FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

B.TECH. COMPUTER SCIENCE & ENGINEERING

(Credit Based Evaluation and Grading System)
(SEMESTER: I to VIII)

Session: 2020-21
BATCH from Year 2020 to 2024

GURU NANAK DEV UNIVERSITY AMRITSAR

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) SEMESTER SYSTEM
(Credit Based Evaluation and Grading System)
Batch from Year 2020 to Year 2024

SEMESTER –I

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CEL120	Engineering Mechanics	3	1	0	4
2.	MEL121	Engineering Graphics & Drafting Using AutoCAD	3	0	1	4
3	MTL101	Mathematics-I	3	1	0	4
4.	PHL183	Physics	4	0	1	5
5.	MEL110	Introduction to Engg. Materials	3	0	0	3
6.		Elective-I	2	0	0	2
7.	SOA- 101	Drug Abuse: Problem, Management and Prevention -Interdisciplinary Course(Compulsory)	2	0	0	2
List of Electives–I:						
1.	PBL121	Punjabi (Compulsory)**OR**	2	0	0	2
2.	PBL122*	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
3.	HSL101*	Punjab History & Culture (1450-1716) **OR**	2	0	0	
		Total Credits:	**20**	**2**	**2**	**24**

SEMESTER –II

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CYL197	Engineering Chemistry	3	0	1	4
2.	MTL102	Mathematics-II	3	1	0	4
3.	ECL119	Basic Electrical &Electronics Engineering	4	0	1	5
4.	CSL126	Fundamentals of IT & Programming using Python	2	1	1	4
5.	ENL 101	Communicative English-I	2	0	0	2
6.		Elective-II	2	0	0	2
7.	MEP 102	Manufacturing Practices	0	0	1	1
List of Electives–II:						
1.	PBL131	Punjabi (Compulsory)**OR**	2	0	0	2
2.	PBL132*	ਮੁੱਢਲੀ ਪੰਜਾਬੀ	2	0	0	
3.	HSL102*	Punjab History & Culture (1717-1947) **OR**	2	0	0	
		Total Credits:	**16**	**2**	**4**	**22**

Note: * Special Paper in lieu of Punjabi Compulsory, For those students who are not domicile of Punjab

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SEMESTER –III

S. NO.	Course Code	Course	L	T	P	CREDITS
1.	CSL231	Data Structures & Programming Methodology	3	1	0	4
2.	CSL233	Programming in C++	2	1	1	4
3.	ECL291	Digital Circuits & Logic Design	3	0	1	4
4.	ENL201	Written & Oral Technical Communication	2	1	1	4
5.	ESL220	Environmental Studies -Interdisciplinary Course(Compulsory)	2	0	0	2
		Total	**12**	**3**	**3**	**18**

SEMESTER –IV

S. NO.	Course Code	Course	L	T	P	CREDITS
1.	CSL240	Operating System	2	1	1	4
2.	CSL241	Data Communication	3	0	1	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.	PSL-055	Human Rights and Constitutional Duties - Interdisciplinary Course	2	0	0	2
		Total	**16**	**4**	**2**	**22**

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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	3	0	1	4
3.	CSL333	Design & Analysis of Algorithm	3	1	0	4
4.	CSL334	Computer Graphics	3	0	1	4
5.	CSL336	Programming in ASP.Net	2	1	1	4
6.		Interdisciplinary Course-I	4	0	0	4
		Total	**18**	**3**	**3**	**24**

SEMESTER –VI

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

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SEMESTER –VII

S. NO.	Course Code	Course	L	T	P	CREDITS
1.	CSL471	Formal Languages & Automata Theory	3	1	0	4
2.	CSL474	Cloud Computing	3	0	1	4
3.	CSL477	Artificial Intelligence	3	0	1	4
4.	CSL478	Machine Learning	3	0	1	4
5.		Departmental Elective–II	3	1	0	4
		Total	**15**	**2**	**3**	**20**
		List of Departmental Electives–II:				
1.	CSL472	Internet Protocol	3	1	0	4
2.	CSL473	Advanced Microprocessors	3	1	0	4
3.	CSL476	Robotics	3	1	0	4

SEMESTER –VIII

S. NO.	Course Code	Course	L	T	P	CREDITS
1.	CSD480	Industrial Training Cum Projects	0	0	35	35
		Total				**35**

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-I* (CBEGS)

(Syllabus for the Batch from Year 2020 to Year 2024)

Course Name	**:**	**Engineering Mechanics**
Course Code	**:**	**CEL-120**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

- To understand distributed force systems, centroid/ centre of gravity and method of finding centroids of composite figures and bodies.
- To understand moment of inertia and method of finding moment of inertia of areas and bodies.
- To understand dynamics of a particle.
- To understand the kinetics of rigid bodies and simple problems.

Total No. of Lectures –36

	Lecture wise breakup	Number of Lectures
	SECTION - A	
1	Introduction: Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application. Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.	9
	SECTION - B	
2	Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems. Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.	9

SECTION - C		
3	Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis and perpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects. Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.	9
SECTION - D		
4	Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams Classification of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.	9

Course Outcomes:	
1	Basic understanding of laws and principles of mechanics.
2	Ability to analyse and solve simple problems of mechanics.
3	An understanding of assumptions and limitations of approaches used.

Suggested / Reference Books:	
1	Engineering Mechanics – Irving H. Shames, PHI Publication.
2	Engineering Mechanics – U.C.Jindal, Galgotia Publication.
3	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.

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-I* (CBEGS)
(Syllabus for the Batch from Year 2020 to Year 2024)

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

Course Name	**:**	**Engineering Graphics & Drafting Using AutoCAD**
Course Code	**:**	**MEL-121**
Credits (L-T-P)	**:**	**4 (3-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

At the end of this course, the student should be able to understand the

1. Increase ability to communicate with people
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic CAD skills.
5. Learn basic engineering drawing formats
6. Prepare the student for future Engineering positions

Total No. of Lectures – 48

	Lecture wise breakup	Number of Lectures
Instructions for the Paper Setters: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.		
SECTION – A		
1	Introduction: Instruments used, Lettering, Types of Lines used, Scales, Types of Projections in use, Dimensioning of Figures, etc.; Orthographic Projections of Points, Lines & Lamina **Lab Work:** Introduction to AutoCAD, Practice of 2D commands, Exercises related to the theory contents of this section.	6

	SECTION – B	
2	Projection of Solids: Section of Solids & its Projections; Interpenetration of Solids & Curve of Interpenetration; Development of Surfaces. **Lab Work:** Familiarity with 3D commands, Exercises related to the theory contents of this section.	6

	SECTION – C	
3	Isometric Drawing & Isometric Projection, Orthographic Projection **Lab Work:** Lab Exercises related to the theory contents of this section.	6
	SECTION – D	
4	Free-Hand sketching of Engineering Components, Advance 3D Commands: Solving Problems using AutoCAD. **Lab Work:** Lab Exercises related to the theory contents of this section.	6

Course Outcomes:	
1	Student's ability to hand letter will improve.
2	Student's ability to perform basic sketching techniques will improve.
3	Students will be able to draw orthographic projections and sections.
4	Student's ability to use architectural and engineering scales will increase.
5	Students ability to produce engineered drawings will improve
6	Student's ability to convert sketches to engineered drawings will increase.
7	Students will become familiar with office practice and standards.
8	Students will become familiar with two and three dimensional drawings.
9	Students will develop good communication skills and team work.

