: Characteristics of a constrained problem, direct methods - Random search methods, Complex method, Sequential linear programming, Basic approach in the methods of feasible directions, indirect methods-Transformation techniques, basic approach of the penalty function method.

Module V 8 hours
Integer Programming: Graphical Representation, Gomory’s cutting plane method, Bala’s algorithm for zero-one programming, Branch-and-bound method, generalized penalty function method.

Textbook(s)

References
EOE202: GERMAN FOR BEGINNERS
(Elective)

Module I  
9 hours

Module II  
8 hours
Language: Asking for and giving information; Discussing home and the household. Grammar: Conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs. Pronunciation: Vowels.

Module III  
8 hours

Module IV  
8 hours

Module V  
9 hours

References
1. Deutsch als Fremdsprache IA Grundkurs
EOE204: CHINESE FOR BEGINNERS  
(Elective)  

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Module I  
9 hours  
Introduction to the Chinese language and pronunciation system; Tones; Chinese numbers; Language: Saying hello, greetings. Pronunciation: Initials: b p m n l h; Finals: a o e I u ü / ao en ie in ing uo; First tone.  

Module II  
8 hours  
Language: Asking what someone wants; Identifying people; Asking someone's name and nationality. Grammar: Word order in Chinese sentence. Pronunciation: Initials: d t g k f; Finals: ei ou an ang iao iou(iu); Second tone.  

Module III  
8 hours  
Language: Introducing oneself; Asking for permission. Grammar: Sentence with an adjectival predicate; "Yes-no" question. Pronunciation: Initials: zh ch sh r; Finals: -I / ai uai ong; Third tone.  

Module IV  
8 hours  
Language: Introducing oneself; Asking for permission. Grammar: Questions with an interrogative pronoun. Pronunciation: Initials: j q x; Finals: ia ian iang / uei(-ui) uen(-un) üe üan; Fourth tone.  

Module V  
9 hours  
Language: Making comments and suggestions; Asking someone to repeat something; Refusing or declining politely. Grammar: Sentences with a verbal predicate. Pronunciation: Initials: z c s; Finals:-i er iong ua uan uang ün; Neutral tone; Retroflex ending.  

*The course will focus on the pronunciation system, the introduction of common Chinese expressions and every-day phrases in the context of communicative activities.  

References  
Module I  
**Introduction to Indian Classical Music:** Heritage- Contribution of various races and tribes to the evolution of music in India, technical aspects of Indian classical music, influences Persian music especially on hindustani music, significance of music in bringing about social change.

Module II  
**History of Indian Music:** Origin- Vedas, scriptures and bharata's natyasastra, traditions- hindustani and carnatic, basic elements, shruthi, swara, raaga and taala, similarities and variations in hindustani, carnatic and western classical music, octave, semitones, introduction to shruthi, swara, raaga and taala, fundamental ragas, importance of taala in indian music, introduction to pallavi, anupallavi and charana.

Module III  
**Hindustani Music:** Brief history of hindustani music, concepts of raaga and taala, introduction to various gharanas, classification of music (folk, semi-classical, bhajans, light), appreciation of music.

Module IV  
**Carnatic Music:** History of carnatic music, traditions, the musical trinity, Syama Sastri, Thyagaraja, Muthuswami Dikshitar, introduction to technical terms in carnatic music, compositional forms/strategies.

Module V  
**Connections-Music, Art and Culture:** Musical oral tradition as a transmitter of culture, music as an expression of societal change, music as a means of communication across cultures.

References
EOE208: GANDHIAN PHILOSOPHY
(Open Elective)  

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Module I  
**Gandhi - The Man and His Times**: Early life and education, lessons learnt from his wife, in South Africa, influence of Thoreau, Tolstoy and other thinkers, return to India, Sabarmati ashram, role in the Indian national movement, his impact during his life time.

Module II  
**Interpretation and Pursuit of Truth**: Learning through trial and error: power of introspection, truth in thought, speech and action, pursuit of truth as true devotion to god, truth leads to courage and victory.

