# FACULTY OF ENGINEERING & TECHNOLOGY

## SYLLABUS

## FOR

## B.TECH. COMPUTER SCIENCE & ENGINEERING
(Under Credit Based Continuous Evaluation Grading System)
(SEMESTER: I to VIII)

## Session: 2017–18



# GURU NANAK DEV UNIVERSITY AMRITSAR

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM*
*(Under Credit Based Continuous Evaluation Grading System)*

| S. NO. | Course Code | Course | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| | | **Semester – I** | | | | |
| 1. | ARL197 | Engineering Graphics & Drafting using AutoCad | 2 | 1 | 2 | 4 |
| 2. | ENL101 | Communicative English | 2 | 0 | 0 | 2 |
| 3. | MTL101 | Mathematics–I | 3 | 1 | 0 | 4 |
| 4. | PHL183 | Physics | 3 | 1 | 2 | 5 |
| 5. | ECL115 | Electrical Engineering | 3 | 1 | 0 | 4 |
| 6. | | Elective–I | 2 | 0 | 0 | 2 |
| | | **Total** | **15** | **4** | **2** | **21** |
| | | List of Electives–I | | | | |
| 1. | PBL121 | Punjabi (Compulsory) OR | 2 | 0 | 0 | 2 |
| 2. | PBL122 | ਮੁੱਢਲੀ ਪੰਜਾਬੀ (In lieu of Punjabi Compulsory) | 2 | 0 | 0 | 2 |
| 3. | * SOA 101 | Drug Abuse: Problem, Management and Prevention (Compulsory) | 3 | 0 | 0 | 3 |

**\* Credits will not be included in SGPA**

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## ARL–197: ENGINEERING GRAPHICS AND DRAFTING USING AUTOCAD

**CREDITS**
**L    T    P**
2    1    1

### UNIT I

**Drawing Techniques:** Various types of lines, principles of dimensioning, size and location of dimensions, symbols, conventions scales (plane and diagonal) and lettering as per IS Code SP–46 of practice for general engineering drawings.

**Projection of Points, Lines and Planes:** First angle and third angle projections, concept of horizontal and vertical planes, Projection of points and lines, True length, Horizontal and vertical traces, Projection of Planes, Traces of Planes, Auxiliary planes.

**Projection and Sectioning of Solids:** Projection of solids such as Prisms, Pyramids, Cylinders, Cones, Spheres, Auxiliary View

### UNIT II

**Introduction to AutoCAD**: Basics of Computer Aided Design, Application of AutoCAD. Drafting using various co–ordinate systems–absolute, relative & polar relative.

**Preparation of 2–D Drawings**: use of various drawing commands for 2–D drawings generation and editing commands for modification of drawings. Application of layers.

### UNIT III

**3–D modelling**: Use of various commands for 3–D solid and surface modelling. 3–D Editing commands.

**Recommended Books:**

1. Engineering Drawing by ND Bhatt
2. Goldenberg, Joseph; "AutoCAD Architecture 2010 – Comprehensive Tutorial", Autodesk, 2010.
3. Aubin, Paul F; "Mastering Auto CAD Architecture", 2010.
4. Elise, Moss, "Autodesk AutoCAD Architecture 2013 Fundamentals", SDC Publications, USA, 2013.

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## ENL–101: COMMUNICATIVE ENGLISH

**Time: 3 Hrs.**

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                                                    CREDITS
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                                                    2   0   0
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**Objective**: To introduce students to the skills and strategies of reading and writing by identifying organizational patterns, spotting classification systems and understanding associations between ideas. This course will prepare students to read a variety of texts and also to communicate more effectively through writing. The course will also pay special attention to vocabulary building.

**Prescribed Text books:**

1. *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition.
2. *The Written Word* by Vandana R. Singh, Oxford University Press, New Delhi.

**Course Contents:**

**1. Reading and Comprehension Skills:**

Students will be required to read and comprehend the essays in Unit 1 and 2 of the book *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition. They will be required to answer the questions given after each essay.

**2. Developing Vocabulary and using it in the Right Context:**

The students will be required to master "Word List" and "Correct Usage of Commonly Used Words and Phrases" from the Chapter "Vocabulary" in the book *The Written Word.*

**3. Writing Skills**

Students will be required to learn "Report Writing" and "Letter Writing" as in the book *The Written Word.*

Students will be required to write long essays based on the prescribed text book *Making Connections: A Strategic Approach to Academic Reading.*

<u>**Minor 1:**</u>

**Syllabus to be covered:**
1. Unit 1 from *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition.
2. Report Writing from *The Written Word.*

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**Suggested Paper Pattern:**
1. Report Writing ( 8 marks)
2. Short answer type questions from Unit 1 of *Making Connections: A Strategic Approach to Academic Reading* (6 marks)
3. Essay type question from Unit 1 of *Making Connections: A Strategic Approach to Academic Reading* (6 marks)

## Minor 2:

**Syllabus to be covered:**
1. "Word List" from the Chapter "Vocabulary" in the book *The Written Word.*
2. Unit-2 from the book *Making Connections: A Strategic Approach to Academic Reading* by Kenneth J. Pakenham, Second Edition.

**Suggested Paper Pattern:**
1. Word List from the Chapter "Vocabulary" in the book *The Written Word* (8 marks)
2. Short answer type questions from Unit 2 of *Making Connections: A Strategic Approach to Academic Reading* (6 marks)
3. Essay type question from Unit 2 of *Making Connections: A Strategic Approach to Academic Reading* (6 marks)

**Suggested Paper Pattern for Major Exam:**
1. Letter Writing as prescribed in *The Written Word /*1 out of 2 (10 Marks)
2. Short answer type questions from Unit 1,2 of *Making Connections: A Strategic Approach to Academic Reading* (14 Marks)
3. "Word List" and "Correct Usage of Commonly Used Words and Phrases" from the Chapter "Vocabulary" present in the book *The Written Word.* (10 Marks)
4. Essay type question from Unit 1,2 of *Making Connections: A Strategic Approach to Academic Reading* 1 out of 2 (8 Marks)
5. Report Writing from *The Written Word* (8 Marks)
   Letter Writing as prescribed in *The Written Word /*1 out of 2 (10 Marks)

# MTL–101: MATHEMATICS–I

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                                                  3    1    0
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## UNIT–I

Calculus: Partial derivatives, Euler's theorem on homogeneous functions, Maclaurin's and Taylor's expansions of single and two variables, Maxima and minima of functions of several variables, Lagrangian method of multipliers; Multiple integrals <u>and</u> their use in obtaining surface areas and volumes of solids.

## UNIT–II

Infinite Series: Sequences and sub sequences and their convergence, Cauchy sequence, Infinite series and their convergence, Standard tests for convergence including p–test, Ratio test, Comparison test, Raabe's test, Cauchy Integral test, Cauchy root test, Gauss's test, Absolute convergence, Alternating series and its convergence, Power series.

## UNIT–III

Vector Calculus: Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field and their physical interpretations, Line integral of a vector field, Surface integral of a vector field, Volume integral of a scalar field, Green's theorem, Stokes theorem, Gauss divergence theorem (without proofs) and their applications.

Books Recommended:

1. Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.
2. Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.
4. Murray & Spiegal, Vector Analysis, Schaum Publications Co.

# PHL–183: PHYSICS

CREDITS

L  T  P
3  1  1

## UNIT-I

Electric and magnetic fields in a medium, Susceptibility and Conductivity, Maxwell's equations, Boundary conditions; EM wave equation, Plane wave solutions, Polarization of the EM waves, Pointing vector and intensity of the EM wave; Wave packet, Phase and Group velocities; Reflection and refraction of EM waves at a dielectric interface; Brewster angle; Total internal reflection at a dielectric interface; EM waves in a conducting medium and plasma.

## UNIT-II

Wave-particle duality, de-Broglie waves; Quantum mechanical operators; Schroedinger equation, Wave function, Statistical interpretation, Superposition Principle, Continuity equation for probability density; Stationary states, Bound states.

## UNIT-III

Free-particle solution, 1-D infinite potential well, Expectation values and uncertainty relations; 1-D finite potential well, Quantum mechanical tunnelling and alpha-decay, Kronig-Penny model and emergence of bands

## Books Recommended:

1. Concepts of Modern Physics. Arthur Beiser, (Tata McGraw-Hill, Sixth Edition 2003).

2. Lasers & Nonlinear optics. B.B. Laud (New Delhi, India: Wiley Eastern 1991).

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# LIST OF EXPERIMENTS (LAB-A) (PHYSICS)

1. **STUDY OF POWER SOURCE**
   A. *To Study the output voltage, output resistance, power dissipation in the load and source for same $R_2/R_1$ ratio.*
      I. Draw a graph between $V_L$ and $I_L$ for all the three sets of $R_1$ and $R_2$.
      II. Find $V_S$ and $R_S$ from the graph and formula given in the book. Verify $R'_S = x\ R_5$ if R and $R_2$ are changed by a factor of x.
      III. Calculate the power dissipated in the load resistance $R_L$ form $P_L = V_L I_L$ and $P_S$ from $V_S^2/2R_S$. Find $P_L/P_S$ and show that the maximum value of this ratio is 0.5. Plot P vs $R_L$.
   B. *To Study the reflected load resistance in a network.*
      I. Calculate $R'_L$, from the relation
         $$R'_L\ ' = Vo/(Io-I)$$
         And compare it with the measured value.
      II. Plot a graph between $R_L'$ and $R_L$.

2. **STUDY OF CAPACITOR**
   A. *To study the voltage ($V_C$) across a capacitor during charging in an RC circuit.*
      I. Plot a graph between $V_C$ and time. Find time constant of the circuit.
      II. Verify the exponential nature of the charging process by a plot of log (Vo-V)/Vo and time. Determine the time constant from it.
   B. *To study the energy dissipation in charging of a capacitor and to study its dependence in C and V.*
      I. Plot a graph between $I_2$ and time. Calculate area under the curve. Calculate the energy dissipated in the circuit which is equal to R times this area.
      II. Show the dependence of energy dissipation on V and C using the following combinations ($V_1$, $R_1$, $C_1$; $V_1$, $R_1, C_2\ V_2$, $R_1, C_1$)
   C. *To study the energy dissipation during adiabatic charging of a capacitor.*
      I. Plot a graph between $I_2$ and time for three sets (0-5 and 5-10). Calculate the energy dissipated in each case. Show that the energy dissipated in two steps charging up to 1 volt is one third that of direct charging 0-10 V.

3. **STUDY OF ELECTROMAGNETIC INDUCTION**
   A. *To study the emf induced as a function of the velocity of the magnet.*
      I. Plot a graph between induced emf and velocity of the magnet.
   B. *To study electromagnetic induction.*
      I. Plot a graph between induced emf, $e(t)$ and number of pulses.
      II. Plot a graph between induced emf, $e(t)$ and $1/R$ where R is the resistance in the circuit.
      III. Calculate maximum magnetic induction, $B_{max}$
   C. *To Study the electromagnetic damping.*
      I. Study the electromagnetic damping for closed circuit, open circuit, circuit containing the resistance and circuit containing the capacitor.

4. **STUDY OF RC CIRCUIT WITH AC MAINS**
   A. To study simple RC circuit
      I. Compare the measured value of current I with the calculated one from the formula $V_R=I_R$ and $V_C=I/\omega C$ in each case.
      II. Plot a graph between $V_C$ and I/C. determine the value of frequency of the source.
      III. Determine the impedance of the circuit by formula $Z=V_O/I$ and verify theoretically.
      IV. From the vector diagram between $V_R$, $V_C$ and $V_O$, show that $V_O^2 = V_R^2 + V_C^2$ in all cases.
      V. Show that the sum of resistive voltage and the sum of capacitive voltage are in quadrature in circuit.
   B. To study the deviation in the behavior of an actual capacitor by adding a series resistance.
      I. With source voltage $V_O$ as base construct triangles for the resistance and the capacitor.
      II. Show that phase angle reduces as more and more resistances are added to C.
   C. To study the deviation in the behavior of an actual capacitor by adding a shunt resistance.
      I. Draw voltage vector diagrams to evaluate the effect of increasing R on the performance of capacitor.
      II. Draw current vector diagrams also.

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**5. STUDY OF LCR CIRCUIT**
  A. To determine equivalent power loss resistance ( r) of an inductor.
    I. Calculate r for all the observations from vector diagrams.
    II. Draw graphs between (i) r & $V_O$ and (ii) r & R
  B. To analyse LR and RC circuits.

Make parallel circuits containing (i) $L_1R_1$ and $L_2R_2$ (ii) $C_1R_1$ and $C_2R_2$ & (iii) $L_1R_1$ and $C_2R_2$

 I. Draw vector diagrams and find $V_{ab}$ for all the observations. Show that calculated and measured $V_{ab}$ are in agreement. Determine the condition for which $V_{ab}$ becomes minimum.
 II. To find the value of an inductor in the LCR resonance circuit.

6. PHASE MEASUREMENTS BY SUPERPOSITION

 (**Note**: Verify all phase angles of voltages across each element by vector diagrams also.)

  A. *To study the relative of voltages across the resistors and capacitors in series.*

# List of Experiments (LAB-B)

1. To determine the elastic constants of a solid using
  a. Koenig's method      b. Maxwell's needle method
2. Measurement of wavelength of sodium light using a Fresnel Biprism.
3. a. To determine the thermal conductivity of an insulator by Lee's method.
  b. To study the behavior of coupled identical pendula and to establish a relationship between the coupling length and characteristic frequencies of the symmetric & anti-symmetric modes of oscillations.
4. To study single-slit diffraction using He-Ne laser.
5. To determine the surface tension of a liquid using
  a Jaeger's method      b. Capillary-rise method
6. To obtained the Cauchy's dispersion formulae for refractive index of a prism.
7. *To determine the wavelengths of mercury vapour lamp using a diffraction grating.
8. To determine the viscosity of a liquid by the oscillating disc method (Mayer's method).
9. To determine the wavelength of sodium light by Newton's rings.
  * Exp 7 can be done only after doing Exp No. 6

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## ECL-115: ELECTRICAL ENGINEERING

CREDITS

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|---|---|---|
| 3 | 1 | 0 |

**Purpose:**
Engineers today are required to work with multi disciplinary (including electrical, electronics, computer and mechanical) systems. They have to have understanding of the basic knowledge of electrical engineering for appreciating its application in the machinery, power and control circuits and analyze simple problems in consultation with specialists in electrical engineering. The subject imparts basic concepts, principles and skills in electrical engineering.