Suggested / Reference Books:	
1	Engineering Drawing, N. D. Bhatt
2	Engineering Graphics with AutoCAD, James D. Bethune
3	Engineering Drawing & Graphics, K. Venugopal
4	Engineering Drawing PS Gill
5	Engineering Drawing, M. B. Shah & B. C. Rana

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-I* (CBEGS)

(Syllabus for the Batch from Year 2020 to Year 2024)

Course Name	**:**	**Mathematics-I**
Course Code	**:**	**MTL-101**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

The aim of the course is to introduce the important topics of mathematics to future engineers which they would find useful in their respective engineering branches. This course would act as foundation for the students with basic as well as advanced concepts for familiarizing them with the use of mathematics to the real life and problems associated with their respective disciplines.

Total No. of Lectures – 44

	Lecture wise breakup	**Number of Lectures**
Instructions for the Paper Setters: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.		
	SECTION - A	
1	Matrices: Introduction to matrices, Inverse and rank of a matrix, rank nullity theorem; Symmetric, skew-symmetric and orthogonal matrices, Hermitian and skew-Hermitian matrices, Unitary matrix, Determinants; System of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem.	10
	SECTION - B	
2	Infinite Series: Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D' Alembert's ratio test, Cauchy's root test, Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence.	10

	SECTION - C	
3	Differential 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 and their use in obtaining surface areas and volumes of solids.	12
	SECTION - D	
4	Vector Calculus: Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar field, Divergence and Curl of a vector field, Line integral of a vector field, Surface integral of vector field, Volume integral of a scalar field, Green's theorem, stokes theorem, Gauss divergence theorem (without proofs) and their applications.	12

Course Outcomes:	
1	Students will be able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Caylay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
2	It will equipped the students in determining whether the given function can be approximated with the power series.
3	Students will learn the various applications of mathematics using vector calculus techniques.

Suggested / Reference 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.

Course Name	**:**	**Physics**
Course Code	**:**	**PHL-183**
Credits (L-T-P)	**:**	**5 (4-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

- To make the students aware about Electromagnetic wave fundamentals.
- To make students aware about quantum physics phenomena.

Total No. of Lectures – 48

Lecture wise breakup		**Number of Lectures**
SECTION - A		
1	Electric and magnetic fields in a medium, Susceptibility and Conductivity, Maxwell's equations, Boundary conditions; EM wave equation, Plane wave solutions.	9
SECTION - B		
2	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.	9
SECTION - C		
3	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.	9
SECTION - D		
4	Free-particle solution, 1-D infinite potential well, Expectation values and uncertainty relations; 1-D finite potential well, Quantum mechanical tunneling and alpha- decay, Kronig-Penny model and emergence of bands	9

Course Outcomes:	
1	This will enable the students to learn physical concepts associated with electromagnetic radiation and devices.
2	Student will understand quantum mechanical aspects of physics.

Suggested / Reference Books:	
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).

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-I* (CBEGS)

(Syllabus for the Batch from Year 2020 to Year 2024)

Course Name	**:**	**Introduction to Engineering Materials**
Course Code	**:**	**MEL110**
Credits (L-T-P)	**:**	**3 (3-0-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

At the end of this course, the student should be able to understand the:

1. To review physics and chemistry in the context of materials science & engineering.
2. To describe the different types of bonding in solids, and the physical outcomes of these differences.
3. Give an introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.
4. Give an introduction to the relation between processing, structure, and physical properties.
5. Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.

Total No. of Lectures – 47

	Lecture wise breakup	**Number of Lectures**
	SECTION – A	
1	Introduction**:** Historical perspective, scope of materials science and engineering. Atomic structure and interatomic bonding. Lattices, basic idea of symmetry.	9
	SECTION – B	
2	Lattice structure: Bravais lattices, unit cells, crystal structures, crystal planes and directions,co-ordinationnumber.Singlecrystals,polycrystalline,non-crystalline,nano-crystallinematerials.Imperfections in solids: point defects, line defects, surfaced effects.	9
	SECTION – C	
3	Solid solutions: phases, phase diagrams. Diffusion phenomenon, phase transformations. Strengthening mechanisms.	9

SECTION - D		
4	Classification of materials: properties of materials. Structure, properties and applications of different metals and alloys, ceramics, composites and polymers.	9

Course Outcomes:	
1	Given a type of material, be able to qualitatively describe the bonding scheme and its general physical properties, as well as possible applications.
2	Given a type of bond, be able to describe its physical origin, as well as strength.
3	Be able to qualitatively derive a material's Young's modulus from a potential energy curve.
4	Given the structure of a metal, be able to describe resultant elastic properties in terms of its 1D and 2D defects.
5	Be able to do simple diffusion problems.

Suggested / Reference Books:	
1	Materials Science and Engineering by W.D. 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.)

PBL 121 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ - ।

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਵਿਤਾ ਭਾਗ : 1-4 ਕਵੀ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਗੁਰਮੁਖੀ ਔਰਥੋਗਰਾਫੀ ਦੀ ਜੁਗਤ (ਪੈਂਤੀ, ਮੁਹਾਰਨੀ, ਬਿੰਦੀ, ਟਿੱਪੀ ਤੇ ਅੱਧਕ); ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹ, ਸ਼ਬਦ ਜੋੜ (ਸ਼ੁਧ-ਅਸ਼ੁਧ)

ਸੈਕਸ਼ਨ-ਬੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਵਿਤਾ ਭਾਗ : 5-8 ਕਵੀ
(ਕਵੀ ਦਾ ਜੀਵਨ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਕਾਵਿ-ਕਲਾ)

II. ਲੇਖ ਰਚਨਾ (ਜੀਵਨੀ-ਪਰਕ, ਸਮਾਜਕ ਅਤੇ ਚਲੰਤ ਵਿਸ਼ਿਆਂ ਉੱਤੇ) : 10 ਲੇਖ ਲਿਖਵਾਉਣੇ
(ਕਲਾਸ ਵਿਚ ਅਤੇ ਘਰ ਲਈ ਅਭਿਆਸ)

ਸੈਕਸ਼ਨ-ਸੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਹਾਣੀ ਭਾਗ : 1-4 ਕਹਾਣੀਆਂ
(ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ, ਕਹਾਣੀ-ਕਲਾ)

II. ਸ਼ੁੱਧ, ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
(15 ਪੈਰ੍ਹਿਆਂ ਦੇ ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ ਅਭਿਆਸ ਕਰਵਾਉਣੇ)

ਸੈਕਸ਼ਨ-ਡੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਕਹਾਣੀ ਭਾਗ : 5-8 ਕਹਾਣੀਆਂ
(ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ, ਕਹਾਣੀ-ਕਲਾ)

II. ਅਖ਼ਬਾਰੀ ਇਸ਼ਤਿਹਾਰ : ਨਿੱਜੀ, ਦਫ਼ਤਰੀ ਤੇ ਸਮਾਜਕ ਗਤੀਵਿਧੀਆਂ ਨਾਲ ਸੰਬੰਧਤ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਰਾਜਿੰਦਰਪਾਲ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਕਵਿਤਾ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
2. ਬ੍ਰਹਮਜਗਦੀਸ਼ ਸਿੰਘ, **ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਾਵਿ ਸਿਧਾਂਤ, ਇਤਿਹਾਸ ਅਤੇ ਪ੍ਰਵਿਰਤੀਆਂ**, ਵਾਰਿਸ ਸ਼ਾਹ ਫਾਉਂਡੇਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਬਲਦੇਵ ਸਿੰਘ ਧਾਲੀਵਾਲ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
4. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਸਫ਼ਰ ਤੇ ਸ਼ਾਸਤ੍ਰ ਭਾਗ-**, ਸਿੰਘ ਬ੍ਰਦਰਜ਼, ਅੰਮ੍ਰਿਤਸਰ।
5. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, **ਕਾਲਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ**, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ।
6. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
7. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ
8. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਬੋਧ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਅੰਮ੍ਰਿਤਸਰ।