Module III  
**Peace and Conflict Resolution**: Ahimsa as practical idealism - the means to the goal of truth, non-violent civil resistance, living faith in the power of nonviolence, prerequisites for practice, faith, courage and humility, prevention of structural violence, two pronged approach - conflict resolution and establishing peace, examples of methods and practices.

Module IV  
**Transformation of the Individual**: Liberating the mind from dogmatism, control of the senses, thoughts and actions, respect for all faiths and universalism, a few strategies - Anasakta Karma, non-discrimination, simple living and self-sufficiency.

Module V  
**Contemporary Relevance**: Gandhi's social, political and economic thought, sarva dharma sambhava - tolerance, respect towards all religions, educational reform - basic education and adult education, social equality-sarvodaya, removal of untouchability, communal unity, women empowerment, prohibition, service of backward classes, village sanitation, political solutions-swaraj, decentralization of power, democracy of enlightened majority, economic solutions-swadeshi, trusteeship, khadi and village industries, decentralization of wealth, sustainable development and equal opportunity, youth as agents of change.

References
   Comprehensive Website by Gandhian Institutions - Bombay Sarvodaya Mandal and Gandhi Research Foundation
Module I 8 hours
Introduction: Philosophy's relevance to education; Philosophical roots of education, education as transmission of knowledge, education as the fostering of inquiry or reasoning skills, education as an agent of social change or personal liberation, liberal education and vocational education.

Module II 9 hours
Philosophical Concepts Related to Education: Indian: from the vedic to the modern - an overview; Western: an overview - metaphysics - naturalism or supernaturalism; Epistemology - reason or faith; Human nature - dualism, reductive materialism or integrationism; Ethics - egoism, predation or altruism; Idealism, Realism, Pragmatism, Behaviorism, Existentialism.

Module III 9 hours
Knowledge and Wisdom: Interrelation between education, science, technology, society and environment, Galileo to today-an overview.

Module IV 8 hours
Purposes of Education: Personal growth or self-improvement, intellectual purposes, political purposes, economic purposes such as job preparation, social purposes such as the development of social and moral responsibility.

Module V 8 hours

References
Module I
Mechanics of Essay Writing: Framework of an essay, introduction, hypothesis/statement of claim, body-claims and counter claims, refuting or disproving the opposing position with reasons and examples, providing evidence and examples that prove or support one's claim, conclusion-restatement of the claim and summary of the main ideas, paragraphing, discourse markers.

Module II
Analyzing an Argument: Terms and definitions, statement, argument, claim, truth value, premise, identifying premises and claims/conclusions, strengths and weaknesses of an argument, discussion on the validity of a claim, scope for counter-argument if any, critiquing an argument.

Module III
Analyzing an Issue: An issue statement or statements followed by specific task instructions, discussing the extent to which one agrees or disagrees with the statement, rationale for the position one takes, developing and supporting one's position, discussion on the validity of the given statement/claim, addressing the different views that are presented, remaining unbiased in assessing a claim, taking a stand and justifying it, writing a response.

Module IV
Writing an Argumentative Essay on a Topic of Contemporary Interest: Planning, writing and revising, clear, concise and defined thesis statement that occurs in the introduction, clear and logical transitions. Body Paragraphs that include Evidential Support (factual, logical, statistical or anecdotal), conclusion that does not simply restate the thesis, but readdresses it in light of the evidence provided.

Module V
Peer Review: Preparing a template for peer review that is derived from the response rubric given to the student and assessment rubric used for evaluation, formulating and communicating constructive feedback on a peer's work, responding to feedback on one's work, checklist for peer review-lead strategy use in the introduction, thesis statement, supporting details given in the body, the writer's acknowledgement of a counterargument and his/her response to it, closing strategy used in the conclusion.

References
EOE214: INDIAN ECONOMY
(Elective)

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Module I 8 hours
Structure of Indian Economy: Meaning of economic growth and development, features of Indian economy, changing structure of Indian economy, trends in national income, sources of growth, agriculture, industry and service sectors.