**Instructional Objectives:**
- Understanding the basic concepts, principles and theories of electrical sciences relating to application of electrical engineering in industries.
- Explain the distribution of electrical power from power station to consumers after going through transmission and distribution lines.
- Recognize accessories, devices, equipment and protection employed in lines, machines and circuits.
- Understand construction, working principles and application of transformer, induction motor, DC motor and fractional horse power motors.
- Select motors for various applications in Engineering.
- Diagnose simple faults in wiring, installation, motor control circuits, protection systems and earthing.
- Understand requirements of lighting for various industrial applications and select lighting devices.
- Use measuring instruments for measuring current, voltage and power in supply circuit and machines.
- Calculating current, voltage and power in simple single phase and three phase AC circuits.
- Prepare report of experimentation done on an electrical circuit or electrical machines.
- Analyzing motor control circuits and distribution circuits to identify and operate control and protective devices.

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**Contents:**
## PART - I
1. **Electricity:** A brief review of various applications of electricity, difference between AC and DC, units of voltage, current and resistance, concept of electromagnetic induction and production of alternating e.m.f. - single phase and poly phase, concept of 3 phase system star and delta connections, voltage and current relations (formula only).

2. **Power Supply:** A brief review of special features of the power supply system, power station, transmission, distribution lines, service main, domestic and industrial wiring installation.
3. **Circuit Analysis:** A brief review of DC and single phase AC circuits. Three phase AC circuits, phaser representation, star-delta transformation, concept of balanced and unbalanced three phase circuits, measurement of power and power factor in three phase balanced circuits, AC circuits (L.R.C.) solution.
4. **Electrical Machinery:** Transformers, its working principle, types of transformers and their applications, performance losses, efficiency and voltage regulation open circuit and short circuit tests on a transformer, auto transformer.

## PART - II
5. **DC Motors:** Force and EMF production, methods of excitation in DC machines, various types, characteristic and application of DC shunt and series motors.

6. **3 Phase Induction Motor:** Construction and type of three phase induction motors, equivalent circuits, application of different types of induction motors, starters and protective devices used for motors.

7. **3 Phase Synchronous Machines:** Principle of working and construction of alternators and synchronous motors.

8. **Single Phase Induction Motors:** Types and construction, their working principle, starting of single phase motor, application of single phase motors.

## PART - III
9. **Control and Protection:** Control mechanism, principle and application of servomotors, protection devices for wiring installation and motors - fuses MCB, LCB, relays.

10. **Cables:** Types of cables, construction of LT and HT cables, laying of cables, selection of cables.

11. **Earthing and Grounding:** Need, types, Indian Electricity Rules, use of meggar and earth tester for measurement of earth resistance.

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**Recommended Books:**

1. Principles of Electrical Engineering by Gupta BR; S. Chand and Company, New Delhi.

2. Electrical Technology by Hughes Edward; The English Language Book Society and Longmans Group Limited, London.

3. Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.

4. Experiments in Basic Electrical Engineering by Bhattacharya SK and Rastogi KM; New Age International, New Delhi.

5. Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.

6. Advanced Electrical Technology by Cotton H; Isaac Pitmans and Sons Limited, London.

7. Electrical Engineering - Basic Technology by Hubschar; Deutsche Gesllschaft Fur Technische Zusammenabelt (GTZ) GMBH.

8. Basic Electrical Engineering by T.K. Naggarkar & Ms. Sakhija Seventh Edition 2008, Oxford University Press.

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# Punjabi (Compulsory)
## PBL121: ਪੰਜਾਬੀ – I (ਲਾਜ਼ਮੀ)

CREDITS

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**(I)** 1. E`qm En`qm (sਜ਼ਮ. virE`m isਜ਼ਮG sਠDUEqyf. sਜ਼ਮihਠਮrblr isਜ਼ਮG, grਮUn`nk dਮv wਮhlvristl, Eਠ਼mਮਿqsr)
ivਿeਠਮਮhਮਿT il Kਮykh`xlk`r :
    (a) grਮmK isਜ਼ਮG mਮਮਿਿiPr        :         gਮt`r
    (E) sਜ਼ਮਿj`n isਜ਼ਮG          :         pT`x dਮl Dਮl
    (e) krਮq`r isਜ਼ਮG dਮਿgਮl       :         aਮਿeਮl Eਮਿਓfਮl v`l l gਮrਮg`bl
     (kh`xl-s`r, ivS`-vsqਠਮੁl, kh`xl-kl`, kh`xlk`r)

   2.  grਮmKl Eਮਿਠਵfਮ਼Oਮgr`Pl dl jਮਿgਮq, (pਠਮਿ਼qਿl; mਮਿਮ਼ਮh`rnl; ibਮਠਮਮ਼ਮlਮੁਿ, itਮਿਮੇਮlਮੁqyE®k); ivr`m ਿਿਠਮਿਿਿਿ਼hਠਮਿ਼l Sbd jਿਿV (SਠਮਿਿਮਮਮD-ESਠਮਮਿਮਮਮD)

**(II)** 1. E`qm En`qm (sਜ਼ਮਿb. virE`m isਜ਼ਮG sਠਮਿDUEqyf. sਜ਼ਮਿਮ਼ਮihਠਮਕਮrblr isਜ਼ਮG, grਮUn`nk dਮy wਮhlvristl,
Eਠਮਿਠਮmਮਿqsr) ivਿeਠਮਿਿhਠਮਿਿਿT il Kਮykh`xlk`r :
    (a) sਜ਼ਮਿਮ਼tਮhਕਮਿK isਜ਼ਮG Dਮlr       :         s-Jਮਿਿl kਮਿ®D
    (E) kਮlਮ਼ vਮਕਮਿਮ਼ਮੁਿ isਜ਼ਮG ivਮrਮk       :         aਮਿjਮਿ`V
    (e) mਮਿihਠਮਿr isਜ਼ਮG srnਮ`       :         jਮਿਿOਮਿpਮਿਮ਼d`r mਮਿkਕਮਿਠਮਲ isਜ਼ਮG
     (kh`xl-s`r, ivS`-vsqਠਮੁl, kh`xl-kl`, kh`xlk`r)

   2.  IਿਿK rcnਮ` (jਮਿlvnl-prk, smਮ`j k Eqyclਮਿਿ਼ਮt, iviSਮਿ਼E~aਮਿਿ਼ਮ਼ਮੁ਼):
10 IਿਿK il Kਮ਼vਮ`axy(klਮ`s ivc EਮਿਮਿਿਿqyGr l el EiBEਮਿਮ`s)

**(III)** 1. E`qm En`qm (sਜ਼ਮਿb. virE`m isਜ਼ਮG sਠਮਿDUEqyf. sਜ਼ਮਿਮ਼ਮihਠਮਕਮrblr isਜ਼ਮG, grਮUn`nk dਮy wਮhlvristl,
Eਠਮਿਠਮmਮਿqsr) ivਿeਠਮਿਿhਠਮਿਿਿT il Kਮykh`xlk`r :
    (a) pਜ਼ਮਿਮ਼਼n pਮਕਮ`S          :         mਮ`V bਮਿਮਲਮਲਮਮ਼
    (E) gਮਿlਮ਼z`r isਜ਼ਮG sਠਮਿDU       :         kਮlਮ਼€xy
    (e) mਮhਮਲਮਲਮn Bਮਿਿ਼Frl         :         Gਮਿਿ਼tਮਲਮx`
    (s) virE`m isਜ਼ਮG sਠਮਿDU        :         dਮl dl
     (kh`xl-s`r, ivS`-vsqਠਮੁl, kh`xl-kl`, kh`xlk`r)

   2. pਮਕਮੈ਼ pVਮਿ਼ਮIਿਿ਼kypਮਿ਼I Sn-dਮyਮaਮਕਮਿ਼r dਮx`
     (E`qm En`qm psਮਿqਮਿqk dਮykh`xl Bਮ`g ivਿeਠਮਲ 15 pਮlਮ਼rਮI਼E~dਮyEiBEਮਿਮ`s krvਮ`aਮਕਮy)

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**PBL-122: ਮੁੱਢਲੀ ਪੰਜਾਬੀ**
**(In lieu of Punjabi Compulsory)**

CREDITS

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ਪਾਠ-ਕ੍ਰਮ

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ,
   ਗੁਰਮੁਖੀ ਲਿਪੀ
   ਗੁਰਮੁਖੀ ਲਿਪੀ : ਬਣਤਰ ਅਤੇ ਤਰਤੀਬ

2. ਗੁਰਮੁਖੀ ਆਰਥੋਗ੍ਰਾਫੀ
   ਸੁਰ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ
   ਵਿਅੰਜਨ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ

3. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ
   ਸਾਧਾਰਨ ਸ਼ਬਦ
   ਇਕ ਉਚਾਰਖੰਡੀ ਸ਼ਬਦ

# ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1. ਪੰਜਾਬੀ ਭਾਸ਼ਾ : ਨਾਮਕਰਣ ਅਤੇ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ, ਗੁਰਮੁਖੀ ਲਿਪੀ : ਨਾਮਕਰਣ, ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ; ਪੈਂਤੀ ਅੱਖਰੀ, ਅੱਖਰ ਕ੍ਰਮ, ਸੁਰ ਵਾਹਕ (ੳ ਅ ੲ), ਲਗਾਂ ਮਾਤਰਾਂ, ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ, ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ।

2. ਗੁਰਮੁਖੀ ਆਰਥੋਗ੍ਰਾਫੀ ਅਤੇ ਉਚਾਰਨ; ਸੁਰਾਂ ਦੀ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ (ਲਘੁ-ਦੀਰਘ ਸੁਰ); ਸੁਰ ਅਤੇ ਲਗਾਂ ਮਾਤਰਾਂ; ਵਿਅੰਜਨਾਂ ਦੀ ਬਣਤਰ ਅਤੇ ਉਚਾਰਨ; ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣਾਂ (ਹ, ਰ, ਵ) ਦਾ ਉਚਾਰਨ ; ਲ ਅਤੇ ਲ਼ ਦਾ ਉਚਾਰਨ; ਭ, ਧ, ਢ, ਝ, ਘ ਦਾ ਉਚਾਰਨ; ਪੈਰ ਵਿਚ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣਾਂ ਦਾ ਉਚਾਰਨ।

3. ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ : ਸਾਧਾਰਨ ਸ਼ਬਦ; ਇਕੱਲਾ ਸੁਰ (ਜਿਵੇਂ ਆ); ਸੁਰ ਅਤੇ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਆਰ); ਵਿਅੰਜਨ ਅਤੇ ਸੁਰ (ਜਿਵੇਂ ਪਾ); ਵਿਅੰਜਨ ਸੁਰ ਵਿਅੰਜਨ (ਜਿਵੇਂ ਪਾਰ); ਕੌਸ਼ਗਤ ਸ਼ਬਦ (ਜਿਵੇਂ ਘਰ, ਪੀ); ਵਿਆਕਰਣਕ ਸ਼ਬਦ (ਜਿਵੇਂ ਨੂੰ, ਨੇ); ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ-1; ਲਿੰਗ-ਪੁਲਿੰਗ, ਇਕ ਵਚਨ-ਬਹੁ ਵਚਨ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ-1: ਖਾਣ-ਪੀਣ, ਸਾਕਾਦਾਰੀ, ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਗਿਣਤੀ, ਮੌਸਮ ਆਦਿ ਨਾਲ ਸੰਬੰਧਿਤ।

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER – I (ELECTIVES)*
*(Under Credit Based Continuous Evaluation Grading System)*

**SOA 101: Drug Abuse: Problem, Management and Prevention**
**(Compulsory Paper)**

**PROBLEM OF DRUG ABUSE**

Credit 3-0-0

Time: 3 Hours

1) **Meaning of Drug Abuse:** Concept and Overview, Historical Perspective of Drug Abuse, Drug Dependence, Drug Addiction, Physical and Psychological Dependence: Drug Tolerance and withdrawal symptoms.

2) **Types of Abused Drugs and their Effects.**
   1) Stimulants: Amphetamines – Benzedrine, Dexedrine, Cocaine.
   2) Depressants: Alcohol Barbiturates: Nembutal, Seconal, Phenobarbital and Rohypnol.
   3) Narcotics: Heroin, Morphine, Oxycodone.
   4) Hallucinogens: Cannabis, Marijuana, Hashish, Hash Oil, MDMA, LSD.
   5) Steroids.

3) **Nature and Extent of the Problem:** Magnitude or prevalence of the menace of Drug Abuse in India and Punjab, Vulnerable groups by age, gender and economic status, Signs and Symptoms of Drug Abuse: Physical, Academic, Behavioural and Psychological Indicators.

**References:**

1. Ahuja, Ram (2003), *Social Problems in India*, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. *The Drug Crime Connection.* Beverly Hills: Sage Publications.
4. Kapoor. T. (1985) *Drug epidemic among Indian Youth*, New Delhi: Mittal Pub.
5. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
6. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
7. Sain, Bhim 1991, *Drug Addiction Alcoholism,* Smoking obscenity New Delhi: Mittal Publications.
8. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab*: A Sociological Study. Amritsar: Guru Nanak Dev University.
9. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
10. Sussman, S and Ames, S.L. (2008). *Drug Abuse: Concepts, Prevention and Cessation,* Cambridge University Press.
11. World Drug Report 2010, United Nations office of Drug and Crime.
12. World Drug Report 2011, United Nations office of Drug and Crime.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM*
*(Under Credit Based Continuous Evaluation Grading System)*

| S. NO. | Course Code | Course | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| | | **Semester – II** | | | | |
| 1. | CSL126 | Fundamentals of Information Technology and Programming Using Python | 2 | 1 | 2 | 4 |
| 2. | CYL196 | Engineering Chemistry | 2 | 1 | 2 | 4 |
| 3. | MTL102 | Mathematics–II | 3 | 1 | 0 | 4 |
| 4. | PHL199 | Mechanics | 3 | 1 | 0 | 4 |
| 5. | PHL182 | Material Science | 3 | 1 | 0 | 4 |
| 6. | ECP117 | Manufacturing Practices | 0 | 0 | 4 | 2 |
| 7. | | Elective–II | 2 | 0 | 0 | 2 |
| | | **Total** | 15 | 5 | 7 | 24 |
| | | List of Electives–II | | | | |
| 1. | PBL 131 | Punjabi (Compulsory) OR | 2 | 0 | 0 | 2 |
| 2. | PBL 132 | ਮੁੱਢਲੀ ਪੰਜਾਬੀ (In lieu of Punjabi Compulsory) | 2 | 0 | 0 | 2 |
| 3. | *SOA 102 | Drug Abuse: Problem, Management and Prevention (Compulsory) | 3 | 0 | 0 | 3 |

**\* Credits will not be included in SGPA**

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– II*
*(Under Credit Based Continuous Evaluation Grading System)*

**CSL–126: FUNDAMENTALS OF INFORMATION TECHNOLOGY AND PROGRAMMING USING PYTHON**

**CREDITS**
**L   T   P**
2   1   1

## UNIT – I

Block diagram of Computer, Associated peripherals, Memories – RAM, ROM, Secondary Storage Devices, Classification of Computers and Languages, Introduction to Compilers, Interpreter and Assemblers, Introduction of various operating system with their file system. Algorithm and Flowchart,

## UNIT – II

Introduction to Python and Setting up the Python development environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Random number, Real numbers, immutable variables, Python console Input / Output. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators, Control statements: if-else, Nested If-Else, Loops (for, while)

## UNIT – III

Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Recursion, String Handling, Unicode strings, Strings Manipulation:-compare strings, concatenation of strings, Slicing strings in python, converting strings to numbers and vice versa. Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

**PRACTICAL:**
* Installation of Various operating systems.
* Exercises (at least twenty) involving assignment, looping, functions, arrays, string and file handling in Python.