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

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

ਪੈਂਤੀ ਅੱਖਰੀ : ਅੱਖਰ ਕ੍ਰਮ, ਮਾਤ੍ਰਾਵਾਂ
(ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ)
ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ) : ਪਛਾਣ ਤੇ ਵਰਤੋਂ

ਸੈਕਸ਼ਨ-ਬੀ

ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ
ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ
ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ

ਸੈਕਸ਼ਨ-ਸੀ

ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
ਸਮਾਨਾਰਥਕ ਤੇ ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ

ਸੈਕਸ਼ਨ-ਡੀ

ਹਫ਼ਤੇ ਦੇ ਸੱਤ ਦਿਨਾਂ ਦੇ ਨਾਂ, ਬਾਰ੍ਹਾਂ ਮਹੀਨਿਆਂ ਦੇ ਨਾਂ, ਰੁੱਤਾਂ ਦੇ ਨਾਂ,
ਇਕ ਤੋਂ ਸੌ ਤੱਕ ਗਿਣਤੀ ਸ਼ਬਦਾਂ ਵਿਚ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਅਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
2. **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

PUNJAB HISTORY & CULTURE
HSL-101 : HISTORY AND CULTURE OF THE PUNJAB (1450-1716)
(Special paper in lieu of Punjabi Compulsory)

Credits: 2-0-0
Marks : 50
Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. Land and the People.
2. Bhakti Movement

SECTION-B

3. Life and Teaching of Guru Nanak Dev.
4. Contribution of Guru Angad Dev, Guru Arjun Dev ,Guru Amar Das and Guru Ram Das.

SECTION-C

5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

SECTION-D

7. Guru Gobind Singh and the Khalsa.
8. Banda Singh Bahadur: Conquests and Execution.

Suggested Reading

1. Kirpal Singh(ed.), *History and Culture of the Punjab, Part-ii, Punjabi University,* Patiala. 1990.
2. Fauja Singh (ed.), *History of Punjab, Vol, III Punjabi University, Patiala, 1987.*
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs*, Vol. I, OUP, New Delhi, 1990

Course Name	**:**	**Engineering Chemistry**
Course Code	**:**	**CYL-197**
Credits (L-T-P)	**:**	**4 (3-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

At the end of this course, the student should be able to understand the water quality requirement for human consumption, different treatment process for municipal water treatment, application of glass, ceramics, composites, magnetic materials, Role of refractories for synthesis of high performance materials. Polymer, rubber and silicone material uses in daily life. Introduction to electrochemistry. Application of CNT and graphene in electronics industry.

Total No. of Lectures –45

	Lecture wise breakup	**Number of lectures**
	SECTION - A	
1	**Water hardness:** Common impurities of water, Hardness: Introduction, EDTA method for determination of hardness, degree of hardness. Numerical based on hardness and EDTA method.	3
2	**Water hardness related problems:** Boiler troubles, their causes, disadvantages and prevention: Formation of solids (scale and sludge), carry over (priming and foaming), corrosion and caustic embrittlement.	2
3	**Water treatment techniques**: Introduction, water purification techniques, steps involved in purification of water, sedimentation, coagulation, filtration and sterilization, chlorination.	2
4	**Softening of water:** Lime-Soda method, Zeolite method, Deionization/Demin-eralization methods. Numerical problems based on Lime-Soda and Zeolite softening methods.	2

	SECTION - B	
5	**Glasses, Ceramics, Composites** Glassy state, glass formers and modifiers, types of glasses, manufacturing, applications. Ceramic structures, types of ceramics and their properties. Composites; types, properties and applications.	3
6	**Magnetic Materials:** Introduction, types of magnetic material, hard and soft ferrites, magnetic properties and applications.	3
7	**Refractories:** Definition, classification, properties, requisites of good refractory, manufacturing of refractory, silica and fire clay refractory and their uses. Seger's (Pyrometric) Cone Test and RUL Test.	3
	SECTION - C	
8	**Polymers:** Introduction, classification and constituents of polymers, polymer structure and properties, glass transition temperature (T_g), melting point (T_m), structure-property relations (general), synthesis, properties and application of commercial polymers (Bakelite, Polyethylene, Polypropylene, Polystyrene, Polycarbonate, Polytetra fluoroethylene, Polyester and Nylon)	3
9	**Polymer processing methods**: Introduction, compounding, moulding (Injection, Compression, Blow film and Extrusion). Application of polymers such as contact lenses, bulletproof vest, etc.	3
10	**Rubber:** Introduction, natural rubber, vulcanization, different types of rubber, synthesis of rubbers viz. Buna-S, Buna-N, Buty1 and neoprene rubbers, properties and application.	3
	SECTION - D	
12	**Silicone based compounds:** Introduction, properties, preparation of silicones, cross-linked silicones, silicon fluids or oils, silicon elastomers and their applications.	2
13	**Electrochemistry:** Introduction, Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, Arrhenius theory of ionization, specific conductance, molar conductance, Faraday's Law of electrolysis, Chemical cells, distinguish between electrolytic and galvanic cell, reversible and irreversible cells with examples. Standard electrode (reduction) potential of half-cells. Applications of electrochemistry in daily life.	4
14	**Nanomaterial:** Introduction, properties, general methods of preparation. Applications of fullerenes, CNTs and graphene.	3

List of Practical's:

1. Determination of total hardness of Water.
2. Determination of temporary and permanent hardness of water.
3. To determine the strength of sodium carbonate in given sample of washing soda.
4. To determine the strength of sodium carbonate and sodium hydroxide in caustic soda solution.
5. To determine the strength of acetic acid in vinegar
6. Find the strength of KMnO4 solution with oxalic acid
7. Find the strength of KMnO4 solution with Mohr's salt.
8. To determine the number of water molecules in Mohr's salt by titration method.
9. Determination of relative viscosity of a given liquid with respect to water by viscometer.
10. Determination of surface tension of a given liquid by drop number method by stalagmometer.
11. To determine the strength of strong and weak acid conductometry
12. To determine the critical micelle concentration of a soap (sodium laurate) by surfacetension measurements.

Course Outcomes:	
1	Develop new methods to produce soft water for industrial use and potable water at low cost.
2	Replace metals with polymer in different application areas.
3	Develop low cost and new methods for synthesis of Nano materials.
4	Apply their knowledge for development of new application of electrochemistry.
5	Demonstrate the knowledge of polymer materials for advance engineering applications.

Suggested / Reference Books:	
1	Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, NewDelhi.2014.
2	Physical Chemistry by A. Peter and J.de. Paula 10th Edition Oxford University Press, 2014.
3	Inorganic Polymers by P.B. Saxena, Discovery Publishing House, 2007.
4	Ferrite materials by V.R.K. Murthy & B. Viswanathan, Springer Verlag, Berlin, 1990
5	Advanced practical physical chemistry by J.B Yadav by Krishna's educational publishers.

E-learning resource: https://nptel.ac.in/courses.php

Course Name	**:**	**Mathematics-II**
Course Code	**:**	**MTL-102**
Credits (L-T-P)	**:**	**4 (3-1-0)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

The goal of the course is to introduce the theory of differential equations along with their applications in modelling the engineering system. The course also introduces complex analysis and its uses to study Fourier transform and series. The students will also be apprised with Laplace and Fourier transforms as a toll for analysis/ processing of signals and solution of differential and integral equations.