Module II 8 hours

Module III 8 hours
Public Finance: Sources of government revenue, Indian tax structure, direct and indirect taxes, composition of the government expenditure, role of monetary and fiscal policies, federal finance in India, 14th finance commission.

Module IV 8 hours
Foreign Trade: Importance, composition and direction of foreign trade, foreign direct investment, BoPs equilibrium, Foreign Exchange Management Act (FEMA).

Module V 8 hours

Text Book(s)

References
EOE216: PUBLIC ADMINISTRATION  
(Elective)

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**Module I**  
**Introduction:** Meaning, scope and significance of public administration, evolution of the discipline and its present status, challenges of liberalisation, privatization and globalization, good governance, electronic governance-concepts and applications, New Public Management (NPM).

**Module II**  
**Administrative Thought:** Scientific management theory, classical theory, bureaucratic theory, human relations theory, system theory.

**Module III**  
**Accountability and Control:** Legislative, executive and judicial control over administration, role of media, interest groups, NGOs, civil society, Right to Information Act (RTI), social audit, citizen chapters.

**Module IV**  
**Union and State Governments Administration:** President, prime minister, council of ministers, cabinet, central and state secretariats, boards and commissions, governor, chief minister and council of ministers, central-state relations, finance commission, Neeti ayog.

**Module V**  
**Civil Services:** Recruitment, training and other condition of services, district administration, role of collector, local self governing institutes-73rd and 74th constitutional amendments act.

**Text Book(s)**
2. B. L. Fadia, Kuldeep Fadia, Indian Administration, 8/e, Sahitya Bhawan, India, 2014.

**References**
Module I 8 hours
**Basic Concepts:** Environment types, features of environment, structure of atmosphere, earth's four spheres, ecology, ecological principles, photosynthesis, components of ecosystem, carbon and oxygen cycles, nitrogen, hydrological, sedimentary, phosphorous and energy cycles.

Module II 8 hours

Module III 8 hours
**Environmental Degradation and Management:** Greenhouse effect and global warming, acidification, world distribution of acid rain, impact of acid of precipitation, ozone depletion, Antarctic ozone hole, some basic facts about ozone depletion, salinisation, desertification or desertisation, soil erosion, types of soil erosion, soil conservation, deforestation, waste disposal, sustainable development.

Module IV 8 hours
**Natural Hazards and Disaster Management:** Disaster, natural hazards, earthquakes in India, seismic zones of India, earthquake prediction, tsunami, landslides, types of landslides, avalanches, cyclones, thunderstorms, tornadoes, surge, sea-surge or storm surge. Floods: floods in India, flood disaster management. Drought hazards: causes of droughts, consequences of droughts, biological hazards and disasters, famines, wildfire (forest fire), forest fires in India.

Module V 8 hours
**Climate Change:** Evidence of global warming, consequences of climatic change, consequences of climate change in India. Biodiversity and Legislation: Earth summit, the five earth summit agreements, the Montréal protocol, Kyoto protocol on climatic change.

**Text Book(s)**

**References**
Module I 10 Hours
Ancient Indian History and Culture (Earliest Times to 700 AD): Indus valley civilisation, origin, significance, art and architecture, Aryans and Vedic period, expansions of Aryans in India, significance of the Vedic age, evolution of monarchy and varna system, political conditions and administration under Mauryas, Guptas, social and economic conditions in ancient India, philosophy and religions in ancient India.

Module II 8 Hours
Medieval Indian History and Culture: Delhi sultanate, great mughals, bahumanis, rise of south supremacy and conflicts, Pallava, Chalukya, Chola and RashtraKutus.

Module III 8 Hours
Modern Indian History and Culture: European penetration into India, the Portuguese and the Dutch, the English and the French east India companies, their struggle for supremacy, the battle of Plassey and its significance, consolidation of British rule in India.