**Recommended Books:**
1. Computers Today by Sanders.
2. Fundamentals of Computers TTTI Publication.
3. Learning Python  by Mark Lutz, 5th Edition
4. Python Cookbook, by David Beazley , 3rd Edition
5. Python Essential Reference, by David Beazley , 4th Edition
6. Python Programming: An Introduction to Computer Science, by John Zelle, 2nd Edition.
7. Python in a Nutshell, by Alex Mortelli, 2nd Edition

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## CYL–196: ENGINEERING CHEMISTRY

**Credits: 2-1-1**                                                               **(30hrs.)**

1. Concept of entropy; thermodynamic scale of temperature; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible reactions. Introduction to enthalpy, enthalpy change of reactions, effect of temperature and pressure on enthalpy of reaction.    **(6hrs.)**

   Free Energy Functions: Gibbs and Helmholtz energy; Variation of S,G,A with T,V and P. Free energy Change and spontaneity.    **(4hrs.)**

2. Phase Equilibria: Concept of phases, components and degrees of freedom, Derivation of Gibb's phase rule for reactive and non reactive systems; Clausius Clapeyron equation and its application to solid-liquid, liquid vapour and solid vapour equilibria.    **(5hrs.)**

3. Physical basis of atomic and molecular structure: Valence band and molecular orbital approaches, LCAO-NO treatment of $H_2^+$, bonding and antibonding orbitals, , Qualitative extension to $H_2$. Comparison of MO & VB approaches.    **(4hrs.)**

4. Organometallic compounds

   Introduction, Metal carbonyl complexes: binding mode and the structures of representative mono-, di-, tri- and tetra-nuclear complexes. Applications of organometallic compounds in catalysis (Hydroformylation, Monsanto acetic acid process, Ziegler-Natta catalyst in polymerisation reaction of alkenes, Alkene hydrogenation)    **(3hrs.)**

5. Coordination compounds

   Bonding in coordination compounds (valence bond theory, crystal field theory and molecular orbital theory with representative examples). Discussion on the colors of Hexaaquo complexes of $Cr^{2+}$, $Cr^{3+}Co^{2+}$ and $Ni^{2+}$, considering their electronic transitions.

   Magnetic properties: Paramagnetism, diamagnetism, ferro- and anti-ferromagnetism with examples. Spin only magnetic moments of 1st row transition elements and reasons for deviations observed in some cases.

   Tetragonal distortions in the regular octahedral complexes (Jahn-Teller distortions)

      **(4hrs.)**

6. Metal ions in biological systems

   Introduction, energy sources for life, non-photosynthetic processes Essential and trace elements on biological processes, Biological role of alkali and alkaline earth metal ions with special reference of $Na^+$-$K^+$ Pump.    **(2hrs.)**

7. Silicone based compounds

   Introduction, Preparation of silicones, cross linked silicones, Silicon fluids or oils, Silicon elastomers, Silicon resins and their applications.    **(2hrs.)**

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**Reference Books:**
1. Casetllan, G.W. Physical Chemistry 4<sup>th</sup> edition Narosa 2004.
2. Peter A. and Paula, J.de Physical Chemistry 10<sup>th</sup> edition Oxford University Press (2014).
3. Mcquarrie, D.A. and Simon, J.D. Molecular Thermodynamics, Viva Books Pvt. Ltd. New Delhi.
4. Chanda A.K. Introductory Quantum Chemistry Tata McGraw Hill.
5. Anautharaman R. Fundamentals of Quantum Chemistry Mcmilan India Ltd.
6. Concise Inorganic Chemistry by J. D. Lee, fifth edition
7. Inorganic Chemistry by J. E. Huhey , fourth edition.
8. James E. Mark, Harry R. Allcock, Robert West,  Inorganic Polymers, Second Edition, Oxford University Press (**2005)**

**List of Practicals:**

1. Preparation of benzimidazole.
2. Synthesis of p-nitroacetanilide from acetanilide.
3. Quantitative estimation of given glucose solution.
4. Find the strength of $KMnO_4$ solution.
5. Determine number of water molecules in Mohr salt by titration method.
6. Determine percentage of sodium carbonate in given sample of washing soda.
7. Determination of total Hardness of Water.
8. Determine the percentage of $Ca^{2+}$ and $Mg^{2+}$ in the given sample of water.
9. To determine the strength of strong and weak acid conductometrically.
10. Determination of coefficient of viscosity of a given liquid by viscometer.
11. Determination of hydrogen ion concentration and pH of a given solution using potentiometric titration.
12. To find the mol. wt. of high polymer by using viscosity measurements.
13. Determination of surface tension of a given liquid by drop number method by stalagmometer.
14.  To determine the critical micelle concentration of a soap (sodium laurate) by surface tension measurements.
15. Chemical Kinetics- Acid hydrolysis of ethyl-acetate.

**Books Recommended:**
1. Findlay's Practical Physical Chemistry.
2. Advanced Practical Physical Chemistry by J.B. Jadav.
3. Quantitative Organic Analysis by Vogel.

# MTL–102: MATHEMATICS–II

CREDITS
L   T   P
3   1   0

## UNIT – I

Differential Equations: Exact differential Equation, Higher order linear Differential equations, ODE's with constant coefficients.

Laplace Transforms: Laplace transforms, Properties of Laplace transforms, Laplace transform of derivatives and differentiation theorem, Integration theorem, Laplace transform of Integrals, Inverse Laplace transform, Formulas for obtaining inverse Laplace transforms, Convolution theorem, The second shifting property

## UNIT–II

Fourier Series and Fourier Transform: Fourier series expansion, Fourier series for even and odd functions, half range series, harmonic functions, Modulation theorem, Shifting properties, convolution theorems, sine and cosine transforms, Fourier transform of derivatives and integrals, inverse Fourier transform, applications to PDE's & ODE's .

## UNIT–III

Complex Analysis:  De Moivre's theorem with applications, Analytic functions, Cauchy–Riemann equations, Laplace equation, Cauchy's integral theorem, Cauchy's integral formula (without proofs), Taylor series and Laurent series (without proofs), Residues and their application in evaluating real improper integrals

Recommended Books:

1. Louis A. Pipes: Applied Mathematics for Engineers and Physicists, McGraw Hill Book Company.
2. Kreyszig: Engineering Mathematics, Wiley Eastern Ltd.
3. B.S. Grewal: Higher Engineering Mathematics, Khanna Publisher, New Delhi.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– II*
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# PHL–199: MECHANICS

CREDITS
L   T   P
3   1   0

## UNIT–I
Internal forces and momentum conservation. Centre of mass. Elastic collisions in laboratory and center of mass systems; velocities, angles, energies in these systems and their relationships. Conservation of angular momentum and examples–shape of the galaxy, angular momentum of solar system. Torques due to internal forces, angular momentum about center of mass. Cross– section, elastic scattering and impact parameter, Rutherford scattering.

## UNIT–II
Equation of motion of a rigid body, rotational motion of a rigid body in general and that of plane lamina. Rotation of angular momentum vector about a fixed axis. Angular momentum and kinetic energy of a rigid body about principal axis, Euler's equations. Precession and elementary gyroscope, Spinning top.

## UNIT–III
Frames of reference, Galilean transformation, Galilean invariance, The Michelson–Morley experiment. Special theory of relativity, the Lorentz transformation, Relativity of length and time, relativistic velocity addition, mass variation formula, mass–energy equivalence.

Recommended Books:

1. Mechanics–Berkeley Physics Course, Vol–I (Second Edition): C. Kittel, W.D. Knight, M.A. Ruderman, C.A. Helmholtz and R.J. Moyer–Tata McGraw Hill Publishing Company Ltd., New Delhi.

2. Analytical Mechanics: Satish K. Gupta–Modern Publishers.

3. Fundamentals of Physics: D. Halliday, R. Resnick and J. Walker (Sixth Edition)–Wiley India Pvt. Ltd., New Delhi.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– II*
*(Under Credit Based Continuous Evaluation Grading System)*

## PHL- 182: MATERIAL SCIENCE

CREDITS
L   T   P
3   1   0

### UNIT-I

Structure-property relationship; crystal system, close packing, crystal planes and directions; Miller indices; Determination of crystal structure using X-Ray diffraction.

### UNIT-II

Phase diagram; Unary and binary; Lever rule; solid solutions; steel types; non-ferrous materials and alloys.

### UNIT-III

Elastic and Plastic deformation; Effect of temperature, impurity and grain size on strength of materials;. Ferroelectric, dielectric, piezeoelectric and pyroelectric materials.

Recommended Books:
1. Materials Science and Engineering by WD Callister Jr. (John Wiley & Sons Inc., Eighth Edition)
2. Materials Science and Engineering: A First Course by V Raghvan (Prentice-Hall of India Pvt. Ltd.).

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## ECP-117: MANUFACTURING PRACTICES

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                                          CREDITS
                                          L   T   P
                                          0   0   2
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Aim of this lab course is to make the students familiar with machine shop, Welding shop and Carpentry shop.

In the Machine shop the students are required to understand the working of Lathe machine, Drilling Machine, Shaper machine and Grinding Machines. Students will be given a job to make using these machines

In the welding shop the students are required to be familiar with arc welding and gas welding. Different types of joints. The students will have hand on practice on the gas and arc welding and will be required to make some job as instructed by the instructor.

In the carpentry shop the students will be made familiar with different types of tools used in carpentry and also some simple jobs will be given to the students to have a hand on practice in this shop.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER – II (ELECTIVES)*
*(Under Credit Based Continuous Evaluation Grading System)*

Punjabi (Compulsory)
PBL-131: ਪੰਜਾਬੀ – II (ਲਾਜ਼ਮੀ)

CREDITS
L    T    P
2    0    0

ਪਾਠ–ਕ੍ਰਮ ਅਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

(I)     1.E`qm En`qm(sµb. virE`m is½G sIDU Eqy f. siuhµdrblr is½G, gurU n`nk dy
       whIvristI,Eµimqsr) iveчIhჲT-il KykvI :

       (a) B`el vIr is½G
       (E) p¬I p¬Irn is½G
       (e) p¬I mhIn is½G
          (kivq`-s`r, ivS`–vsqU, k`iv-kl`, kvI)

       2.pµj`bI Sbd bxqr: D`qUmUl, vDqr (Egyqr, ipCyqr, ivalµpq Eqyrup-qrl), sm`s |

(II)    1. E`qm En`qm (sµb. virE`m is½G sIDUEqyf. siuhUdrblr is½G, gurUn`nk dy whIvristI,
       Eµimqsr) iveчIhჲT il KykvI :

       (a) Eµimq` p¬Iqm
       (E) f. hrBjn is½G
       (e) iSv kuµ`r bt`l vI
          (kivq`-s`r, ivS`-vsqUl k`iv-kl`, kvI)
       2. pµh¬Ircn` : kI `s ive 10 iviSE- (siBE`c`rk, D`rimk Eqyr jnIqk) qypµh¬Ircn` dyEiBE`s
       krv`aऱy|

(III)   1. E`qm En`qm (sµb. virE`m is½G sIDUEqyf. siuhUdrblr is½G, gurUn`nk dµv whIvristI,
       Eµimqsr) iveчIhჲT il KykvI :

       (a) f. jsvµl is½G nµkI
       (E) f. jgq`r
       (e) f. surjIq p`qr
       (s) p`S
          (kivq`-s`r, ivS`-vsqUl k`iv-kl`, kvI)

       2. mµh`vryqyEK`x (EK`x qymµh`vr` k5 ive) 200 mµh`virE- Eqy100 EK`x-nUµv`k-ive vrqx
       dyEiBE`s krv`aऱy(kI `s ive qyGr I el)|

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER – II (ELECTIVES)*
*(Under Credit Based Continuous Evaluation Grading System)*

Mudhli Punjabi
PBL-132: **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**
(In lieu of Punjabi Compulsory)

CREDITS
L    T    P
2    0    0

ਪਾਠ-ਕ੍ਰਮ

1.    ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ
       ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ
       ਬਹੁ-ਉਚਾਰਖੰਡੀ ਸ਼ਬਦ

2.    ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ
       ਸਾਧਾਰਨ-ਵਾਕ : ਕਿਸਮਾਂ
       ਸੰਯੁਕਤ-ਵਾਕ : ਕਿਸਮਾਂ
       ਮਿਸ਼ਰਤ-ਵਾਕ : ਕਿਸਮਾਂ

3.    ਪ੍ਰਕਾਰਜੀ ਪੰਜਾਬੀ
       ਚਿੱਠੀ ਪੱਤਰ
       ਪੈਰ੍ਹਾ ਰਚਨਾ
       ਸੰਖੇਪ ਰਚਨਾ
       ਅਖਾਣ ਅਤੇ ਮੁਹਾਵਰੇ

# ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1.    ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ : ਸੰਯੁਕਤ ਸ਼ਬਦ; ਸਮਾਸੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਲੋਕ ਸਭਾ); ਦੋਜਾਤੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਕਾਲਾ ਸਿਆਹ); ਦੌਹਰੇ ਸ਼ਬਦ/ਦੁਹਰਰੁਕਤੀ (ਜਿਵੇਂ ਧੁਰੂ ਧਾਰੂ/ਭਰ ਭਰ), ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਬਣਤਰ/ਸਿਰਜਨਾ; ਅਗੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਉਪ ਭਾਸ਼ਾ), ਪਿਛੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਰੰਗਲਾ), ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ-2: ਪੜਨਾਵੀ ਰੂਪ, ਕਿਰਿਆ/ਸਹਾਇਕ ਕਿਰਿਆ ਦੇ ਰੂਪ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ-2: ਮਾਰਕੀਟ/ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਿਤ।