Total No. of Lectures –36

	Lecture wise breakup	**Number of Lectures**
	SECTION - A	
1	Differential Equations: Exact differential Equation, Higher order linear Differential equations, ODE's with constant coefficients.	9
	SECTION - B	
2	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.	9
	SECTION - C	
3	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 .	9

	SECTION - D	
4	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	9

Course Outcomes:	
1	It will help the students in the study of engineering system by modeling it with ordinary and partial differential equations.
2	With Laplace transform, mathematical models involving differential equations can be simplified and studied by solving algebraic equations.
3	In engineering, sound, signal, etc can be represented by mathematical functions, Fourier transforms/ series enable the engineers in simplications of the study of these functions.

Suggested / Reference 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.

Course Name	**:**	**Basic Electrical & Electronics Engineering**
Course Code	**:**	**ECL-119**
Credits (L-T-P)	**:**	**5 (4-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:
This course is aimed to introduce important initial understanding of electrical and electronics engineering to the 1st year students, this will act as the foundation for the advanced electronics courses. The aim of this course is to familiarize the students to the basics of electricity, electrical machines and the basics of electronic devices. so that they can use this knowledge in relevant applications.

Total No. of Lectures –48

	Lecture wise breakup	**Number of Lectures**
	SECTION – A	
1	**Electricity and power supply**: Features of the power supply system, power station, transmission, distribution lines, difference between AC and DC, voltage, current and resistance, concept of electromagnetic induction and production of alternating e.m.f - single phase and 3 phase, 3-phase star and delta connections, voltage and current relations. **Electrical Machinery:** Transformer, its working principle, types of transformers and their applications, performance losses, efficiency and voltage regulation, open circuit and short circuit tests on transformer, auto transformers.	12
	SECTION – B	
2	**Circuit Analysis**: A brief review of DC and single phase AC circuits. , Star-delta load transformation, concept of balanced and unbalanced three phase circuits, measurement of power and power factor in three phase balanced circuits. **Semiconductors:** Introduction to semiconductors, Intrinsic Semiconductor, n-type and p-type semiconductors, Effect of Doping, Fermi levels, Charge flow in semiconductors.	12

SECTION – C		
3	**PN junction diode**: Theory of PN junction diode, depletion layer, barrier potential, Volt-Ampere Characteristics, Current Components, Storage Capacitance and transition capacitance, Junction diode switching times, Zener diode, LED, Photodiode, Varactor diode, Schottky diode **Bipolar Junction Transistors**: Junction Transistor, Current components, transistor as an amplifier, CB, CE and CC configurations and characteristics.	12
SECTION – D		
4	**Fundamentals of DC & AC Motors:** Working principle, construction, types & characteristics of DC motor, Working principle of Single-Phase & Three-Phase Induction motor, Three phase synchronous motor. **Control and Protection**: Control mechanism, principle and applications of protection devices: Fuses, MCB, LCB, relays. Need& types of earthing and grounding, Cables, Construction of LT & HT cables.	12

Course Outcomes: After study of this subject the student will become	
1	Familiar with the electricity production, distribution and the use of control/protection devices.
2	Able to understand the working and applications of electrical machines.
3	Able to understand the basics of semiconductor devices and their applications.
4	Familiar to the concept of rectification and filtration circuits.
5	Able to analyze the basic DC and AC circuits and to solve related circuit problems.

Suggested / Reference 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.
3	Electrical Machines by Bhattacharya SK; Tata McGraw Hill, Delhi.
4	Basic Electrical Engineering by T.K. Naggarkar& Ms. Sakhija Seventh Edition 2008, Oxford University Press.
5	Electronic Devices and Circuit Theory, Boylestad R.L. VIII Edition, Pearson Education, 2008.
6	Electronic Fundamentals & Application, J.D. Ryder, PHI, 2006.
7	Experiments in Electrical Engineering by Bhatnagar US; Asia Publishing House, Bombay.

PRACTICAL:

1. Study of VI characteristics of PN junction
2. Study of Half wave, full wave & Bridge rectifiers.
3. Study of simple capacitive, T & II filters.
4. Study of zener as a voltage regulator.
5. Study of transistor characteristics in CC, CB and CE configuration
6. To study the performance characteristic of clipper circuit
7. To study the performance characteristic of clamper circuit

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-II* (CBEGS)

(Syllabus for the Batch from Year 2020 to Year 2024)

Course Name	**:**	**Fundamentals of Information Technology and Programming using Python**
Course Code	**:**	**CSL 126**
Credits (L-T-P)	**:**	**4 (2-1-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

At the end of this course, the student should be able to understand the basics of computer as well as programming. The students are able to write programs. This course introduces computer programming using the Python programming language. Emphasis is placed on common algorithms and programming principles utilizing the standard library with Python.

Total No. of Lectures –40

	Lecture wise breakup	Number of Lectures
	SECTION - A	
1	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.	10
	SECTION - B	
2	Algorithm and Flowchart, 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)	10
	SECTION - C	
3	Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Recursion, lists, Common List operations	10

SECTION - D		
4	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).	10

Course Outcomes:	
1	Implement a given algorithm as a computer program in python language with the understanding of hardware components and memory utilization.
2	Able to use standard programming constructs: repetition, selection, functions, composition, modules and different data types
3	Adapt and combine standard algorithms to solve a given problem (includes numerical as well as non-numerical algorithms) and to debug the program written in python language

Suggested / Reference 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 in a Nutshell, by Alex Mortelli, 2nd Edition.
7	Python programming: An Introduction to computer science, by John Zelle, 2nd Edition.

ENL-101: COMMUNICATIVE ENGLISH –I

Credits: 2-0-0
Total Marks-50
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

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

SECTION–A
"Word List", "Correct Usage of Commonly used words and Phrases" from the chapter "Vocabulary" given in ***The Written Word*** by Vandana R. Singh.

SECTION–B
Letter- writing as prescribed in ***The Written Word*** by Vandana R. Singh.
Report writing as prescribed in ***The Written Word*** by Vandana R. Singh.

SECTION–C
Section 1 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

SECTION–D
Section 2 from ***Making Connections: A Strategic Approach to Academic Reading*** by Kenneth J. Pakenham, Second Edition.

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-II* (CBEGS)
(Syllabus for the Batch from Year 2020 to Year 2024)

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

Course Name	**:**	**Manufacturing Practices**
Course Code	**:**	**MEP-102**
Credits (L-T-P)	**:**	**1 (0-0-1)**
Total Marks	**:**	**100**
Mid Semester Examination	**:**	**20% weightage**
End Semester Examination	**:**	**80% weightage**

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Internal Marks: 20	**External Marks: 80**

Course Objectives:

At the end of this course, the student should be able to understand the

1. Understand applications of hand tools and power tools.
2. Understand the operations of machine tools.
3. Select the appropriate tools required for specific operation.
4. Comprehend the safety measures required to be taken while using the tools.

Total No. of Practicals – 24

	Lecture wise breakup	**Number of Practicals**
	SECTION - A	
1	Carpentry Shop: (a) Study of tools & operations and carpentry joints. (b) Simple exercise using jackplane. (c) To prepare half-lap corner joint, mortise & tennon joints. (d) Simple exercise on wood working lathe.	3
2	Fitting (Bench Working) Shop: (a) Study of tools & operations (b) Simple exercises involving fitting work. (c) Make perfect male-female joint. (d) Simple exercises involving drilling / tapping / dieing.	3
	SECTION – B	
3	Black Smithy Shop: (a) Study of tools & operations (b) Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.	3

4	Welding Shop: (a) Study of tools & operations of Gas welding & Arc welding. (b) Simple butt and Lap welded joints. (c) Oxy-acetylene flame cutting.	3
	SECTION - C	
5	Sheet-metal Shop: (a) Study of tools & operations. (b) Making Funnel complete with soldering. (c) Fabrication of tool-box, tray, electric panel box etc.	3
6	Machine Shop: (a) Study of Single point cutting tool, machine tools and operations. (b) Plane turning. (c) Step turning. (d) Taper turning.	3
	SECTION - D	
7	Foundry Shop: (a) Study of tools & operations (b) Pattern making. (c) Mould making with the use of a core. (d) Casting	3
8	Electrical and Electronics Shop: Study of tools & operations	3

Course Outcomes:	
1	To acquire skills in basic engineering practice, measuring skills and practical skills in the trades.
2	To provides the knowledge of job materials in various shops.
3	To identify the hand tools and instruments.
4	To provides the knowledge of core technical subjects for making and working ofany type of project.
5	Understand modern manufacturing operations, including their capabilities, limitations, and how to design economically.
6	Gain insight into how designers influence manufacturing schedule and cost, and cost of different components.
7	Learn how to analyze products and be able to improve their manufacturability and make the cost effectively.