Module IV 8 Hours
Impact of British Colonial Rule: Economic: Commercialization of agriculture, dislocation of traditional trade and commerce, de-industrialisation, decline of traditional crafts, drain of wealth, famine and poverty in the rural interior. Social and Cultural Developments: The state of indigenous education and its dislocation, orientalist, anglicist controversy, introduction of western education in India, the rise of print media, literature and public opinion, the rise of modern vernacular literature, progress of science, rail and road connectivity.

Module V 8 Hours
The Rise of Indian National Movement: Indian response to British rule, the great revolt of 1857, the peasant movements of the 1920s and 1930s, the foundation of the Indian national congress, the moderates and extremists, the partition of Bengal (1905), the swadeshi movement in Bengal, the economic and political aspects of swadeshi movement. Gandhian nationalism: Gandhi’s popular appeal, Rowlett Act, satyagraha, the Khilafat movement, the non-cooperation movement, civil disobedience movement, Simon commission, the peasant and working class movements, Cripps mission, the quit India movement, declaration of independence.
Text Book(s)

References
**EOE301: INDIAN CONSTITUTION**  
*(Elective)*

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**Module I**  
**10 Hours**  
**Introduction to Indian Constitution:** Constitutional history, constituent assembly, salient features of the constitution, significance of preamble, amending process of the constitution.

**Module II**  
**8 Hours**  
**Rights and Duties:** Citizenship, fundamental rights and directive principles, fundamental duties.

**Module III**  
**8 Hours**  
**Union Government:** President and vice president, election, removal and powers, prime minister and council of ministers, parliament, supreme court, union, state relations, emergency provisions.

**Module IV**  
**8 Hours**  
**State and Local Governments:** Governor, state legislature, assembly and council, chief minister and council of ministers, high court, rural and urban local governments with special reference to 73rd and 74th constitutional amendment acts.

**Module V**  
**8 Hours**  
**Other Constitutional and Statutory Bodies:** Comptroller and auditor general, election commission, finance commission, attorney general and advocate general, union public service commission (UPSC), state public service commissions (SPSCs), tribunals, national human rights commission (NHRC).

**Text Book(s)**

**References**
EOE303: JAPANESE FOR BEGINNERS
(Elective)

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Module I 9 hours
Introduction to Japanese language, simple explanation of writing and pronunciation systems, characteristics of Japanese, grammar, meeting people, introductions, exchanging business cards, identifying people and things, useful daily expressions.

Module II 8 hours
Asking about business hours, shopping, time and numbers, large numbers, counters. Grammar: Pronouns and noun modifiers. Useful daily expressions.

Module III 8 hours
Getting around, confirming schedules (including going/coming), visiting another company (including month/week/day). Grammar: Motion verbs. Useful daily expressions.

Module IV 8 hours

Module V 9 hours
Giving and receiving, expressing gratitude, talking about plans (usage of Te-Form), Grammar: Adjectives, present form of i-adjective, present form of na-adjective, past forms of i-adjective and na-adjective, the Te-Form. Useful daily expressions.

References

*Study through Romanized Textbook - No reading/writing in Japanese letters
Module I  
9 hours
Asking for and giving personal information, asking for and giving directions, gender and number. Grammar: Verbs "avoir" and "etre", present tense, questions, vocabulary: countries and nationalities, professions, family, food

Module II  
8 hours
Asking and giving the time, asking when something is open or someone is available, asking for prices and describing what one wants. Grammar: Alphabet and numbers, possessive adjectives, negative sentences. Vocabulary: Days of the week, months, money.

Module III  
8 hours
Asking for information related to travel and accommodation, expressing one's wants/needs. Grammar: Present tense for verbs in -er, -ir and -re, present tense of irregular verbs. Verbs: to be able to, to want, to know. Vocabulary: Food, shops, packaging and measures.

Module IV  
8 hours
Talking about daily routine and the working day, describing things, expressing oneself when buying things. Grammar: Possessive pronouns, reflexive verbs. Vocabulary: Clothes, colours and shapes, weather.