2.    ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ : ਕਰਤਾ ਕਰਮ ਕਿਰਿਆ; ਸਾਧਾਰਨ ਵਾਕ, ਬਿਆਨੀਆ, ਪ੍ਰਸ਼ਨਵਾਚਕ, ਆਗਿਆਵਾਚਕ, ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਵਾਕਾਂ ਦੀਆਂ ਕਿਸਮਾਂ; ਸੁਤੰਤਰ ਅਤੇ ਅਧੀਨ ਉਪਵਾਕ; ਸਮਾਨ (ਤੇ/ਅਤੇ) ਅਤੇ ਅਧੀਨ (ਜੋ/ਕਿ) ਯੋਜਕਾਂ ਦੀ ਵਰਤੋਂ; ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ : ਵਿਭਿੰਨ ਸਮਾਜਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸਥਿਤੀਆਂ ਦੇ ਅੰਤਰਗਤ; ਘਰ ਵਿਚ, ਬਾਜ਼ਾਰ ਵਿਚ, ਮੇਲੇ ਵਿਚ, ਸ਼ੌਪਿੰਗ ਮਾਲ/ਸਿਨਮੇ ਵਿਚ, ਵਿਆਹ ਵਿਚ, ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਵਿਚ, ਦੋਸਤਾਂ ਨਾਲ ਆਦਿ।

3.    ਇਸ ਯੂਨਿਟ ਵਿਚ ਚਿੱਠੀ ਪੱਤਰ (ਨਿੱਜੀ/ਦਫ਼ਤਰੀ/ਵਪਾਰਕ), ਪੈਰਾ ਰਚਨਾਂ, ਸੰਖੇਪ ਰਚਨਾ ਅਤੇ ਅਖਾਣ ਮੁਹਾਵਰਿਆਂ ਦੀ ਵਰਤੋਂ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਦੀ ਭਾਸ਼ਾਈ ਯੋਗਤਾ ਨੂੰ ਪਰਖਿਆ ਜਾਵੇਗਾ।

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER – II (ELECTIVES)*
*(Under Credit Based Continuous Evaluation Grading System)*

## SOA 102: Drug Abuse: Problem, Management and Prevention
### (Compulsory Paper)

### DRUG ABUSE: MANAGEMENT AND PREVENTION

Time: 3 Hours                                                                                   Credit 3-0-0

1) **Consequences of Drug Abuse for:**
   1) Individual – Education, employment and income issues.
   2) Family – Violence
   3) Society – Crime.
   4) Nation – Law and order problem.
2) **Management of Drug abuse:**
   1) Medical Management: Medication for treatment and to reduce withdrawal effects, Drug De-addiction clinics, Relapse management.
   2) Psycho-Social Management: Counselling, family and group therapy, behavioural and cognitive therapy, Environmental Intervention.
3) **Prevention of Drug Abuse:**
   1) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
   2) School
      Counselling, Teacher as role-model. Parent-Teacher-Health Professional Coordination, Random testing on students.
   3) Media:
      Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse,
      Educational and awareness program
   4) Legisltaion: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs, Strict enforcement of laws, Time bound trials.

**References:**
1. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
2. Inciardi, J.A. 1981. *The Drug Crime Connection*. Beverly Hills: Sage Publications.
3. Modi, Ishwar and Modi, Shalini (1997) *Drugs: Addiction and Prevention*, Jaipur: Rawat Publication.
4. Sain, Bhim 1991, *Drug Addiction Alcoholism*, Smoking obscenity New Delhi: Mittal Publications.
5. Sandhu, Ranvinder Singh, 2009, *Drug Addiction in Punjab*: *A Sociological Study. Amritsar*: Guru Nanak Dev University.
6. Singh, Chandra Paul 2000. *Alcohol and Dependence among Industrial Workers*: Delhi: Shipra.
7. World Drug Report 2011, United Nations office of Drug and Crime.
8. World Drug Report 2010, United Nations office of Drug and Crime.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM*
*(Under Credit Based Continuous Evaluation Grading System)*

| S. NO. | Course Code | Course | L | T | P | CREDITS |
|--------|-------------|--------|---|---|---|---------|
| | | **Semester – III** | | | | |
| 1. | CSL231 | Data Structures & Programming Methodology | 2 | 1 | 2 | 4 |
| 2. | CSL233 | Programming in C++ | 2 | 1 | 2 | 4 |
| 3. | *ESL220 | Environmental Studies | 3 | 0 | 0 | 3 |
| 4. | ECL291 | Digital Circuits & Logic Design | 3 | 0 | 2 | 4 |
| 5. | ENL201 | Written & Oral Technical Communication | 2 | 1 | 2 | 4 |
| 6. | | Interdisciplinary Course-I | 4 | 0 | 0 | 4 |
| | | **Total** | **16** | **3** | **8** | **23** |

**\*Credits will not be included in SGPA**

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III (Under Credit Based Continuous Evaluation Grading System)*

## CSL–231: DATA STRUCTURES & PROGRAMMING METHODOLOGY

```
                                              CREDITS
                                              L   T   P
                                              2   1   1
```
Theory:

### UNIT – I

Introduction: Define data structure, Data structure operations. Algorithm: Def., Complexity, Time-space tradeoff, Algorithmic notations. Big O notation.
Arrays: Linear array, Representation of Linear array in memory, Traversing linear array, Inserting, Deleting, Sorting (Bubble sort), Searching (Linear search, Binary search).
Linked List: Representation in memory, Traversing, Searching, Insertion, deletion, Header Linked List, Two ways List: operations.

### UNIT – II

Queues: Define Queues, Operations, Dequeues, Priority Queues.
String Processing: Introduction, Basic terminology, Storing strings, Character data type, String operations, Word processing.

Stacks: Introduction, operations, Arithmetic expression, Polish notations, Transforming infix to postfix, Quick sort, Recursion concept.

### UNIT – III

Trees: Binary trees, Representation in memory, Traversing, Traversal algorithms using stacks, Binary Search trees: Searching, Inserting and Deleting. Heap and Heap sort.

Graphs: Graph Theory Terminology, Sequential Representation, Wars hall's Algorithm, Linked Representation, Traversing a graph, Hashing.

Practical's:

Algorithm development in all areas of data structures covered in the course. Emphasis should be given on the following matters. Development of recursive as well as non recursive a algorithms involving linked list trees and graphs. Use of pointers for dynamic allocations of storage. Development of classes for some of the data structures using the concept of the abstract data types.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III (Under Credit Based Continuous Evaluation Grading System)*

**Texts / References:**

1. Seymour Lipschutz : Theory and Problems of Data Structures, Schaum's Outline Series

2. Aho A. V. J. E. Hopcroft, J.D. Ullman; Data Structures and Algorithms, Addison–Wesley, 1983.

3. Baase, S Computer Algorithms; Introduction to Design and Analysis, Addison – Wesley, 1978.

4. Berztiss, A.T88888.: Data Structures, Theory and practice: $2^{nd}$ ed., Academic Press, 1977.

5. Collins, W.J. Data Structures, An Object–Oriented Approach, Addison – Wesley, 1992.

6. Goodman, S.E., S.T.Hedetniemi: Introduction to the Design and Analysis of Algorithms, McGraw Hill, 1977.

7. Horowitz, E.S. Sahni: Algorithms: Design and Analysis, Computer Science Press, 1977.

8. Kunth, D.E. The Art of Computer Programming. Vols. 1–3, Addison – Wesley, 1973.

9. Kurse, R.L. Data Structures and Program Design, $2^{nd}$ Ed., Prentice Hall, 1987.

10. Lorin, H.: Sorting and Sort Systems, Addison – Wesley, 1975.

11. Standish, T.A.: Data Structure Techniques, Addison – Wesley, 1980.

12. Tremblay, J.P., P.G. Soreson: An Introduction to Data Structures with Applications, McGraw Hill, 1976.

13. Wirth, N.: Algorithms + Data Structures = Programs, Prentice Hall, 1976.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III*
*(Under Credit Based Continuous Evaluation Grading System)*

# CSL–233: PROGRAMMING IN C++

```
                                                    CREDITS
                                              L     T     P
                                              2     1     1
```

**Theory:**

## UNIT-I

Difference between C, C++ and VC++. Brief introduction to data types, operators and control statements in C++. Advanced preprocessor statements, Features of C++, I/O statements in C++, Manipulators, Classes and Objects, Access Specifies, Function Overloading, Inline Functions, Friend Functions,

## UNIT-II

Constructors & Destructors: Types of Constructors, Inheritance, Types Of Inheritance, Ambiguity in Inheritance, Polymorphism: Virtual Functions, Pure virtual Functions, Operator Overloading & Type Conversion,

## UNIT-III

Pointers, Array of pointers, Dynamic memory allocation in C++, File handling in C++, Templates and Exception Handling.

## PROGRAMMING LANGUAGES LAB:

Students should be asked to write programs in C++ using different statements, Libraries and Functions, Designing Unique Manipulators

## BOOKS:

1. Object Oriented programming in C++ - Robert Lafore
2. Programming ANSI and TURBO C++ - Kamdhane
3. Let Us C++ - Yashwant Kanetkar
4. The C++ Programming Language - Bjarne Stroustrup

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III*
*(Under Credit Based Continuous Evaluation Grading System)*

## ESL220: ENVIRONMENTAL STUDIES
## (COMPULSORY PAPER)

```
CREDITS
L   T   P
3   0   0
```

1. **The Multidisciplinary Nature of Environmental Studies:** Definition, scope & its importance, Need for public awareness.

2. **Natural Resources**: Natural resources and associated problems.
   a) **Forest Resources**: Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
   b) **Water Resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
   c) **Mineral Resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
   d) **Food Resources**: World food problems, change caused by agriculture and overgrazing, effects or modern agriculture, fertilizer-pesticide problem, salinity, case studies.
   e) **Energy Resources**: Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
   f) **Land Recourses**: Land as a resource, land degradation, soil erosion and desertification.
   g) Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.

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

4. **Biodiversity and its Conservation:**
   **Definition:** Genetic, species and ecosystem diversity, Biogeographical classification of India.
   **Value of Biodiversity**: Consumptive use; productive use, social, ethical, aesthetic and option values.
   Biodiversity of global, National and local levels, India as mega-diversity nation "Hot-spots of biodiversity.
   **Threats to Biodiversity**: Habitat loss, poaching of wild life, man wildlife conflicts
   Endangered and endemic species of India.
   **Conservation of Biodiversity**: In situ and Ex-situ conservation of biodiversity.

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*(Under Credit Based Continuous Evaluation Grading System)*

5. **Environmental Pollution:**
   Definition, Causes, effects and control measures of:
   a) Air Pollution
   b) Water Pollution
   c) Soil Pollution
   d) Marine Pollution
   e) Noise Pollution
   f) Thermal Pollution
   g) Nuclear Hazards
   **Solid Waste Management**: Causes, effects and control measures of urban and industrial wastes.
   Role of an individual in prevention of pollution.
   Pollution case studies Disaster Management: Floods, Earthquake, Cyclone and Landslides

6. **Social Issues and Environment:**
   * From unsustainable to sustainable development
   * Urban problems related to energy
   * Water conservation, rain water harvesting, watershed management
   * Resettlement and rehabilitation of people; its problems and concerns. Case studies
   * Environmental ethics: Issues and possible solutions.
   * Climate change, global warning, acid rain, ozone layer depletion, nuclear accidents and holocause. Case studies.
   * Wasteland reclamation
   * Consumerism and waste products
   * Environmental Protection Act
   * Air (prevention and Control of Pollution) Act
   * Water (prevention and Control of Pollution) Act
   * Wildlife Protection Act
   * Forest Conservation Act
   * Issues involved in enforcement of environmental legislation
   * Public awareness

7. **Human Population and the Environment**
   * Population growth, variation among nations
   * Population explosion-Family welfare programme
   * Environment and human health
   * Human rights
   * Value education
   * HIV / AIDS
   * Women and child welfare
   * Role of information technology in environment: and human health
   * Case studies

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*(Under Credit Based Continuous Evaluation Grading System)*

* **Road Safety Rules & Regulations:** Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs
* **Accident & First Aid:** First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance

## 8. National Service Scheme

* **Introduction and Basic Concepts of NSS:** History, philosophy, aims & objectives of NSS: Emblem, flag, motto, song, badge etc.; Organization structure, roles and responsibilities of various NSS functionaries.
* **Health, Hygiene & Sanitation:** Definition, needs and scope of health education; Food and Nutrition; Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan); National Health Programme; Reproductive health.
* **Civil/Self Defense:** Civil defense services, aims and objectives of civil defense; Needs for self defense training.

**9. Field Work:** Visit to a local area to document environmental assets–river / forest / grassland / hill / mountain.  Visit to a local polluted site–Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds.  Study of simple ecosystems–pond, river, hill slopes, etc. (Field work equal to 5 lecture hours)

**References:**

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.

2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.

3. Bharucha, E. 2004. The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad.

4. Brunner, R. C. 1989. Hazardous Waste Incineration, McGraw Hill Inc. New York.

5. Clark, R. S. 2000. Marine Pollution, Clanderson Press Oxford.

6. Cunningham, W. P., Cooper, T. H., Gorhani, E. & Hepworth, M. T. 2001. Environmental Encyclopedia, Jaico Publications House, Mumbai.

7. De, A. K. 1989. Environmental Chemistry, Wiley Eastern Ltd.

8. Down to Earth, Centre for Science and Environment, New Delhi.

9. Hawkins, R. E. 2000. Encyclopedia of Indian Natural History, Bombay Natural History Society.

10. Heywood, V. H & Waston, R. T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.

11. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.

12. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.

13. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.

14. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.

15. Odum, E. P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.

16. Rajagopalan, R. 2005. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.

17. Sharma, B. K. 2001. Environmental Chemistry. Geol Publishing House, Meerut.

18. Sharma, J. P. 2004. Comprehensive Environmental Studies, Laxmi Publications (P) Ltd, New Delhi.

19. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.

20. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.