Suggested / Reference Books:	
1	Lab Manual to be provided by Department of Mechanical Engineering
2	Work shop technology by Hajraand Chaudhary
3	Work shop technology by Chapmen

PBL 131 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ–II
(Ability Enhancement Compulsory Course)

ਸਮਾਂ : 3 ਘੰਟੇ **ਕਰੈਡਿਟ : 2**

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
1-4 ਨਿਬੰਧ
(ਨਿਬੰਧ ਦਾ ਸਾਰ, ਵਾਰਤਕ ਕਲਾ ਅਤੇ ਸ਼ੈਲੀ)

II. ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ : ਧਾਤੂ/ਮੂਲ, ਵਧੇਤਰ (ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਵਿਉਂਤਪਤ ਅਤੇ ਰੁਪਾਂਤਰੀ), ਸਮਾਸ।

ਸੈਕਸ਼ਨ-ਬੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
5-8 ਨਿਬੰਧ
(ਨਿਬੰਧ ਦਾ ਸਾਰ, ਵਾਰਤਕ ਕਲਾ ਅਤੇ ਸ਼ੈਲੀ)

II. ਪੈਰ੍ਹਾ ਰਚਨਾ : ਕਲਾਸ ਵਿਚ 10 ਵਿਸ਼ਿਆਂ (ਸਭਿਆਚਾਰ, ਧਾਰਮਕ ਅਤੇ ਰਾਜਨੀਤਕ) 'ਤੇ ਪੈਰ੍ਹਾ ਰਚਨਾ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ।

ਸੈਕਸ਼ਨ-ਸੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
1-4 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਪੱਖ)

II. ਮੁਹਾਵਰੇ ਤੇ ਅਖਾਣ (ਅਖਾਣ ਤੇ ਮੁਹਾਵਰਾ ਕੋਸ਼ ਵਿਚ) 200 ਮੁਹਾਵਰਿਆਂ ਅਤੇ 100 ਅਖਾਣਾਂ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤਣ ਦੇ ਅਭਿਆਸ ਕਰਵਾਉਣੇ (ਕਲਾਸ ਵਿਚ ਤੇ ਘਰ ਲਈ)।

ਸੈਕਸ਼ਨ-ਡੀ

I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਸਾਹਿਤ** (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
5-8 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਕਲਾਤਮਕ ਪੱਖ)

II. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ, ਸੰਬੰਧਕ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਸਤਿੰਦਰ ਸਿੰਘ, **ਪੰਜਾਬੀ ਵਾਰਤਕ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
2. ਪ੍ਰੋ. ਪਿਆਰਾ ਸਿੰਘ, **ਪੰਜਾਬੀ ਵਾਰਤਕ : ਸਿਧਾਂਤ ਇਤਿਹਾਸ ਪ੍ਰਵਿਰਤੀਆਂ**, ਨਿਊ ਬੁੱਕ ਕੰਪਨੀ, ਜਲੰਧਰ।
3. ਇੰਦਰਪ੍ਰੀਤ ਸਿੰਘ ਧਾਮੀ, **ਪੰਜਾਬੀ ਰੇਖਾ ਚਿਤਰ : ਰੂਪ ਤੇ ਪ੍ਰਕਾਰਜ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
4. ਬਲਬੀਰ ਸਿੰਘ ਦਿਲ, **ਪੰਜਾਬੀ ਨਿਬੰਧ : ਸਰੂਪ, ਸਿੱਧਾਂਤ ਅਤੇ ਵਿਕਾਸ**, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
5. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, **ਕਾਲਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ**, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ।
6. ਡਾ. ਅਮਰ ਕੋਮਲ (ਸੰਪਾ.), **ਚੋਣਵੇਂ ਪੰਜਾਬੀ ਨਿਬੰਧ** (ਭੂਮਿਕਾ), ਨੈਸ਼ਨਲ ਬੁੱਕ ਟਰੱਸਟ, ਇੰਡੀਆ।
7. ਅਬਨਾਸ਼ ਕੌਰ, **ਪੰਜਾਬੀ ਰੇਖਾ ਚਿੱਤਰ**, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
8. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
9. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।

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

ਸਮਾਂ : 3 ਘੰਟੇ ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 50

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਦੋ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।
2. ਵਿਦਿਆਰਥੀ ਨੇ ਕੁੱਲ ਪੰਜ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਹਨ। ਹਰ ਭਾਗ ਵਿਚੋਂ ਇਕ ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹੈ। ਪੰਜਵਾਂ ਪ੍ਰਸ਼ਨ ਕਿਸੇ ਵੀ ਭਾਗ ਵਿਚੋਂ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।
3. ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਬਰਾਬਰ ਅੰਕ ਹਨ।
4. ਪੇਪਰ ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ
(ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ)

ਸੈਕਸ਼ਨ-ਬੀ

ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ : ਬਾਜ਼ਾਰ, ਵਪਾਰ, ਰਿਸ਼ਤੇ-ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧੰਦਿਆਂ ਨਾਲ ਸੰਬੰਧਤ

ਸੈਕਸ਼ਨ-ਸੀ

ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ
ਸਾਧਾਰਨ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)
ਸੰਯੁਕਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)
ਮਿਸ਼ਰਤ ਵਾਕ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਸੈਕਸ਼ਨ-ਡੀ

ਪੈਰ੍ਹਾ ਰਚਨਾ
ਸੰਖੇਪ ਰਚਨਾ

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਅਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
2. **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।

PUNJAB HISTORY & CULTURE
HSL-102 : HISTORY AND CULTURE OF THE PUNJAB (1717-1947)
(Special paper in lieu of Punjabi Compulsory)

Credits: 2-0-0
Marks : 50
Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

1. Sikh Struggle for Sovereignty.
2. Ranjit Singh : Conquests, Administration and the Anglo-Sikh Relations.

SECTION-B

3. Anglo-Sikh Wars and the Annexation.
4. The Punjab under the British: New Administration, Education and social Change.

SECTION-C

5. Economic Changes: Agricultural
6. Socio-Religious Reform Movements.

SECTION-D

7. Role of Punjab in the Freedom Struggle.
8. Fairs and Festivals.

Suggested Reading

1. Kirpal Singh (ed.), *History and Culture of the Punjab,* Part-II, Punjabi University, Patiala, 1990.
2. Fauja Singh (ed.), *History of Punjab,* Vol, III, Punjabi University, Patiala, 1987.
3. J.S. Grewal, *The Sikhs of the Punjab, Cup, Cambridge, 1991.*
4. Khushwant Singh, *A History of the Sikhs,* Vol. I, OUP, New Delhi, 1990

CSL–231: DATA STRUCTURES & PROGRAMMING METHODOLOGY

CREDITS		
L	T	P
3	1	0

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Theory:

SECTION–A

Introduction: About 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).

SECTION–B

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

Queues: Define Queues, Operations, Dequeues, Priority Queues.