Module V  
9 hours

References
1. LE NOUVEAU SANS FRONTIÈRES - Textbook
2. LE NOUVEAU SANS FRONTIÈRES - Workbook
   CD and selected passages/ exercises
Module I

Reading the Texts: Reading for gist, chapter summaries, plot, pair work and discussions in small groups.

Module II

Understanding the Texts: Basic themes, characterization-major characters, watching short videos followed by discussion, analysis and writing short reviews.

Module III

Story Retelling and Responsive Writing: Narrating short episodes, enacting select scenes, role play, writing short paragraphs and short essays based on basic themes, plot and major characters.

Module IV

Exploring the Texts from Socio-cultural and Political Perspectives: Identifying examples of mutual co-existence, duties and responsibilities of individuals in the context of family and society, righteous action, conflict between good and evil, possibilities of redefining cultural and political systems, identifying spaces for reconciliation in conflict situations.

Module V

Contemporary Relevance of the Epics: Human relations, team play, leadership lessons, resource management, core competencies and competitiveness.

References

1. C. Rajagopalachari, Ramayana, 44/e, Bharatiya Vidya Bhavan, Mumbai, India, 1951.
Module I 9 hours
Background: Early British colonialism in India, early rebellions-Pazhassi Raja (the cotiote war - Kerala, 18th century), Veerapandiyan Kattabomman (Tamilnadu/Madras Presidency - 18th century), Paik rebellion (Kalinga/Odisha, early 19th century), Vellore mutiny (early 19th century); The Sepoy Mutiny of 1857 and its consequences.

Module II 8 hours
Contributory Factors: Socio-political consciousness, growth of Western education and its impact on socio-religious movement, British economic policies and their impact.

Module III 8 hours
Rise of Organized Movements: Emergence of Indian national congress, its policies and programmes, partition of Bengal, rise of radical nationalists, Bal-Lal-Pal, formation of the Muslim league; Minto-Morley reforms, the national movement during the first world war.

Module IV 9 hours

Module V 8 hours
Towards Independence: Constitutional developments, provincial elections, quit India movement and after, participation of women, national movement during the second world war, Indian national army, naval mutiny of 1946, freedom and partition, impact on the world.

References
Module I 8 hours

Planet Earth: Introduction, the crust in motion, earth quakes, mineral future, promise of oceans, changing climate, green house effect, global environmental issues, meteorological science, preserving mother earth.

Module II 8 hours

Living State: Introduction, molecular genetics, cell biology, immunology, neuro sciences, biology and agriculture, storage of food grains, agriculture products and their preservation, biotechnology in food processing.

Module III 8 hours

Energy: Introduction, some important time perspectives, mid-term energy options, mid-term supply strategies, hydro, wind, thermal, solar and nuclear energies, environmental and health effects in harvesting energy, long term energy options, some research needs.

Module IV 8 hours

Computer and Communications: Introduction, development of communication system, telegram, telephone, wireless communication, current technology and systems, theoretical computer science and contribution from mathematics, computer and communications, artificial intelligence, television and entertainment.

Module V 8 hours

Materials and Processing: Materials in ancient India, development in materials, materials processing and manufacturing; recent concepts in materials, polymer materials, composites, nano sciences and nano technologies, super conductivity, laser and photonics.

Text Book(s)

References
Module I 8 hours
**Internal Communication:** Memo-structure, layout and style, e-mail-structure, style, content and etiquette, notice-structure, content and layout, conducting a meeting, purpose and preparation, drafting agenda and minutes, conducting effective meetings, meeting etiquette.

Module II 9 hours
**Making a Business Presentation:** Planning-define the purpose, analyze audience and occasion, preparation-developing central idea, main ideas, gathering supporting materials, audio-visual aids, organization-introduction, body and conclusion, delivery-addressing the audience, body language, eye contact, use of appropriate language, style and tone.

Module III 8 hours
**Business Letters:** Form and structure, style and tone, letters of enquiry, letters placing orders/giving instructions/urging action, letters of complaint and adjustment.