21. Survey of the Environment. 2005. The Hindu.

22. Tiwari, S. C. 2003. Concepts of Modern Ecology, Bishen Singh Mahendra Pal Singh, Dehra Dun.

23. Townsend, C., Harper, J. and Michael, B. 2001. Essentials of Ecology, Blackwell Science.

24. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III*
*(Under Credit Based Continuous Evaluation Grading System)*

## ECL–291: DIGITAL CIRCUITS AND LOGIC DESIGN

```
                                                CREDITS
                                              L   T   P
                                              3   0   1
```

Theory:

### UNIT–I

Data and number representation–binary–complement representation BCD–ASCII, ISCII. [15%]
Boolean algebra, logic gates, minimization, use of programs such as expression minimization.
[05%]
Digital Circuit Technologies, RTL / DTL / DCTL / TTL / MOS / CMOS / ECL, analysis of basic
circuits in these families, internal architecture of programmable logic devices.    [10%]
Combinational design, design with Muxes.    [05%]

### UNIT–II

Sequential circuits, flip–flops, counters, shift registers, multi-vibrators, state diagram–sequential
circuit design from state diagrams computer aids in synthesis.    [15%]
Memory system – RAM, ROM, EPROM, EEPROM, PAL, PLDs, PGAs.    [20%]

### UNIT–III

Bus structures, transmission line effects, line termination.    [10%]
A/D and D/A conversion techniques and selected case studies.    [15%]
CAD tools, FPGA based design exercises.    [15%]
Introduction to VLSI Design, Custom and semi–custom design.    [05%]

Practicals:

Realization of selected circuits using TTL and MOS components.
Familiarization with CAD design tools.
Design exercises using EPLDs and FPGAs.
Compare two six bit numbers and display the larger number on seven segment
display. Design a mod – 7 counter. Generate a pulse for every 1 ms.
Use 2 to 1 Mux and implement 4 to 1
Mux. Pattern recognizer.
4 bit ALU.
Serial to parallel shifter and parallel to serialshifter. Priority resolver.
Binary to gray code converter. Traffic light controller. Pattern Generator.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– III*
*(Under Credit Based Continuous Evaluation Grading System)*

Texts / References:

1. Morris Mano, Digital Design– Prentice Hall of India Pvt. Ltd., New Delhi, 1992.

2. Jesse H.Jenkins, Designing with FPGAs and CPLDs, PTR Prentice Hall, Englewood Cliffs, New Jersy, 1994.

3. H.Taub & D. Schilling, Digital Integrated Electronics. McGraw Hill, 1977.

4. Douglas L. Perry, VHDL, McGraw Hill, Inc. 2nd Edition, 1993.

5. Mead and L. Conway, Introduction to VLSI Systems, Addition Wesley, 1979.

*CSA1: B.TECH. (COMPUTER SCIENCE &ENGINEERING)SEMESTER – III*
*(Under Credit Based Continuous Evaluation Grading System)*

ENL–201: WRITTEN & ORAL TECHNICAL COMMUNICATION
(Communication Skills for Scientists and Engineers)

CREDITS
L   T   P
2   1   1

| | |
|---|---|
| Note taking from lectures and reference material | [10%] |
| Essay and precis writing | [30%] |
| Slide preparation and oral presentation principles | [10%] |
| Written presentation of technical material | [20%] |
| Preparation of Bibliography | [10%] |
| Basics of Official Correspondence | [15%] |
| Preparation of bio–data | [05%] |

Students should be asked to prepare and present Seminars during the practice session.

Texts / References:
1.  The Chicago Manual of Style, 13th Edition, Prentice Hall of India 1989.
2.  Gowers Ernest, "The Complete Plan in Words" Penguin, 1973.
3.  Menzel D.H., Jones H.M., Boyd, LG., "Writing a Technical Paper", McGraw Hill, 1961.
4.  Strunk, W., & White E.B., "The Elements of Style:, 3rd Edition, McMillan, 1979.
5.  Turbian K.L., "A Manual for Writers of Term Papers, Thesis and Dissertations" Univ. of Chicago Press, 1973.
6.  IEEE Transactions on "Written and Oral Communication" has many papers.

Practical:
Students should be asked to prepare Technical Presentation on the emerging areas of Information Technology and present the same to the group of Students.

Texts / References:
1.  The Chicago Manual of Style, 13th Edition, Prentice Hall of India, 1989.
2.  Gowers Ernest, "The Complete Plan in Words" Penguin, 1973.
3.  Menzel D.H., Jones H.M., Boyd, LG., "Writing a Technical Paper", McGraw Hill, 1961.
4.  Strunk, W., & White E.B., "The Elements of Style:, 3rdEdition, McMillan, 1979.
5.  Turbian K.L., "A Manual for Writers of Term Papers, Thesis and dissertations" Univ. of Chicago Press, 1973. IEEE Transactions on "Written and Oral Communication" has many papers

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM*
*(Under Credit Based Continuous Evaluation Grading System)*

| S. NO. | Course Code | Course | L | T | P | CREDITS |
|--------|-------------|--------|---|---|---|---------|
| **Semester – IV** |
| 1. | CSL240 | Operating System | 2 | 1 | 2 | 4 |
| 2. | CSL241 | Data Communication | 3 | 0 | 2 | 4 |
| 3. | CSL243 | System Programming | 3 | 1 | 0 | 4 |
| 4. | CSL244 | Discrete Structures | 3 | 1 | 0 | 4 |
| 5. | CSL245 | Computer Architecture | 3 | 1 | 0 | 4 |
| 6. | | Interdisciplinary Course-II | 4 | 0 | 0 | 4 |
| | | **Total** | **18** | **4** | **4** | **24** |

## CSL–240: OPERATING SYSTEM

CREDITS
L T P
2 1 1

### UNIT–I

Introduction to Operating Systems, Main Functions and characteristics of Operating Systems, Types of Operating Systems, System Calls

Process Management: Process States, Process Control Block, Process Scheduling, CPU Scheduling, Resource allocation graph, Deadlocks: Deadlock Avoidance and Deadlock Handling

### UNIT–II

Process Synchronisation: Race Condition, Critical Section, Semaphores, Classical problems of synchronization, Monitors

Memory Management: External fragmentation, Internal fragmentation, Compaction, Paging, Segmentation, Virtual memory, Demand paging.

### UNIT–III

Device Management: Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O Device handlers.

Disk Scheduling: FCFS, SSTF, SCAN, C–SCAN, N–Stop Scan

Introduction to Multiprocessor and Distributed Operating Systems.

Case Studies: Windows 8x/XP/2000, UNIX, LINUX to be discussed briefly.

**Practical:**

Linux Shell Programming, C programming using System Calls use of Fork calls IEEE POSIX threads Library Package and its use in writing multithreaded programs. Example problems on some of the live problems like Disk access, shared memory and deadlocks. Implementation and use of semaphores and other constructs.

**Text / References:**
1. Peter B. Galvin, A. Silberchatz: Operating System Concepts, Addison Wesley, 6th Edi., 2003.
2. A.S. Tenenbaum: Operating System: Design and Implementation PHI, 1989
3. Madnick and Donovan: Operating System, McGraw Hill, 1973.
4. P.B. Henson: Operating System Principles, Prentice Hall, 1973.
5. P.B. Henson: Architecture of concurrent programs, Prentice Hall, 1977.
6. A.C. Shaw: Logic Design of operating System, Prentice Hall, 1974.
7. M.J. Bach: Design of UNIX Operating system, PHI, 1986.

## CSL–241: DATA COMMUNICATION

CREDITS
L    T    P
3    0    1

### UNIT–I
OSI Reference Model, Concepts of layer, protocols, layer interfaces; TCP/IP Model.
Network topologies, LAN, MAN, WAN.
Transmission Media: Twisted pair, coaxial cables, fibre–optics cables.
Wireless Transmission: Electromagnetic spectrum, Radio transmission, Microwave Transmission, Infrared, and Millimeter Waves, Lightwave Transmission.

### UNIT–II
Error Detection and correction, sliding window protocols, Multiple Access protocols: ALOHA, CSMA/CD
LAN standards: Ethernet, Wireless LAN Standards, Bluetooth Architecture
Repeaters, Hubs, Bridges, Switches, Routers, Gateways

### UNIT–III
Virtual Circuits and datagrams, Routing Algorithms, Congestion Control Algorithms. Internetworking.
Elements of Transport Protocol
Fundamental of Data Compression Techniques and Cryptography.
Domain Name System, Electronic Mail, FTP, Worldwide web (WWW). IPv4, IPv6

**Practical:**
- Hands on practice for preparing cross cable & straight cable.
- Hands on practice of various Communication Media (both Guided and Unguided).
- Study of various Topologies and Setup.
- Configure various network devices like Switch, Router etc.
- Simulation of OSI Reference Model.
- Implement various error detection algorithms for Noisy channel.
- Simulate and implement stop and wait protocol for noisy channel.
- Simulate and implement go-back-N and sliding window protocols.
- Simulate and implement Routing Algorithms.
- Hands on Practice of various servers like DHCP, Proxy and FTP.
- Implementation of various Cryptography Algorithms.

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**Relevant Book:**

1. Tanenbaum, A.S.: Computer Networks, Prentice Hall, 1992 2nd Ed.

2. Tanenbaum, A.S.: Computer Networks, Prentice Hall, 1992 3rd Ed.

3. Stallings, William: Local Networks: An introduction Macmillan Publishing Co.

4. Stallings, William: Data & Computer Communication Macmillan Publishing Co.

5. Black: Data Networks (PHI) 1988.

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## CSL–243: SYSTEM PROGRAMMING

**CREDITS**
**L T P**
3 1 0

### UNIT–I

**Introduction:** Foundations of System Programming, General Machine Structure, Simplified Machine Architecture & its components, System software & its components.

**Assemblers:** Low Level Languages, Basics of an assembly language, instructions & Basic elements, Types of Statements & format, Assembler & its design, Pass structure of assemblers, Design of two pass assembler.

### UNIT–II

**Macro Processors**: Introduction, Macro definition & expansion, Arguments in Macros, Concatenation of Macro Parameters, Generation of unique labels, Conditional Macro Expansion, Nested macros, Macros Defining Macros, Macro processor Design, Two pass & single pass macro processor, implementation within an assembler.

**Loaders& Linkers**: Introduction, Basic Loader Functions, Loader Schemes, Design of an absolute Loader, Relocating Loaders, Design of a linking loader, Linkage Editors & its functions, Dynamic Linking, Bootstrap Loader.

### UNIT–III

**Introduction to Compilers:** Introduction, Compiler Design & its Phases, Lexical analysis, Parsing, storage Management, Intermediate code generation, Code Optimization & Generation, interpreters, Incremental compilers, Cross & P-code compilers.

**Editors & Debuggers**: Introduction to a text editor & its types, Interactive debugging systems.

**Texts / References:**
1. Barron D.W., Assemblers and Loaders, 2/e New York, Elsevier, 1972.
2. Beck L.L., Systems Software: An Introduction to Systems Programming, Addison–Wesley, 1985.
3. Calingaret, P, Assemblers, Compilers and Program Translation Rockville, MD, Computer Science Press, 1979.
4. Donovan J.J., Systems Programming, New York, McGraw Hill, 1972.
5. Groslinc G.W., Assembly and Assemblers, The Motorola 68000 Family, Prentice Hall, Englewood Cliffs, 1988.
6. Ullman. J.D., Fundamental Concepts of Programming Systems, Addison–Wesley 1976.

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7.    Dhamdhere, D.M., Introduction to Systems Software, Tata McGraw Hill, 1996.

8.    Glingaret P., Assembles Loaders and Compilers, Prentice Hall.

9.    Echouse, R.H. and Morris, L.R., Minicomputer Systems Prentice Hall, 1972.

10.   Rochkind M.J., Advance C Programming for Displays, Prentice Hall 1988.

11.   Biggerstaff, T.S. Systems Software Tools Prentice Hall 1986.

12.   Finsett, C.A., The Craft of Text Editing Springer Verlag, 1991.

13.   Shooman H.L., Software Engineering McGraw Hill 1983.

14.   Aho A.V. and J.D. Ullman Principles of Compiler Design Addison Wesley/Narosa 1985.

15.   Aho A.V. and Ullman J.D. The theory of Parsing, Translation and compiling, Vol. I Parsing.Prentice Hall Inc. 1972.

16.   Aho A.V. and Ullman J.D. The theory of Parsing, Translation and compiling, Vol. II Compiling.Prentice Hall Inc. 1972.

17.   Aho A.V., Sethi R. and Ullman J.D. Compiler, Principles, Techniques and Tools

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## CSL–244: DISCRETE STRUCTURES

**CREDITS**
**L T P**
3 1 0

### UNIT–I
**Groups and Rings:** Groups, monoids, and Submonoids, Semigroup, Subgroups and Cosets. Congruence relations in semigroups. Morphisms. Normal subgroups. Cyclic groups, permutation groups, dihedral groups, Rings, subrings, morphism of rings, ideals and quotient rings.

### UNIT–II
**Graph Theory:** Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphic Graphs, Paths, Connectivity, Bridges of Konigsberg, Transversable Multigraphs, Labeled and Weighted Graphs, Complete, regular and Bipartite Graphs, Tree graphs, Planar Graphs, Graph Colorings, Representing Graphs in Computer Memory. Directed Graphs: Sequential Representation of Directed Graphs, Warshall's Algorithm, Shortest Paths, Linked Representation of Directed Graphs, Rooted Trees, Graph Algorithms, Depth–first and Breadth–first searches, Directed Cycle–Free Graphs, Topological Sort, Pruning Algorithm for Shortest Path. Binary Trees: Complete and Extended trees, Representing trees in memory, Traversing trees, Search trees, Heaps, path Lengths, Huffman's Algorithm.

### UNIT–III
**Lattices and Boolean algebra:** Partially ordered sets, lattices and its properties, lattices as algebraic systems, sub–lattices, direct products, Homomorphism, some special lattices (complete, complemented, distributive lattices). Boolean algebra as lattices, Boolean identities, sub–algebra, Boolean forms and their equivalence, sum of product, product of some canonical forms.

**Recurrence Relations and Generating Functions:** Polynomial expressions, telescopic form, recursion theorem, closed form expression, generating function, solution of recurrence relation using generating function

**Books Recommended:**
1. Trambley, J.P. and Manohar, R: Discrete Mathematical Structures with Applications to Computer Science.
2. Liu C.L.: Elements of Discrete Mathematics.
3. Alan Doerr and Kenneth Levasseur: Applied Discrete Structures for Computer Science
4. Narsingh Deo: Graph Theory.
5. Lipschutz, S. and Lipson, M.: Discrete Mathematics (Schaum's out lines series).

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## CSL245: COMPUTER ARCHITECTURE

**CREDITS**
**L    T    P**
3    1    0

### UNIT-I
**Basic computer Organisation and design:** Register Transfer language & operations, various Arithmetic, Logic & Shift micro-operations instructions, codes, computer registers, instructions, timing & control, instruction cycle, design of a complete basic computer & it's working.

### UNIT-II
**Programming & controlling the basic computer:** Machine & Assembly Language, hardwired & Microprogrammed control, Design of a control unit.

**CPU Architecture:** General register & stack organization, instruction formats and addressing modes, ALU & Control unit architecture.

**Memory Organisation:**    Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation.

### UNIT-III
**I/O Organization:**    Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA, I/O Processors.

**Parallel & Multiprocessing Environment:** Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, interprocessor communication & synchronisation.

*Text/References:*

1. Morris Mano: Computer System Architecture, PHI.

2. Hayes J.P.:  Computer Architecture & Organisation, McGraw Hill.

3. Stone:   Introduction to Computer Architecture: Galgotia.

4. Tanenbaum:  Structured Computer Organisation, PHI.

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| | | Semester – V | | | | |
|---|---|---|---|---|---|---|
| **S. NO.** | **Course Code** | **Course** | **L** | **T** | **P** | **CREDITS** |
| 1. | CSL330 | System Analysis And Design | 3 | 1 | 0 | 4 |
| 2. | CSL332 | Relational Database Management Systems | 2 | 1 | 2 | 4 |
| 3. | CSL333 | Design & Analysis of Algorithm | 3 | 1 | 0 | 4 |
| 4. | CSL334 | Computer Graphics | 2 | 1 | 2 | 4 |
| 5. | CSL336 | Programming in ASP.Net | 2 | 1 | 2 | 4 |
| 6. | | Interdisciplinary Course–III | 4 | 0 | 0 | 4 |
| | | **Total** | **16** | **5** | **6** | **24** |

## CSL–330: SYSTEM ANALYSIS AND DESIGN

**CREDITS**
**L    T    P**
3    1    0

### UNIT–I

**Systems Concept:** Definition**,** Characteristics, Elements and Types of system, System Development life cycle. Role of System Analyst.