SECTION–C

String Processing: Introduction, Basic terminology, Storing strings, String operations, Word processing.

Linked List: Representation in memory, Traversing, Searching, Insertion, deletion, Header Linked List, Two ways List: operations.

SECTION–D

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, Warshall's Algorithm, Linked Representation, Traversing a graph, Hashing.

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. T.: Data Structures, Theory and practice: 2nd 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, 2nd 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. Sorenson: 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* (CBEGS)
(Syllabus for the Batch from Year 2020 to Year 2024)

CSL–233 PROGRAMMING IN C++

CREDITS		
L	T	P
2	1	1

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Theory:

SECTION–A

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, Arrays and Strings.

SECTION–B

Classes and Objects; Access Specifiers, Function Overloading, Inline Functions, Friend Functions and Friend Class. Constructors & Destructors: Types of Constructors.

SECTION–C

Inheritance, Types of Inheritance, Ambiguity in Inheritance. Polymorphism: Virtual Functions, Pure virtual Functions, Operator Overloading.

SECTION–D

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 for the development of program in all areas of data structures covered in the course. Emphasis should be given on development of recursive as well as non recursive algorithms involving arrays, string handling, stacks and queues, linked list trees and graphs. Use of pointers for dynamic memory allocation.

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 - BjarneStroustrup

ECL–291: DIGITAL CIRCUITS AND LOGIC DESIGN

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

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Theory:

SECTION–A

Data and number representation–binary, Octal, Hexadecimal (conversions, addition & subtraction) complements, BCD, ASCII, Excess-3 code, Gray codes, logic gates, Boolean Algebra.

SECTION–B

Minimization of logic functions. Sum of Products (SOP), Product of Sums (POS), minterm, maxterm. Digital Circuit Technologies: RTL / DTL / DCTL / TTL / MOS / CMOS / ECL, analysis of basic circuits in these families. Comparison of logic families.

SECTION–C

Combinational circuit design, Adder, Subtractor, Encoder, Decoder, Multiplexer, Demultiplexer. Sequential circuits: flip–flops, counters, shift registers, State diagram for sequential circuits.

SECTION–D

A/D and D/A conversion techniques. Memory system – RAM, ROM, EPROM, EEPROM, PLDs, PAL, PLA, PGAs. Introduction to VLSI Design.

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 serial shifter.
- Priority resolver.
- Binary to gray code converter.
- Traffic light controller.
- Pattern Generator.

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-IV*(CBEGS)
(Syllabus for the Batch from Year 2020 to Year 2024)

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

CREDITS		
L	T	P
2	1	1

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

ote taking from lectures and reference material	
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	[5%]

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. f Chicago Press, 1973. IEEE Transactions on "Written and Oral Communication" has many papers

CSL–240: OPERATING SYSTEM

CREDITS		
L	T	P
2	1	1

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

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.

SECTION-B

Resource allocation graph, Deadlocks: Deadlock Avoidance and Deadlock Handling

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

SECTION-C

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

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

SECTION-D

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.

Practicals:

Implementation of scheduling algorithm, Banker's algorithm, memory management technique (First Fit, Best Fit, Worst Fit), Practical concept of virtual memory.

Text / References:

1. Peter B. Galvin, A. Silberchatz: Operating System Concepts, Addison Wesley, 6thEdi., 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

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

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.

SECTION-B

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

SECTION-C

Virtual Circuits and datagrams, Routing Algorithms, Congestion Control Algorithms. Internetworking. Elements of Transport Protocol

SECTION-D

Fundamental of Data Compression Techniques and Cryptography.

Domain Name System, Electronic Mail, FTP, Worldwide web (WWW), IPv4, IPv6

Practicals:

- 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.

Relevant Books:

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

CSL–243: SYSTEM PROGRAMMING

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

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

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.

SECTION-B

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.

SECTION-C

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.

SECTION-D

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.
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

CSL–244: DISCRETE STRUCTURES

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

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

Groups and Rings: Groups, monoids, and Submonoids, Semigroup, Subgroups and Cosets. Congruence relations in semigroups. Morphisms. Normal sub groups. Cyclic groups, permutation groups, dihedral groups, Rings, subrings, morphism of rings, ideals and quotient rings.

SECTION-B

Graph Theory: Graphs and Multigraphs, Subgraphs, Isomorphic and Homomorphic Graphs, Paths, Connectivity, Bridges of Konigsberg, Traversable 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.

SECTION-C

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.

SECTION-D

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. NarsinghDeo: Graph Theory.
5. Lipschutz, S. and Lipson, M.: Discrete Mathematics (Schaum's outlines series).

CSA1: B.TECH. (COMPUTER SCIENCE & ENGINEERING) *SEMESTER-IV*(CBEGS)
(Syllabus for the Batch from Year 2020 to Year 2024)

CSL245–: COMPUTER ARCHITECTURE

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

Mid Semester Examination: 20% Weightage
End Semester Examination: 80% Weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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

SECTION–B

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.

SECTION–C

Memory Organisation: Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation.
I/O Organization: Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA, I/O Processors.

SECTION–D

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

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.

CSL–330: SYSTEM ANALYSIS AND DESIGN

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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

SECTION–B

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

SECTION–C

System Design: Introduction, Methodology, Tools for structured design- Data Flow Diagrams, Flowcharts, Structure Charts, Decision Tree, Decision Table, Structured English, Data Dictionary.
System Testing, Implementation and Maintenance: Test Plan, Activity network for system testing. Implementation &Maintenance, Documentation Tools used in SDLC.

SECTION–D

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, Health Care 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**
3	0	1

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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.

SECTION–B

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

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

SECTION–C

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

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

SECTION–D

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

References:

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

LAB EXERCISES:

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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

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

SECTION–B

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

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.

SECTION–C

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

Branch-and-Bound: General Method, Travelling Salesman Problem.

SECTION–D

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 (Planer Graph Coloring and NP–Hard Absolute Approximations), ε –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**
3	0	1

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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; Midpoint Circle drawing algorithms; Midpoint Ellipse Algorithm; Flood and Boundary Filling;

SECTION–B

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

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.

SECTION–C

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

SECTION–D

Color Models: Properties of Light, Intuitive Color Concepts, concepts of chromaticity, 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.

COMPUTER GRAPHICS LAB:

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

   i. WAP to draw different geometric structure using given output primitives.
   ii. WAP to show the light coming from one source of light in a dark room.
   iii. WAP to draw 2D car and move on the road OR to show the landing and take-off of the airplane.
   iv. WAP to show a moving 2D cartoon in rainy season.

2. Implement DDA line generating algorithm.
3. Implement Bresenham's line generating algorithm.
4. Implement Mid-point circle- generating algorithm.
5. WAP to draw Taj Mahal with filled patterns using output primitives/DDA/Bresenham's algorithm.
6. WAP of color filling the polygon using Boundary fill and Flood fill algorithm.
7. Write a function to create a translation matrix for three successive translations and show its use in a graphics program.
8. Program of line clipping using Cohen-Sutherland algorithm.
9. Program to implement 3D projections.
10. Implement general computer animation functions.

NOTE: Above said exercises can be implemented in C/C++ programming Language.

CSL–336: PROGRAMMING IN ASP.NET

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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. ASP Programming Languages.
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, Namespaces , Using Code-behind Files

SECTION–B

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
Constructing ASP.NET Web Pages
Web Forms, 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 Style Sheets and Selectors
Core Web Application Features: Working with User Sessions, Using the Cache Object, Using Cookies
Steps in Developing a Web Application using an example such as Shopping Cart Application: Using Themes, Skins, and Styles, Using the Master Page.

SECTION–C

Using the Validation Controls

Introducing the ASP.NET Validation Controls, Enforcing Validation on the Server, ,Required Field 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, Grid View, Formatting Data Controls, Using Stored Procedures.