Module IV 9 hours
**Proposals and Reports:** Proposals, types, structure, prefatory parts, body of the proposal, supplementary parts, reports, types, informative, analytical, formal/informal, oral/written, individual/group, format and structure.

Module V 8 hours
**Resume, Cover Letter, Interview and Telephone Etiquette:** Resume, design and structure, cover letter, cover letters, accompanying resumes, opening, body, closing; Interview, planning, purpose, pre-interview preparation, conversation, two-way interaction, projecting a positive image, telephone etiquette-guidelines for telephone conversations in a professional context.

References
Module I  
**Basic Concepts:** Terminology, morals, ethics, values, integrity and spirituality, edicts-religious, social and constitutional edicts, the question of universality, personal and professional ethics, emotional intelligence, dimensions of ethics.

Module II  
**Rights and Responsibilities:** As citizens, as professionals, concepts of justice and fairness, preservation, production, exchange for mutual fulfilment vs. storage for future use, social responsibility and individual rights.

Module III  
**Global Issues in Ethics:** Technology and globalization, business ethics, corporate social responsibility, environmental ethics, media ethics, protecting the common good while respecting the values and beliefs of nations/ethnic groups, issues of compliance and governance, equal opportunities.

Module IV  
**Ethical Integrity and Attitudes:** Integrity as wholeness and consistency of character, beliefs, actions, methods and principles, core group of values, accountability, prioritization, subjectivity and objectivity, attitude, components (cognitive, behavioral and affective), attitude formation and attitude change.

Module V  
**Ethical Living:** Needs of life, materialistic and non-materialistic, qualitative and quantitative, harmony in living, self (physical and mental well being), family, building trust, sharing of responsibilities, cultivating sense of security, society, peace, non-violence, diversity, multiculturalism and oneness, nature, environmental sustainability, reorganizing living conditions, reappraising economic sectors and work practices, developing green technologies, ethical consumerism.

References
EOE317: PERSONALITY DEVELOPMENT  
(Investive) 

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<td><strong>Self Awareness:</strong> Know yourself, have a snapshot of yourself, assess your personal traits, discover natural potential. Activities and Tasks: Class discussion, questionnaires, Johari Window, SWOC analysis (strengths, weaknesses, opportunities and challenges).</td>
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<td><strong>Self Discipline:</strong> Importance of self discipline, characteristics of a self disciplined achiever, self discipline in personal life and career. Activities and Tasks: Viewing short videos followed by discussion and analysis, brainstorming in small groups, creating an action plan to realize academic and career goals.</td>
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<td><strong>Motivating Oneself:</strong> Self motivation, confidence building, goal setting, decision making. Activities and Tasks: Discussion and analysis of case studies, completing self-assessment questionnaires.</td>
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<td><strong>Managing Oneself:</strong> Handling emotions, time management, stress management, change management. Activities and Tasks: Discussion and analysis of case studies, completing self-assessment questionnaires.</td>
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<th>Module V</th>
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<td><strong>Interpersonal Behaviour:</strong> Attitude towards persons and situations, teamwork, leadership skills, problem solving skills, interpersonal adaptability, cultural adaptability. Activities and Tasks: Team-building games and activities.</td>
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**References**


*This will be supplemented by materials and activities from internet-related sources.*
Module I 10 hours

**Interference:** Introduction, interference in thin films due to reflected light, interference in wedge shaped film, Newton’s rings, Michelson’s interferometer, Applications: To find the diameter of a wire, to find the wavelength of light and refractive index of liquids and thin transparent sheets, flatness of surface, thickness of thin-film coating, anti-reflection coatings.

**Diffraction:** Introduction, Fraunhoffer diffraction at single slit, diffraction due to N-slits (diffraction grating), highest possible orders, determination of wavelength of light with a plane transmission grating, resolving power of a grating, dispersive power of a grating.