**System Analysis:** System planning and initial investigation, information gathering tools, Feasibility Study and its importance , Cost Benefit Analysis.

### UNIT–II

**System Design:** Tools for structured design- Data Flow Diagrams, Flowcharts, Structure Charts, Decision Tree, Decision Table, Structured English, Data Dictionary.

**System Testing**: Test Plan, Activity network for system testing. Documentation Tools used in SDLC.

### UNIT–III

**System Security:** Introduction, Threats to System, Control Measures, Disaster Recovery, Audit Trails, Risk Management

**Case study of the following systems:**
Library Management System
University Management System.

**References:**
1. "Elements of System Analysis" – Marvin Gore and John W. Stubbe, 2003.
2. "System Analysis and Design" – Thapliyal M.P., 2002.
3. "Modern Systems Analysis & Design" – Hoffer, George and Valacich, 2001.
4. "SSAD: System Software Analysis and Design" – Mehta Subhash and Bangia Ramesh, 1998.
5. "Understanding Dynamic System: Approaches to Modelling, Analysis and Design" Dorny C. Nelson, 1993.
6. "System Analysis and Design" – Perry Edwards, 1993.
7. "Systems Analysis and Design" – Elias M. Awad, 1993.
8. "Analysis and Design of Information Systems" – James A. Senn, 1989.

# CSL–332: RELATIONAL DATABASE MANAGEMENT SYSTEMS

CREDITS

L    T    P

2    1    1

## UNIT–I

Introductory Concepts: Database, Database Management System (DBMS), Advantages and Disadvantages of DBMS, Database System Structure, DBA and responsibilities of DBA.

Three level ANSI–SPARC Architecture Schemas, Mapping, instances and Database Independence, Entity–Relationship Model, Relational Data Model, Keys, Integrity Constraints, Relational Algebra, Relational Calculus.

SQL: Introduction, Data Definition Language (DDL), Data Manipulation Language (DML),Data Control Language (DCL) statements, Views, Sub–queries, Access Rights, Indexes.

## UNIT–II

Advanced SQL: Introduction, Comparison of SQL, PL-SQL, T-SQL and NoSQL, Creating Stored Procedures and Functions, User-defined functions with parameters, Triggers, Cursor Management

Normalization: Purpose of Normalization, 1NF, 2NF, 3NF, BCNF.

Query Optimization: Introduction of Query Processing, Heuristic Approach to Query Optimization, Cost Estimation, Pipelining.

## UNIT–III

Transaction Management and Concurrency Control : Introduction to Transaction Processing, Properties of Transactions, Serializability and Recoverability, Need for Concurrency Control, , Locking Techniques, Time stamping Methods, Optimistic Techniques and Granularity of Data items.

Database Recovery of database: Introduction, Need for Recovery, Transactions and Recovery, Recovery Facilities, Recovery Techniques.

Database Security: Introduction, Threats, Counter Measures.

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References:
1. Ivan Bayross, "SQL/PLSQL: The Programming Language of Oracle, 3<sup>rd</sup>Revised Edition, 2006.
2. Elmarsi & Navathe, "Fundamentals of Database Systems" 4<sup>th</sup>Edition, 2004.
3. C.J.Date "Introduction to database system", 8<sup>th</sup>Edition, Galgotia Publications, 2004.
4. Connolly &Begg "Database Systems – A practical approach to design, Implementation and Management, 3<sup>rd</sup> Edition, Pearson Education India, 2003.
5. Silberschatz, Korth, Sudershan "Database System Concepts" 4<sup>th</sup>Edition, McGraw HillEducation, 2002.
6. Microsoft SQL Server 2012 Step by Step, Microsoft Press, Patric LeBlanc

**LAB EXERCISE:**
1. Create a table named as Stu_info with columns as Roll_No,Name, Ph_no,Email_id.
2. Create a table named as 'Course_Enrolled' with columns as Roll_No, Department, Name.
3. Truncate the above created tables.
4. Insert 10 rows into the above created tables.
5. Insert 5 rows into the table named as course_enrolled with dept value as CSE, 5 rows with dept value as Punjabi and 5 as electronics.
6. Select all the rows from table Course_enrolled in which dept value is CSE.
7. Select Names and Adresses column from table Stu_info.
8. Select details of students from Stu_info and order them by their names.
9. Select Roll_no,Name and Email_id from stu_info and make a new table named as Student with them.
10. Update all the rows of course_enrolled table having values as CSE with values as DCSE.
11. Add a new column named as Aggr_perc into Course_enrolled.
12. Delete the column named as Name from table course_enrolled.
13. Rename the table and write a sub query to finf the details of students having second highest roll_no from student table.
14. Drop the Stu_info table if already exists and then create the new table Stu_info with roll_no values as unique and not null.
15. Create a table of your choice and use all options of grant and revoke.
16. Write a SQL procedure to show the use of cursors.
17. Write a SQL procedure to show the use of triggers.
18. Write a SQL procedure to handle use of triggers.

# CSL–333: DESIGN AND ANALYSIS OF ALGORITHM

CREDITS

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

## UNIT–I

Introduction: Concept of Algorithm, Algorithm Specification, Performance Analysis (Time andspace complexities), Asymptotic Notations.

Divide and conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort, Selection.

Greedy Method: General Method, Knapsack Problem, Minimum Cost Spanning Trees (Prim'sAlgorithm, Kruskal's Algorithm) and Single–Source Shortest Path.

## UNIT–II

Dynamic Programming: General Method, Multistage Graphs, All Pairs Shortest Paths, Single– Source Shortest Paths, Optimal Binary Search Tress, 0/1 Knapsack and Travelling Salesman Problem.

Backtracking: General Method, 8–Queens Problem, Graph Coloring, Hamiltonian Cycles & Subset-Sum Problem.

Algebraic Algorithms: General Method, Evaluation and Interpolation, Fast Fourier Transformation, Modular Arithmetic.

## UNIT–III

Hard Problems: Basic Concepts, Nondeterministic Algorithms, Classes NP–Hard and NP– Complete , NP–Hard Graph Problems (CNDP, DHC, TSP and AOG).

Approximation Algorithms: Introduction, Absolute Approximation (Planner Graph Coloring and NP–Hard Absolute Approximations),  –Approximations (Scheduling Independent Tasks and Bin Packing).

References:
1. Aho , Hopcroft and Ullman "The Design and Analysis of Computer Algorithms", 2003.
2.  Horowitz, S. Sahni, SanguthevarRajasekaran "Fundamentals of Computer Algorithms" , 2003.
3. R.G.Droomy, "How to Solve it by Computer" , Third Printing, 1989.
4. K. Mehlhorn, "Data Structures and Algorithms", Vols. 1 and 2, Springer Verlag, 1984.
5. Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinechart and Winston, 1985.
6. D. E. Kunth, The Art of Computer Programming, Vols.I and 3, 1968, 1975.

# CSL–334: COMPUTER GRAPHICS

CREDITS
L   T   P
2   1   2

## UNIT–I

Overview of Computer Graphics: Applications of Computer Graphics, Raster–Scan displays, Random–Scan displays, Color CRT Monitors, Flat–Panel Displays; Video Controller, Display Processor, Common Graphic Input and Output devices, Graphic File Formats.
Output Primitives: DDA, Bresenham Line Algorithm; Bresenham and Midpoint Circle drawing algorithms; Midpoint Ellipse Algorithm; Flood and Boundary Filling;

Two Dimensional Geometric Transformation: Translation, Rotation, Scaling, Reflection; Matrix representations; Composite transformations.

## UNIT–II

Two Dimensional Viewing: Viewing coordinate reference frame; Window to Viewport coordinate transformation, Point Clipping; Cohen–Sutherland and Liang–Barskey Algorithms for line clipping; Sutherland–Hodgeman algorithm for polygon clipping.

Three Dimensional Transformations & Viewing: Translation, Rotation, Scaling, Reflection and composite transformations. Parallel and Perspective Projections, Viewing Transformation: View Plan, View Volumes and Clipping.

## UNIT–III

Color Models: Properties of Light, Intuitive Color Concepts, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.
Introduction to Animation Graphics**:** Design of Animation sequences, General Computer Animation functions, Raster Animation & Computer Animation languages.

References:

1. D. Hearn and M.P. Baker, Computer Graphics: C  version, 2nd Edition, PHI, 2004.
2. D.F. Rogers, Procedural Elements for Computer Graphics, 2nd Edition, Addison Wasley, 2004.
3. D.F. Rogers, Mathematical Elements for Graphics, 2nd Edition., McGraw Hill, 2004.
4. J.D. Foley et al, Computer Graphics, Principles and Practices, 2nd Edition, Addison Wasley, 2004.
5. Roy A. Plastock, Gordon Kalley, Computer Graphics, Schaum's Outline Series, 1986.

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Computer Graphics Lab:

1. To work with output primitives available in the graphics library of Borland's C++ IDE.

2. Implement DDA line-generating algorithm in C++.

3. Implement Bresenham's line-generating algorithm in C++.

4. Implement Bresenham's circle -generating algorithm in C++.

5. Implement Mid-Point circle-generating algorithm in C++.

6. Write a function to create a translation matrix for three successive translations and show its use in a graphics program.

7. Program of color filling the polygon using Boundary fill and Flood fill algorithm.

8. Program of line clipping using Cohen-Sutherland  Algorithm.


Above said Exercises can be implemented in C / C++ Programming Language.

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# CSL–336: PROGRAMMING IN ASP.NET

CREDITS
L   T   P
2   1   1

## UNIT – I

**Introducing ASP.NET and the .NET Platform**
Introduction to ASP.NET and .NET Framework,
**ASP.NET Page Structure:** Directives, Code Declaration Blocks, Code Render Blocks, ASP.NET Server Controls, Server-side Comments, Literal Text and HTML Tags,
View State, Working with Directives, **ASP.NET Languages:** Visual Basic, C#

**VB and C# Programming Basics**
**Programming Basics:** Control Events and Subroutines, Page Events, Variables and Variable Declaration, Arrays, Functions, Operators, Conditional Logic, Loops

**Object Oriented Programming Concepts:** Objects and Classes: Properties, Methods, Classes, Constructors, Scope, Events, Understanding Inheritance, Objects In .NET, Namespaces
Using Code-behind Files

**Constructing ASP.NET Web Pages**
Web Forms, **HTML Server Controls:** Using the HTML Server Controls

**Web Server Controls:** Standard Web Server Controls, List Controls, Advanced Controls
Creating a Web User Control, Master Pages, Using Cascading Style Sheets (CSS), Types of Styles and Style Sheets

**Building Web Applications**
Components of Visual Studio IDE, **Features of Visual Studio IDE and Code Editor:** IntelliSense, Browser Link, Themes, Debuggers, Executing the Project using built-in Web Server or IIS
**Core Web Application Features:** Web.config, Global.asax; Using Application State, Working with User Sessions, Using the Cache Object, Using Cookies
**Steps in Developing a Web Application using an example such as Shopping Cart Application:** Preparing the Sitemap, Using Themes, Skins, and Styles, Using the Master Page,
Debugging and Error Handling: Other Kinds of Errors, Custom Errors, Handling Exceptions Locally

## UNIT – II

**Using the Validation Controls**

Introducing the ASP.NET Validation Controls, Enforcing Validation on the Server, ,RequiredField Validator, Compare Validator, Range Validator, Validation Summary, Regular Expression Validator, Custom Validator, Validation Groups

**ADO.NET**

Introducing ADO.NET, Importing the SqlClient Namespace, Defining the Database Connection, Preparing the Command, Executing the Command, Setting up Database Authentication, Reading the Data, Using Parameters with Queries, Checking errors in data handling code,

**Using the Data-bound and Data-aware Controls:** Repeater Control, DataList Control, Grid View, Details View, Formatting Data Controls, Using Stored Procedures.

**Working with Data Sets and Data Tables**: Binding DataSets to Controls, Implementing Paging, Storing Data Sets in View State, Implementing Sorting, Filtering Data, Updating a Database from a Modified DataSet.

## UNIT - III

**Working with Files and Email**

Writing and Reading Text Files, Setting Up Security, Writing Content to a Text File, Reading Content from a Text File, Accessing Directories and Directory Information, Working with Directory and File Paths, Uploading Files, Sending Email with ASP.NET, Configuring the SMTP Server, Sending a Test Email.

**Web Application Security**

Concept of Authentication and Authorization, Types of Authentication in .NET, Configuring web.config file, Login Controls, Cookie-based authentication Process, CAS (Code Access Security), Role based Security

## Books Recommended:

1. Walther, Active Server Pages 2.0 Unleashed, BPB Publications.
2. Stephen Walther, ASP.NET 3.5 UNLEASHED, Pearson Education.
3. Matthew Macdonald, Asp.Net: The Complete Reference, Mcgraw Hill Education
4. Jason N. Gaylord, Christian Wenz, Pranav Rastogi, Todd Miranda, Scott Hanselman: Professional ASP.NET 4.5 in C# and VB, Wrox Publications
5. Imar Spaanjaars: Beginning ASP.NET 4.5: in C# and VB, John Wiley

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| S. NO. | Course Code | Course | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| | | **Semester – VI** | | | | |
| 1. | CSL342 | Object Oriented Analysis & Design | 3 | 1 | 0 | 4 |
| 2. | CSL344 | Object Oriented Programming using JAVA | 2 | 1 | 2 | 4 |
| 3. | | Elective–I (for code see Dept. Elective–I list) | 3 | 1 | 0 | 4 |
| 4. | CSL350 | Software Engineering and Testing | 2 | 1 | 2 | 4 |
| 5. | | Interdisciplinary Course–IV | 4 | 0 | 0 | 4 |
| | | **Total** | **14** | **4** | **4** | **20** |
| | | Electives–I | | | | |
| 1. | CSL345 | Natural Language Processing | 3 | 1 | 0 | 4 |
| 2. | CSL346 | System Hardware Design | 3 | 1 | 0 | 4 |
| 3. | CSL347 | Real Time Systems | 3 | 1 | 0 | 4 |
| 4. | CSL348 | Operation Research | 3 | 1 | 0 | 4 |
| 5. | CSL349 | Language Processor | 3 | 1 | 0 | 4 |

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# CSL–342: OBJECT ORIENTED ANALYSIS AND DESIGN

CREDITS
L   T   P
3   1   0

## UNIT–I

**Introduction**
Introduction to Object Oriented concepts, comparison of object oriented vs Procedural software development techniques. Advantages of Object Oriented Methodology.