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

SECTION–D

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, 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 4 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. ImarSpaanjaars: Beginning ASP.NET 4.5: in C# and VB, John Wiley.

CSL–342: OBJECT ORIENTED ANALYSIS AND DESIGN

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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.

SECTION–B

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

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

SECTION–C

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

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.

SECTION–D

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.

CSL–344: OBJECT ORIENTED PROGRAMMING USING JAVA

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION-A

Introduction to Java: Importance of JAVA to Internet, Features of JAVA, Data Types, Variables, Arrays, Operators and Control Structures Statements.

Classes and Inheritance: Class Fundamentals, Declaring objects, introducing methods, constructors, this keyword, Overloading constructors, Recursion, Nested and Inner classes, Creating Multilevel hierarchy, Method Overriding, Abstract Classes.

SECTION-B

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.

SECTION-C

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

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

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

SECTION-D

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

CSL–350: SOFTWARE ENGINEERING AND TESTING

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

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

Software Product metrics- Object-oriented design metrics, operation-oriented metrics and interface design metrics-metrics for source coding, metrics for testing, metrics for maintenance

SECTION–B

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

SECTION–C

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.

SECTION–D

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

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

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Basic course on artificial intelligence, Data Structure & Algorithms.
Introduction to the methods and techniques of Natural Processing – semantics, pragmatics, Applications of Natural Language Processing.

SECTION–B

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.

SECTION–C

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.

SECTION–D

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. Mdij Arbib & Kfaury, Introduction to Formal Language Theory, Springer Verlag, 1988.

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

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

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:

SECTION–A

CMOS Technology:
Logic levels. Noise Margin.
Power dissipation, supply currents.

Speed delays. Interconnect analysis.

SECTION–B

Power/Ground/ droop/bounce. Coupling analysis.
Transmission line effects/cross talk. Power/ground distribution.

SECTION–C

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

SECTION–D

Memory subsystem design.
Noise tolerant design.
Worst case timing.
Thermal issues in design.
Real life system design examples.

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 International Edition 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.

CSL–348: OPERATION RESEARCH (ELECTIVE – I)

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Introduction to OR modeling approach and various real life situations.
Linear programming problems & Applications, Various components of LP problem formulation. Solving Linear Programming problem using simultaneous equations and graphical Method Simplex method & extensions:

SECTION–B

Sensitivity analysis.
Duality theory.
Revised Simplex.
Dual Simplex.
Transportation and Assignment Problems.

SECTION–C

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.

SECTION–D

Integer programming concepts, formulation solution and applications.
Dynamic programming concepts, formulation, solution and application.
Game Theory.
Queuing Theory & Applications.
Linear Goal Programming methods and applications.
Simulation.

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.

CSL–349: LANGUAGE PROCESSOR (ELECTIVE – I)

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

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:

SECTION–A

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

SECTION–B

Error Recovery: Error detection & recovery. Ad–hoc and systematic methods.

Symbol table management.

Run time memory management: Static memory allocation and stack based memory allocation schemes.

SECTION–C

Intermediate code generation: Different intermediate forms. Syntax directed translation mechanisms and attributed definition.

Code generation: Machine model, order of evaluation, register allocation and code selection.

SECTION–D

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

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

CSL-347: REAL TIME SYSTEMS

Internal Marks: 20

External Marks: 80

CREDITS		
L	T	P
4	0	0

Note: Eight questions are to be set by selecting two questions from each section. Each question is divided in subsections (not exceeding 4). The candidates are required to attempt five questions by selecting one question from each section and the fifth question can be attempted from any section. All questions carry equal marks.

Section - A

Introduction to Real Time Systems: Basic model, components, characteristics, applications, soft and hard RTS, tasks and its parameters, periodic, sporadic and aperiodic tasks.
Real Time Operating Systems: Components, functions, Process Management, Task (States, Functions, Control block), Interrupts, Structure of an RTOS Kernel,

Section - B

RTOS Scheduling: Priority Levels, Scheduling Methodologies (Priority, Pre-emptive, Deterministic), RMA, DMA, EDF, Clock Driven, Uniprocessor versus Multiprocessor, Hybrid (Time-Sliced RoundRobin) Generalised task scheduler.

Section - C

Real Time Languages: Language having facilities for time and task management (Euclid and ADA).
Safety and Reliability in RTS: Basic issues, faults and fault tolerant architectures (TMR Systems).

Section - D

Architectural requirements of Real Time Systems: Tightly coupled systems, hierarchical systems, bus arbiters. [10%]
Real Time Knowledge based systems: Integration of RTS and KBS (Case studies), Neural networks and fuzzy logic in RTS.

References:

Levi S.T. and Aggarwal A.K. Real Time System Design, Mc Graw Hill International Edition, 1990.
Stankovic J.A. and Ramanritham K., Hard Real Time Systems, IEEE Press, 1998.

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.

CSL-471 FORMAL LANGUAGES & AUTOMATA THEORY

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

COURSE CONTENTS :

SECTION–A

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.

SECTION–B

Unrestricted Languages : Normal form and Derivation Graph, Automata and their Languages, , The Equivalence of the Automata, Minimization of Automata and the appropriate grammars. The Dyck Language.

SECTION–C

The Kuroda Normal Form, One sided Context Sensitive Grammars; Moore and Mealy Machines, Finite Pushdown 2-push down Automata and Turing Machines

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

SECTION–D

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

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

TEXTS/REFERENCES:

1. Jeffrey Ullman and John Hopcroft, Introduction to Automata Theory, Languages, and Computation, 3e, Pearson Education India (2008).
2. Peter Linz, An Introduction to Formal Languages and Automata, 6/e, Jones & Bartlett (2016).
3. K.L.P. Mishra, Theory of Computer Science: Automata, Languages and Computation, Prentice Hall India Learning Private Limited (2006).
4. John Martin, Introduction to Languages and the Theory of Computation, McGraw-Hill Higher Education (2007).
5. G.E. Reevsz, Introduction to Formal Languages, McGraw Hill, 1983.
6. M.H. Harrison, Formal Language Theory Wesley 1978.
7. Wolfman Theory and Applications of Cellular Automata, World Scientific, Singapore, 1986.

CSL474: CLOUD COMPUTING

CREDITS		
L	T	P
3	0	1

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Introduction: Definition, Vision, Reference Model, Classification of Cloud Services, Cloud Deployment Models, Benefits, Limitations, Terminology, Open Challenges.
Historical Development: Distributed Systems, Grid Computing, Utility Computing, Service Oriented Computing, Web 2.0, Web Services Standards-SOAP, WSDL, UDDI.

SECTION–B

Virtualization: Definition, Type of Virtualization, Benefits, Limitations, Virtualization and Cloud, Virtual Appliance.
Cloud Migration: The laws of cloudonomics, Measuring cloud computing costs, Seven step model of migration into the cloud, Migration Risks and Mitigation.

SECTION–C

QoS and Service Level Agreement (SLA): QoS Metrics, Types of SLA, SLA Components, Life Cycle of SLA, Phases of SLA Management.
Cloud Security: Securing Data, Establishing Identity-user centric, open-identity systems, Information Cards.

SECTION–D

Programming Models in Cloud: Introduction to Thread Programming, Task Programming and Map–Reduce Programming.
Advance Topics in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Federated Cloud Computing, Mobile Cloud Computing, Fog computing, BigData Analytics.