Module II 8 hours

**Polarisation:** Introduction, Double refraction, double refraction in calcite crystal, negative and positive crystals, Nicol’s prism, Retarders (quarter and half-wave plates), production and detection of linearly, circularly and elliptically polarised lights, analysis of polarized light, applications: Sunglasses, photography, optical microscopy, liquid crystal display, photoelasticity.

Module III 8 hours


**Fiber Optics:** Introduction, structure of an optical fiber, principle of propagation, acceptance angle, numerical aperture, types of optical fibers, single mode and multimode step index fibers, multimode graded index fiber, classification of fibers based on materials, fibre optics in communication, applications of fiber optics.

Module IV 8 hours

**Modern Physics (Quantum Physics):** Introduction, Matter waves & its properties, Davisson-Germer experiment, GP Thomson experiment, Heisenberg’s uncertainty principle, Schrodinger’s time independent wave
equation, Physical significance of wave function, Particle in a one-dimensional infinite well, rectangular potential barrier (transmission coefficient), Band theory of solids (qualitative), distinction between metals, insulators and semiconductors, Introduction to Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstien statistics (qualitative only).

Module V  

9 hours

Ultrasonics: Introduction, properties of ultrasonic waves, production of ultrasonics by magnetostriction and piezoelectric effects, detection (Kundt’s tube, sensitive flame, acoustic grating and piezoelectric methods), applications of ultrasonics.

Electromagnetism: Coulomb’s law, Flux, Gauss’ law of electrostatics in free space; significance of gradient, divergence, and curl operators; divergence of electric field, differential form of Gauss’ law, Ampere’s law, Gauss’ law for magnetism, integral form of Faraday’s law, equation of continuity, displacement current, Maxwell’s equations.

Text Book(s)

References
EPH 102: MATERIALS SCIENCE (Elective)

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Module I 10 hours

**Crystallography:** Forces between atoms, bonding in solids, ionic, covalent and metallic bonding; Fundamental concepts of crystals, lattice points and space lattice, crystal systems, Bravais lattices, directions, planes and Miller indices, atomic packing fraction, structure of simple cubic, body centered cubic (CsCl), face centered cubic (NaCl), hexagonal close-packed (HCP), diamond structure; X-ray diffraction, Bragg’s law.

Module II 8 hours

**Characterization Techniques:** X-ray diffraction, powder X-ray diffractometer - construction and working, crystalline phase analysis, fundamentals of transmission electron microscopy and scanning electron microscopy (SEM), study of crystal structure using TEM, study of microstructure using SEM - scanning electron microscopy with EDS, construction and working, grain size and chemical analysis atomic force microscopy, construction and working, scanning tunneling microscope, construction and working.

Module III 10 hours

**Crystal Imperfections:** Point defects, vacancies and self-interstitials - impurities in solids – dislocations, linear defects, interfacial defects, bulk or volume defects edge and screw dislocation.

**Mechanical Behaviour:** Elastic behaviour of metals, stress–strain relation, Hooke’s law, atomic model of elastic behaviour, plasticity, ductile and brittle materials, tensile strength, hardness, fatigue, creep, fracture, types of fracture (elementary concepts only).

Module IV 8 hours

**Diffusion and phase transformation in solids:** Fick’s laws of diffusion (no derivation), experimental determination of diffusion coefficient, Kirkendall effect, atomic model of diffusion.

Time scale of phase changes - nucleation and growth - nucleation kinetics, applications, solidification and crystallization, glass transition.
Module V 10 hours

**Nanoscience:** Overview of nanotechnology, quantum effect, nanotechnology in nature, energy levels in nano films, nanowires and nanodots

Growth techniques – physical vapor deposition, ball milling, lithography techniques,

Properties at nanoscale, size dependence, structural, chemical, optical, mechanical, electrical and magnetic properties.

**Applications of Nanomaterials:** Sensors and actuators, catalysis, biomedical, advanced electronic materials, current challenges and future trends, safety and societal implications.