**Modeling**
Modeling as a Design technique, Object modeling technique.

**Object Modeling**
Object & Classes, Links & Associations, Generalization & Inheritance, Aggregation, Abstract Classes, example of an Object Model.

## UNIT–II

**Dynamic Modeling**
Events and States, Operations, Nested State Diagrams, Concurrency, example of the Dynamic Model.

**Functional Modeling**
Functional Models, Data Flow Diagrams, Specifying Operations & Constraints, example of a Functional Model.

## UNIT–III

**Analysis & Design**
Overview of Analysis, Problem Statement, example of Analysis Process using Object, Dynamic & Functional Modeling on an example system. Overview of System Design, Object Design, Design Optimization.

**Implementation**
Implementation of the design using a Programming Language or a Database System. Comparison of Object Oriented vs Non Object Oriented Languages.

References:
1. "Object Oriented Modeling& Design" by James Rambaugh, Michael Balaha (PHI , EEE)
2. "Object Oriented Software Construction" Hertfordshire PHI International 1988.
3. "Object Oriented Programming" Brad J.Cox Addison Wessley, 1986.

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## CSL–344: OBJECT ORIENTED PROGRAMMING USING JAVA

**CREDITS**
**L T P**
2 1 1

### UNIT-I

**Evolution of Java:** Importance of JAVA to Internet, Features of JAVA, Bytecode, Object Oriented Approach.

**Data Types, Variables and Arrays:** Data types, Declaration of Variable, Type Conversion and Casting, One Dimensional and Multidimensional arrays

**Operators and Control Structures:** Arithmetic, Bitwise, Relational, Boolean, Assignment Operators, Operator precedence, Selection Statements, Iteration Statements, Jump statements.

**Classes:** Class Fundamentals, Declaring objects, introducing methods, constructors, this keyword, Overloading constructors, Recursion, Nested and Inner classes.

**Inheritance:** Creating Multilevel hierarchy, Method Overriding, Abstract Classes.

### UNIT-II

**Packages and Interface:** Packages, Access Protection, Importing Packages, Interfaces, Defining, Implementing, Applying Interfaces, Extending Interfaces

**Exception Handling:** Fundamentals, Exception Types, uncaught exceptions, try and catch.

**Multithreaded Programming:** The Java Thread Model, Thread Priorities, Synchronization, Interthread communication, Suspending Resuming and Stopping Threads.

**Java I/O:** I/O Basics, Streams, reading Console input and writing console output, PrintWriter class, Reading & writing Files, Byte Streams, Character Streams & Serialization.

### UNIT-III

**Applets:** Applet basics, Applet Architecture, Applet: Display , Repaint , Parameter Passing.

**Event Handling:** The Delegation Event Model, Event Classes, Event Listener Interfaces

**AWT:** Window Fundamentals, Working with Frame Windows, Graphics, Color and Fonts.

**Servlets:** Life Cycle of a Servlet, The Servlet API, Reading Servlet Parameters, Handling HTTP Requests and Responses, Cookies & Session Tracking.

**JDBC**: Database Programming, Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data.

**References:**
1. The Complete Reference–JAVA 2 by Ptrick Naughton & Herbert Schildt TMH Publications, 2007.
2. Balagurusamy: Programming in JAVA, Tata McGraw Hill, 2004.
3. The Java Tutorial Continued by Compione, Walrath, Huml SUN JAVA Tutorial Team. Addison Wessley, 2007.
4. The Java Handbook by Patrick Naughton, Michael Morrison Publisher: Osborne/McGraw-Hill
5. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley
6. Bert Bates,Kathy Sierra ,"HeadFirst Java", O'Reilly Media

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## CSL–350: SOFTWARE ENGINEERING AND TESTING

**CREDITS**
**L    T    P**
2    1    1

### Unit – I

**Introduction to S/W Engineering** - Principles of Software Engineering, Software Development Life Cycle, Software Project Management: Management Activities, Project Planning, Project Scheduling, Risk Management. Software Design: Principles, Methodologies, Design specifications, Verification and validation

**Introduction to S/W Testing** – Fundamentals of testing process, broad categories of testing – General principles of testing – Major Software Testing Techniques- White-box testing, basis path  testing: flow graph notation, cyclomatic complexity; Control structure testing: condition testing, data-flow testing, loop testing ; Black Box testing : Graph based testing methods-BVA

### Unit – II

**Software Testing Strategies** – Approach-verification and validation; Strategic issues; testing conventional software – Unit testing, Integration testing, Validation testing, System testing; Debugging process, strategies, correcting error -  The Testing Phases - Test strategy and Test plan – Test strategy template -  Test plan template – Requirement traceability –Test scenario – Test Case.

**Software Product metrics**: measures, metrics, indicators of quality challenge- measurement principles, attributes of software metrics- McCall and ISO 9126 factors- metrics for analysis model- metrics for design model-architectural design, object-oriented design metrics, CK, MOOD, LK metric suites, component-level design metrics, operation-oriented metrics and interface design metrics-metrics for source coding, metrics for testing, metrics for maintenance.

### Unit – III

**Test Estimation techniques**: Approaches of Test effort estimation, Delphi Technique, Analogy based estimation, Software size based estimation, Test case enumeration based estimation, Task (Activity) based Test estimation, Testing size based estimation, Sizing a Testing project, Merits and demerits of various Test Estimation techniques.

**Test Automation Tool**: Introduction to Selenium Tool, Selenium IDE, Selenium Remote control, Selenium Grid.

**REFERENCES:**
1. Pressman, R., Software Engineering, McGraw Hill, 2005(6e).
2. Humphrey, W., Managing Software Process, Pearson Education Asia, 1998.
3. Crosby, P.B., Quality is Free: The Art of Making Quality Certain, Mass Market, 1992.
4. Senn, J.A., Software Analysis and Design, McGraw Hill, 1989
5. Software Testing Foundations - Andreas Spillner, Tilo Linz, Hans Schäfer
6. Software Estimation Best practices, Tools & Techniques – Murali Chemuturi
7. www.seleniumhq.org

**Programming exercises:**
1. Practical Experiments on software designing and software Project Management
2. Install Selenium, Installing the  IDE - Building & Running Test Cases
3. Selenium Commands – "Selenese" - Script Syntax

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## CSL–345: NATURAL LANGUAGE PROCESSING (ELECTIVE – I)

**CREDITS**

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### UNIT–I

**Basic Course on Artificial Intelligence, Data Structure & Algorithms.**
Introduction to the methods and techniques of Natural Processing – semantics, pragmatics, Applications of Natural Language Processing.

**COURSE CONTENTS:**
**Components of Natural Language Processing:** Lexicography, syntax, Semantics, pragmatics: word level representation of natural languages prosody & natural languages.
**Formal Languages and Grammars:** Shomsky Hierarchy; Left Associative Grammars. Ambiguous Grammars. Resolution of Ambiguities.

### UNIT–II

**Semantics Knowledge Representation:** Semantic Network Logic and inference. Pragmatics, Graph Models and Optimization. Prolog for natural semantic.
**Computation Linguistics:** Recognition and parsing of natural language structures: ATN & RTN; General techniques of parsing: CKY, Earley & Tomita's Algorithm.

### UNIT–III

**Application of NLP: Intelligent Work Processors:** Machine translation; User Interfaces;
**Man–Machine Interfaces:** Natural languages Querying Tutoring and Authoring Systems. Speech Recognition Commercial use of NLP.

**References:**
1) J. Allen, Natural Language understanding, Benjamin/Cunnings, 1987.

2) G. Gazder, Natural Language Processing in Prolog, Addison Wesley, 1989.

3) MdijArbib&Kfaury, Introduction to Formal Language Theory, Springer Verlag, 1988.

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## CSL–346: SYSTEM HARDWARE DESIGN (ELECTIVE – I)

**CREDITS**

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Basic Electrical Circuits (R.L.C. circuit analysis), Basic Electronic Devices and Circuits (B.J.T.s MOSFETs, basic logic gates).
To provide students an exposure to analysis and design techniques used in digital system hardware design.
**Course Contents:**

### UNIT–I

**CMOS Technology:**
Logic levels.
Noise
Margin.
Power dissipation, supply currents.
Speed delays. [10%] Interconnect analysis.

### UNIT–II

Power/Ground/ droop/bounce.
Coupling analysis.
Transmission line effects/cross talk. [40%] Power/ground distribution.

Signal distribution.
Logic Design \ Random logic \ programmable
logic. Microcontrollers.

### UNIT–III

Memory subsystem design.
Noise tolerant design.
Worst case timing.
Thermal issues in design. [40%]
Real life system design examples. [10%]

**References:**
1) James E. Buchanan, "BICMOS–CMOS System Design" McGraw Hill International Edition 1991.
2) James E. Buchanan, "CMOS–TTL System Design" McGraw Hill International Edition 1990.
3) John P. Hayes. "Digital System Design & Microprocessors" McGraw Hill InternationalEdition 1985.
4) Darryl Lindsay, "Digital PCB Design and Drafting" Bishop Graphics 1986.
5) Howard W. Johnson & Martin Graham, High Speed Digital Design – A Handbook of Black Magic, Prentice Hall, PTR Englewood Cliffs, 1993.

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## CSL–347: REAL TIME SYSTEMS (ELECTIVE – I)

**CREDITS**
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3   1   0

**Computer Organization and Operating System.**
To give an insight of concepts underlying, Real Time Systems and knowledge based real time systems, to give an understanding of its design and implementation.

**Course Contents:**

### UNIT–I
**Introduction to Real–time systems:** Issues of Real–time Systems, tasks & Task parameters,Real–time Systems components Soft and hard real time system, periodic and aperiodic tasks. Specification of time constraints.                    [10%]

**Need for task scheduling:** Issues and scheduling methodologies. Priority based scheduler,value based scheduler & Pre–emptive scheduling multiprocessor environment. Deterministic scheduling, Hardware Schedulers.                    [25%]

### UNIT–II
**Real time Operating Systems:** A case study of generalized Executive for multiprocessors(GEM). Programming using Real time OS Constructors. Microprocessor based Real time
scheduler.                    [20%]

**Real Time Languages:**    Case study of a language having facilities for time and task management Euclid and Ada for real time programming.          [10%]

### UNIT–III
**Architectural requirements of Real Time Systems:** Tightly coupled systems, hierarchicalsystems, arbitration schemes, Reliability issues, HW/SW faults, diagnosis, functional testing etc. Fault tolerant architectures: TMR systems.          [10%]

**Real Time Knowledge based systems:** Integration of real time and knowledge based systems.Neural networks and fuzzy logic in real time systems.          [25%]

**References:**
1) Levi S.T. and Aggarwal A.K. Real Time System Design, McGraw Hill International Edition, 1990.
2) Stankovic J.A. and Ramamritham K., Hard Real Time Systems, IEEE Press, 1988.

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## CSL–348: OPERATION RESEARCH (ELECTIVE – I)

|  | **CREDITS** | |
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Importance of need to take intelligent decisions is to be emphasized. How quantitative approach based on formal modeling concepts can be used has to be presented using OR. Major focus should be on how to model various situations in industries and solve them. Wherever possible attention should also be paid on computer softwares available for this purpose.

**Course Contents:**

### UNIT–I

Introduction to OR modeling approach and various real life situations. [5%]

Linear programming problems & Applications, Various components of LP problem formulation. Solving Linear Programming problem using simultaneous equations and graphical Method Simplex method & extensions:

Sensitivity analysis.
Duality theory.
Revised Simplex.
Dual Simplex.
Transportation and Assignment Problems. [25%]

### UNIT–II

Network Analysis including PERT–CPM.
Concepts of network.
The shortest path.
Minimum spanning tree problem.
Maximum flow problem.
Minimum cost flow problems.
The network simplex method.
Project planning & control with PERT & CPM. [20%]

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## UNIT–III

Integer programming concepts, formulation solution and applications. [10%]

Dynamic programming concepts, formulation, solution and application. [05%]

Game Theory. [05%]

Queuing Theory & Applications. [10%]

Linear Goal Programming methods and applications. [05%]

Simulation. [15%]

**References:**

1) F.S. Hillier & G.J. Lieberman, Introduction to OR, McGraw Hill Int. Series 1995.

2) A Ravindran, Introduction to OR. John Wiley & Sons, 1993.

3) R. Kapoor, Computer Assisted Decision Models, Tata McGraw Hill 1991.

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## CSL–349: LANGUAGE PROCESSOR (ELECTIVE – I)

**CREDITS**

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|---|---|---|
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**Formal Language & Automata Theory, Systems Programming.**
At the end of this course on Language processor, the student should be able to:
Understand the influence of Programming languages and architectures on the efficiency of
language translation.
Understand the design of lexical analyzers.
Be proficient in writing grammars to specify syntax, understand parsing strategies and be able to
use yacc to generate parsers.
Understand issues related to error detection.
Understand the issues in declaration processing, type checking, and intermediate code
generation, and be able to perform these through the use of attribute grammars.
Understand the issues involved in allocation of memory to data objects. Understand
the key issue in the generation of efficient code for a given architecture.
Understand the role played by code optimization.

**Course Contents:**
### UNIT–I

Overview of the translation process, **Lexical analysis:** hand coding and automatic generation of
lexical analyzers. [08%] **Parsing theory:** Top down and bottom up parsing algorithms.
Automatic generation of parsers.

[08%]
**Error recovery:** Error detection & recovery. Ad–hoc and systematic methods.      [18%]

### UNIT–II

**Intermediate code generation:** Different intermediate forms. Syntax directed translation
mechanisms and attributed definition.                                              [07%]
**Run time memory management:** Static memory allocation and stack based memory allocation
schemes.                                                                           [17%]
**Symbol table management.**                                                       [08%]

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## UNIT–III

**Code generation:** Machine model, order of evaluation, register allocation and code selection.
[17%]

**Code optimization:** Global data flow analysis. A few selected optimizations like command subexpression removal, loop invariant code motion, strength reduction etc. [17%]

**References:**
1)  Aho, Ravi Sethi, J.D. Ullman, Compilers tools and techniques, Addison–Wesley, 1987.

2)  Dhamdhere, Compiler Construction – Principles and Practice Macmillan, India 1981.

3)  Tremblay J.P. and Sorenson, P.G., The Theory and Practice of Compiler Writing, McGraw Hill, 1984.

4)  Waite W.N. and Goos G., Compiler Construction Springer Verlag, 1983.

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| S. NO. | Course Code | Course | L | T | P | CREDITS |
|---|---|---|---|---|---|---|
| | | **Semester – VII** | | | | |
| 1. | CSL470 | Symbolic Logic & Logic Programming | 3 | 1 | 0 | 4 |
| 2. | CSL471 | Formal Languages & Automata Theory | 3 | 1 | 0 | 4 |
| 3. | CSL472 | Internet Protocol | 3 | 1 | 0 | 4 |
| 4. | | Departmental Elective–II | 3 | 1 | 0 | 4 |
| 5. | | Lab (DE II) | 0 | 0 | 4 | 2 |
| 6. | CSP470 | Software Lab VII (SL & LP) | 0 | 0 | 4 | 2 |
| 7. | | Interdisciplinary–IV | 4 | 0 | 0 | 4 |
| | | **Total** | **16** | **4** | **8** | **24** |
| | | List of Departmental Electives–II: | | | | |
| 1. | CSL473 | Advanced Microprocessors | 3 | 1 | 0 | 4 |
| 2. | CSP473 | Advanced Microprocessors | 0 | 0 | 4 | 2 |
| 3. | CSL474 | Cloud Computing | 3 | 1 | 0 | 4 |
| 4. | CSP474 | Cloud Computing | 0 | 0 | 4 | 2 |
| 5. | CSL475 | Expert Systems | 3 | 1 | 0 | 4 |
| 6. | CSP475 | Expert Systems | 0 | 0 | 4 | 2 |
| 7. | CSL476 | Robotics | 3 | 1 | 0 | 4 |
| 8. | CSP476 | Robotics | 0 | 0 | 4 | 2 |

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## CSL – 470: SYMBOLIC LOGIC & LOGIC PROGRAMMING

**CREDITS**
**L T P**
3 1 0

Course Contents:

### UNIT-I
Prepositional Logic: syntax and semantics: Validity and consequence. Normal forms. Representing world knowledge using prepositional logic.

First Order Logic: World knowledge representation and the need for quantifiers. Syntax, semantics validity consequence clause normal form.

### UNIT-II
Introduction to Prolog: Syntax of Prolog, Structured data representation. Execution model, Introduction to Programming in Prolog, Illustrative examples.

The Connection Between Logic and Logic Programming: Interpreting logic programs interms of Horn clauses Deduction from clause form formulas resolution for prepositional logic Ground resolution. Unification and first order resolution SLD resolution; the computation and search rules. SLD trees and interpretation of non-declarative features of Prolog.

### UNIT-III
Advanced Prolog Features: Programming Techniques: Structural Induction and Recursion, Extra Logical features: Cut and Negation Case Studies.
Introduction to Fuzzy logic and neural networks.

Texts/References:

1. Gries, The Science of Programming, Narosa Publishers, 1985.

2. Stoll, Set Theory and Logic, Dover Publishers, New York, 1963.

3. Clocksin, W.F. and Mellish, C.S., Programming in Prolog 2$^{nd}$ Edition, Springer - Verlag, 1984.

4. O'Keefe, R., The Craft of Prolog. The MIT Press, 1991.

5. Lloyd, J. W., Foundation of Logic Programming, Springer, 1984.

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## CSL-471: FORMAL LANGUAGES & AUTOMATA THEORY

**CREDITS**
**L   T   P**
3   1   0

COURSE CONTENTS:

Basic Definitions

### UNIT-I

Operations on Languages: Closure properties of Language Classes. Context Free Languages:The Chomsky Griebach Normal Forms. Linear Grammars and regular Languages. Regular Expressions Context Sensitive Languages; The Kuroda Normal Form, One sided Context Sensitive Grammars.

### UNIT-II

Unrestricted Languages: Normal form and Derivation Graph, Automata and theirLanguages: Finite Pushdown 2-push down Automata and Turing Machines, The Equivalence of the Automata and the appropriate grammars. The Dyck Language.

### UNIT-III

Syntax Analysis: Ambiguity and the formal power Series, Formal Properties of LL(k) andL.R.(k) Grammars.

Derivation Languages: Rewriting Systems, Algebraic properties, Canonical Derivations, Context Sensitivity.

Cellular Automata: Formal Language aspects, Algebraic Properties Universality &Complexity Variants.

TEXTS/REFERENCES:

G.E. Reevsz, Introduction to Formal Languages, McGraw Hill, 1983.
M.H. Harrison, Formal Language Theory Wesley 1978.
Wolfman Theory and Applications of Cellular Automata, World Scientific, Singapore, 1986.

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CSL – 472: INTERNET PROTOCOL

**CREDITS**
**L   T   P**
3   1   0

Course Contents:

### UNIT-I
Introduction & Overview: The need for Internet, The TCP/IP Internet, Internet services, history & scope, protocol standardization.

Review of underlying Technologies: LAN, WAN, MAN, Archnet & Ethernet topology, Token Ring, ARPANET, PROnet technology.

### UNIT-II
Internet working concepts and architectural model, Application level Internet connection, Interconnection through IP Gateways, Users View.

Internet Address: Universal Identifiers, Three Primary classes of IP Addresses, network &Broadcasting Addresses, Address Conventions, Addressing Authority, Mapping Internet Addresses to physical Addresses, Determining Internet Address at startup (RARP).

### UNIT-III
Internet as virtual Network, Detailed concept of Routers & Bridges. Protocols Layering, Difference between X.25 and Internet layering, gate to Gate Protocol (GGP), Exterior Gateway Protocol (EGP). Managing Internet, reliable transactions & Security on Internet.

Texts / References:

1) Internet working with TCP/IP Vol. - I

2) Principal Protocols & Architecture Comer & Stevens.

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CSP – 470: SOFTWARE LAB VII (SL & LP)

**CREDITS**
**L   T   P**
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SYMBOLIC LOGIC & LOGIC PROGRAMMING LAB

Experiments in Prolog Programming, Deductive databases, Recursion and Prolog list data structures.
Experiments to understand Prolog execution strategies, Cuts and Negation. Search Algorithms.
Term Projects.

TEXTS/REFERENCES   :

Clocksin, W.F. and Mellish, C.S., Programming in Prolog 2$^{nd}$ Edition, Springer - Verlag, 1984.

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## CSL – 473: ADVANCED MICROPROCESSORS (ELECTIVE II)

**CREDITS**
**L   T   P**
3   1   0

COURSE CONTENTS:

### UNIT-I

Review of 8 bit microprocessor and support components.

Selected Case Studies of 16/32/64 bit microprocessors and support

Contents. RISC Architectures and Case Studies: RISC Vs CISC.

### UNIT-II

Power PC 601 Alpha 21064, Pentium super space, Transputer Architectures and Case Studies :

High Performance Embedded Microcontrollers, Case Studies.

### UNIT-III

403 GA Development Systems and support. Selected Applications.

TEXTS / REFERENCES:
1.  J.T. Cain, Selected reprints on microprocessors and microcomputers, IEEE Computer Society Press., 1984.

2.  Rafiquzzaman, Microprocessors & Micro Computers Development Systems, Harper Row, 1984.

3.  Rafiquzzaman, Microprocessors & Micro Computers - Based System Design, Universal Book Stall, New Delhi, 1990.

4.  INMOS Ltd., Transputer Development System, Prentice Hall, 1988.

5.  INMOS Ltd. Communicating Process Architecture, Prentice hall, 1988.

6.  Wunnava V. Subbarao, 16/32 Bit Microprocessors 68000/68010/68020, Software, Hardware & Design Applications, Macmillan Publishing Company, 1991.

7.  Kenneth Hintz, Daniel Tabak, Microcontrollers: Architecture, Implementation & Programming McGraw Hill Inc., 1992.

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8.  Data Books By Intel, Motorola, etc.

9.  Daniel Tabak, Advanced Microprocessors, McGraw Hill Inc., 1995.

10. Andrew m. Veronis, Survey of Advanced Micro Processors, van Nostrand Reinhold, 1991. McGraw Hill Inc., 1992.

11. Daniel Tabak, RISC Systems, John Willey & Sons, 1990.

12. The Power PC Architecture: A Specification for a New family of RISC Processors, Edited by Cathy May, Ed Silha, Rick Simpson, hank Warren, Morgan Kaufmann Publishers, Inc., San Francisco, California, $2^{nd}$ Edition (May 1994)

13. Charles M, Gilmore, Microprocessors Principles and Applications, McGraw Hill International Editions, $2^{nd}$ Edtion, 1995.

14. PowerPC 403GA Embedded Controller User's Manual. PowerPC Tools - Development ToolsFor PowerPC Microprocessor (Nov. 1993).PowerPC 601 RISC Microprocessor User's Manual - 1993.

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CSP – 473: ADVANCED MICROPROCESSORS (Elective) – II

**CREDITS**
**L   T   P**
0   0   2

Student are expected to design and implement micro processor based systems for real life problem and evaluate the performance of various H/W plate forms.

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*(Under Credit Based Continuous Evaluation System) (Elective–II)*

## CSL474: CLOUD COMPUTING

**CREDITS**
**L  T  P**
3  1  0

### UNIT–I

Introduction: Definition, Vision, Reference Model, Benefits, Limitations, Terminology, Open Challenges.
Historical Development: Distributed Systems, Grid Computing, Utility Computing, Service–Oriented Computing, Web 2.0.

### UNIT–II

Cloud Computing Architecture: Service Models, Deployment Models, Cloud Entities, Cloud Clients, Service Level Agreement (SLA) and Quality of Service (QoS) in Cloud Computing. Virtualization: Definition, Type of Virtualization, Benefits, Limitations, Virtualization and Cloud, Virtual Appliance.

### UNIT–III

Programming Models in Cloud: Thread Programming, Task Programming and Map–Reduce Programming.
Advance Topic in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Big–Data Analytics, Federated Cloud Computing.

Textbooks:
1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, Mastering Cloud Computing: Foundation and Application Programming, Tata McGraw Hill, ISBN–13: 978–1–25–902995–0, New Delhi, India, Feb 2013.

Reference Books:

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–6529803, New Delhi, India, 2011.

2. Dr. Saurabh Kumar, Cloud Computing: Insights Into New–Era Infrastructure, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–6528837, New Delhi, India, 2011.

3. Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Cloud Computing For Dummies, Wiley India Pvt. Ltd, ISBN–13: 978–0–47–0597422, New Delhi, India, 2011.

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*(Under Credit Based Continuous Evaluation Grading System) (Elective–II)*

CSP – 474: CLOUD COMPUTING

**CREDITS**
**L   T   P**
0   0   2

Practical based on Programming model in cloud computing.

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*(Under Credit Based Continuous Evaluation Grading System)*

## CSL – 475: EXPERT SYSTEMS

**CREDITS**
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3   1   0

COURSE CONTENTS:

### UNIT-I
Expert Systems, Definitions types, components, Expert System Development Process.

Knowledge Representation Techniques - Logic Frames, Semantic Nets, etc.

### UNIT-II
Domain Exploration - Knowledge elicitation. Conceptualization, bathering, Formaliztions

Methods of Knowledge Acquisition: interviewing Sensor Data Capturing.

### UNIT-III
Learning, Planning and Explanation in Expert System: Neural Expert System, Fuzzy Expert System, Real Time Expert Systems.

Implementation Tools: Prolog, Expert System Shell Expersys, etc. Study of existing expert systems - TIERES, As Mycin & AM.

TEXTS / REFERENCES:
1. Patterson, Introduction to AI Expert System, PHI, 1993.
2. Jackson, Building Expert System, John - Wiley, 1991.

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CSP – 475: EXPERT SYSTEMS (Elective)

**CREDITS**
**L  T  P**
0  0  2

Students are required to develop expert system for various industrial / real life problems.

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*(Under Credit Based Continuous Evaluation Grading System)*

## CSL – 476: ROBOTICS (ELECTIVE - II)

**CREDITS**
**L T P**
3 1 0

COURSE CONTENTS:

### UNIT-I

Introduction to Robotics, Introduction to Manipulators & Mobile Robots, Classification of Robots, Robot Applications. Industrial application environment and work cells, feeders and Orienting devices.
Robot Anatomy, Robot and Effectors, Transmission and actuators, with special reference to servomotors.

### UNIT-II

Robot Arm Kinematics, World, Tool and Joint coordinators, DH transformation and Inverse Kinematics.
Fundamentals of Closed loop control, PWM amplifiers, PID control.

Robotics Sensors: Range, Proximity, Touch, Force & Torque Sensing, Uses of sensors in Robotics.

### UNIT-III

Machine Vision : Introduction to machine Vision, The sensing and digitizing function in Machine Vision, Image Processing and analysis, Training and Vision system, Robotics Application. Low & High Level vision.
Robot Programming & Languages & Environment: Different methods, Features of various programming methods, Case study, Robot Task Planning. : concept, Different Methods, Robots learning.
Mobile Robot: Introduction, Obstacle Representation, Motion Planning in fixed, Changing structured, Unstructured environment based on different requirements.

TEXTS / REFERENCES:

1) M.P. Groover, M. Weins, R.N. Nagel, N.C. Odrey, Industrial Robotics, McGraw Hill, 1986.
2) Klafter D. Richard, Chmielewski T. A. and Negin Michael "Robotic Engineering", Prentice Hall of India Ltd., 1993.
3) K.S. Fu, RC Gonzalez, CSG Lee, Robotics Control, Sensing, Vision and Intelligence, McGraw Hill, International Edition, 1987.
4) Andrew C. Straugard, Robotics & AI, Prentice Hall, Inc.
5) S. Sitharama Iyengar, Alberto Elefes, Autonomous Mobile Robots, Perception, mapping & Navigation, IEEE Computer Society Press.
6) S. Sitharama Iyengar, Alberto Elefes, Autonomous Mobile Robots-Control, Planning and Architecture, IEEE Computer Society Press.
7) Various Research papers in area of Robotics.

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CSP – 476: ROBOTICS (ELECTIVE - II)

**CREDITS**
**L   T   P**
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Students are expected to implement the concept of Robot motion by interfacing the Robot with Computer System and remote operation of the Robot etc.

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM*
*(Under Credit Based Continuous Evaluation Grading System)*

| S. NO. | CourseCode | Course | L | T | P | CREDITS |
|--------|-----------|--------|---|---|---|---------|
| **Semester – VIII** | | | | | | |
| 1. | CSD480 | Industrial Training Cum Projects | 22 | 0 | 0 | 22 |
| | | **Total** | | | | **22** |

*CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER– VIII*
*(Under Credit Based Continuous Evaluation Grading System)*

CSD – 480: Industrial Training-cum-Projects

**CREDITS**
**L    T    P**
0    0    22

Industrial attachment & projects work in the same industry.

A candidate should work on the project for 5 months and 6-8 hours on each working day.

Ist synopsis (containing mainly literature survey corresponding to the problem taken up for the project work and line of attack to solve the problem) within one month of joining the training is to be submitted and will be evaluated for 4 credits.

IInd synopsis (containing essentially the progress of work in comparative details) within three months of joining the training is to be evaluated will be evaluated for 6 credits.

**Credits for Final Project Report & Viva Voce: 12**

**The evaluation shall be done as per the common ordinances for courses under Credit Based Continuous Evaluation Grading System.**