**Text Book (s):**

1. V. Raghavan, Materials Science and Engineering: A First Course PHI publishing, 2007


**REFERENCE BOOKS:**


Module I

**Crystallography:** Classification of solids, forces between atoms, bonding in solids, ionic, covalent and metallic bonding; Fundamental concepts of crystals, lattice points and space lattice, crystal systems, Bravais lattices, directions, planes and Miller indices, atomic packing fraction; Structure of simple cubic, body centered cubic (CsCl), face centered cubic (NaCl), hexagonal closed packed (HCP), diamond structure, X-ray diffraction, Bragg’s law.

Module II

**Dielectric Properties:** Introduction, fundamental definitions, local field, Clausius-Mossotti relation; different types of electric polarizations, electronic, ionic, and dipolar polarizations (qualitative and quantitative), dielectric loss, dielectric breakdown, piezoelectricity and ferroelectricity, spontaneous polarization in BaTiO3, applications of dielectrics and ferroelectrics.

Module III

**Magnetic Properties:** Introduction, fundamental definitions, classification of magnetic materials, Weiss theory of ferromagnetism, domain theory of ferromagnetism, hysteresis, soft and hard magnetic materials, Eddy current losses, ferrites (structure and magnetic properties), Applications: transformer cores, magnetostrictive sensors, data storage.

Module IV

**Semiconductors I:** Introduction, Intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, carrier concentration in n-type and p-type semiconductors, conductivity of extrinsic semiconductors, variation of carrier concentration and conductivity with temperature, drift and diffusion currents in semiconductors, carrier transport phenomena.

Module V

**Semiconductors II:** Recombination of electron hole pairs, p-n junction diode and junction layer formation, direct and indirect band gap of
semiconductors, Hall effect and its applications, magneto resistance, optical and thermal properties of semiconductors, fundamentals of LED, photovoltaic cell (solar cell), tunnel diode.

Text Book(s)

References
EPH106: PHYSICS OF NANOMATERIALS
( Elective )

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Module I
Nanotechnology: Introduction, significance of nanotechnology, finite size effects and properties, classification of nanostructure materials, challenges and future prospects.

Module II
Properties of Nanomaterials: Microstructure and defects in nanomaterials, dislocations, twins, stacking faults and voids, grain boundaries, effect of nanodimension on material behavior, mechanical properties, melting point, diffusivity, grain growth characteristics, solubility, magnetic, electrical and thermal properties of nanomaterials.

Module III
Growth Techniques in Nanomaterials: Introduction, top down and bottom up approaches, lithographic process and limitations, non-lithographic processes, plasma arc discharge, sputtering, evaporation, chemical vapor deposition, molecular beam epitaxy, sol-gel technique, electrodeposition.

Module IV
Characterization Techniques of Nanomaterials: X-ray diffraction, small angle X-ray scattering, scanning electron microscopy with energy dispersive spectroscopy, transmission electron microscope, scanning tunneling microscope.

Module V
Application of Nanomaterials: Sectors influenced by nanomaterials - health, communication, energy, environment, safety, security and defence, nanophotonic devices, nanosensors, Quantum dots, MEMS & NEMS.

Text Book(s)

References
1. J - by Callender and Barne’s method.
2. Thermal conductivity of a bad conductor–Lee’s method.
3. Magnetic field along the axis of a circular coil carrying current 
   Stewart and Gee’s galvanometer.
4. Hall effect – measurement of hall coefficient.
6. Calibration of low range voltmeter - potentiometer bridge circuit.
10. Determination of refractive indices (o and e) of a bi - refringent 
    material (Prism).
11. Cauchy’s constants - using a spectrometer.
14. LASER - diffraction.
15. Determination of band gap in a semiconductor.
16. Optical fibres - numerical aperture and loss of signal.
17. VI characteristics of a pn - junction diode
18. Response of a series RLC circuit
# IT LIST OF SUBJECTS

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Chandrahas ICT Bhavan - Institute of Technology, Visakhapatnam Campus

School of Technology, Hyderabad Campus

Sir Visvesvaraya Bhavan - School of Technology, Bengaluru Campus