Textbooks:

1. Raj Kumar 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. Raj Kumar Buyya, James Broberg, Andrzej Goscinski ,Cloud Computing: Principles and Paradigms , Wiley India Pvt. Ltd, ISBN–13: 978–-81-265-4125-6, New Delhi, India, 2011.
3. Dr. Saurabh Kumar, Cloud Computing: Insights Into New–Era Infrastructure, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–6528837, New Delhi, India, 2011.
4. Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Cloud Computing For Dummies,
5. Wiley India Pvt. Ltd, ISBN–13: 978–0–47–0597422, New Delhi, India, 2011.

Practicals:

1. Using public cloud service providers (e.g. Amazon Web Services and Google cloud) for exploring the usage of cloud services-IaaS, PaaS, SaaS.
2. Use of virtualization software for creating, migrating, cloning, managing VMs.
3. Setting up a private cloud using open source tools (Eucalyptus/Open Stack etc.).
4. Hands on Practical based on Programming model in cloud computing.

CSL-477 ARTIFICIAL INTELLIGENCE

CREDITS		
L	T	P
3	0	1

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Contents:

SECTION–A

Introduction: Definition, Foundations, History, Current AI systems. Intelligent Agents: Agents and environment, Rationality, PEAS, Nature of Environment, Different types of agents. Searching: Agent design, Toy Problems, Searching, Tree Search and Graph Search, Uninformed Search, Breadth First Search, Depth First Search, Depth-Limited Search, Iterative Deepening, Iterative Lengthening, Bidirectional Search, Sensorless problems, Contingency problems.

Informed Search: Informed/Heuristic Search, Heuristic Search, A* Search, Memory bounded heuristic search, heuristic functions, local search and optimization, hill-climbing, simulated annealing, local beam search, online search, online depth first search.

Introduction to Prolog Programming language: Syntax and meaning of Prolog Programs, Using Data Structures, Input and Output, Built-in Predicates.

SECTION–B

Introduction to knowledge-based intelligent systems: Intelligent machines, Journey from 'dark ages' to knowledge-based systems, Introduction to Expert Systems. Logic and Inferences: Propositional Logic, First Order Logic (FOL), Resolution method for FOL, Forward and Backward chaining.

Constraint Satisfaction Problems: Constraint Satisfaction Problems, Backtracking, Minimum Remaining Values heuristic, Most Constraint Variable heuristic, Least Con-straining Value heuristic, Forward Checking, Constraint Propagation, local search, problem decomposition. Adversarial Search: Games, optimal decisions in games, minimax algorithm, multiplayer games, alpha-beta pruning, evaluation functions, cutting o search, expectiminimax algorithm, dice/card games.

SECTION–C

Planning: The planning problem, language specification and PDDL, examples of planning problems, forward search, backward search, heuristics, partial order planning, planning graphs, heuristics from planning graphs, Graphplan algorithm. Uncertainty: Uncertainty, probability basics, axioms of probability, inference using full joint distributions, independence, Bayes' rule, Naive Bayes.

Knowledge Representation (KR): Approaches to KR: Relational knowledge, Procedural knowledge and knowledge represented as logic; Semantic Nets, Ex-tended Semantic Networks, Frames. Rule-based Expert systems: Structure of rule based expert system, Conflict resolution, Uncertainty Management, Advantages & disadvantages of rule-based expert systems, Example, Introduction to JESS. Using Prolog Grammar Rules, Controlling Backtracking.

SECTION–D

Probabilistic Reasoning: Representation, Bayesian Networks, Construction of Bayesian Networks, Conditional Independence, Bayesian Networks with continuous variables. Making Simple Decisions: Beliefs, Desires and Uncertainty, Utility Theory, Utility Functions, Multi-attribute Utility Functions, Decision Networks, Value of Information. Making Complex Decisions: Stochastic Problems, Value Iteration, Policy Iteration, Game Theory.

Frame-based Expert systems: Inheritance in frame-based expert systems, Methods and Continued demons, Interactions of frames and rules, Example. Artificial Neural Network and Neural Expert Systems: How brain works, the Neuron as a single computing element, Perceptron, Multilayer FFNN, Back propagation algorithm, Recurrent networks, Neural expert system.

Text Books:

1. S. Russell and P. Norvig, Artificial Intelligence, Pearson.
2. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Pearson.
3. M. Negnevitsky, Artificial Intelligence: A Guide to Intelligent Systems, Addison Wesley.
4. D. Khemani, A first course in Artificial Intelligence, McGraw Hill Education (India) Pvt. Ltd.
5. S. Kaushik, Artificial Intelligence, CENGAGE Learning.
6. I. Bratko, Prolog Programming for Artificial Intelligence, Pearson.
7. Clocksin, W.F. and Mellish, C.S., Programming in Prolog 2nd Edition, Springer - Verlag, 1984.

Lab Assignments:

Searching using Breath First Search, Heuristic Search, Programming in Prolog (based on following topics covered in the class): Syntax and meaning of Prolog Programs. Using Data Structures. Controlling Back-tracking. Input and Output. Built-in Predicates. Using Prolog Grammar Rules. Higher level assignments/exercises for implementation using Prolog. Expert system design: Using the Expert System Shell (JESS/CLIPS) for development of an Expert System (in domains like Financial, Industrial, Social or other Engineering problems).

CSL – 478 MACHINE LEARNING

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

COURSE CONTENTS :

SECTION–A

Introduction, Machine learning basics, Supervised Learning: Artificial Neural Network, Classifying with k-Nearest Neighbour classifier, Support vector machine classifier, Decision Tree classifier, Naive Bayes classifier, Bagging, Boosting, Improving classification with the AdaBoost meta algorithm.

SECTION–B

Forecasting and Learning Theory: Predicting numeric values: regression, Linear Regression, Logistic regression, Tree-based regression. Bias/variance tradeoff, Union and Chernoff/Hoeffding bounds, Vapnik–Chervonenkis (VC) dimension, Worst case (online) learning.

SECTION–C

Unsupervised Learning: Grouping unlabeled items using k-means clustering, Association analysis with the Apriori algorithm, efficiently finding frequent item sets with FP-growth.

SECTION–D

Reinforcement learning: Markov decision process (MDP), Bellman equations, Value iteration and policy iteration, Linear quadratic regulation, Linear Quadratic Gaussian, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs.

Dimensionality reduction: Feature extraction - Principal component analysis, Singular value decomposition. Feature ranking and subset selection, filter, wrapper and embedded methods

Text Books:

1. Introduction to Machine Learning Author E. Alpaydin Publisher MIT Press Edition 2nd Edition, 2009

Reference Book:

1. Machine Learning Author T. M. Mitchell Publisher McGraw-Hill Edition 1997
2. Machine learning in action Author P. Harrington Publisher Manning Publications Co Edition 2012
3. Pattern recognition and Machine Learning Author C. M. Bishop Publisher Springer, Edition 2007
4. Machine Learning for Big Data Author J. Bell.Wiley, Edition 2014.

CSL - 472 INTERNET PROTOCOL (ELECTIVE II)

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Contents:

SECTION–A

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.

SECTION–B

Internetworking 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).

SECTION–C

Internet as virtual Network, Detailed concept of Routers & Bridges. Protocols Layering, Difference between X.25 and Internet layering.

SECTION–D

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.

CSL - 473 ADVANCED MICROPROCESSORS (ELECTIVE II)

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

COURSE CONTENTS :

SECTION–A

Review of 8 bit microprocessor and support components.
Selected Case Studies of 16 bit microprocessors and support

SECTION–B

Contents. RISC Architectures and Case Studies : RISC Vs CISC.
Selected Case Studies of 32/64 bit microprocessors and support

SECTION–C

Power PC 601 Alpha 21064, Pentium super space, Transputer Architectures and Case Studies : High Performance Embedded Microcontrollers, Case Studies.

SECTION-D

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.
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, 2nd Edition (May 1994)
13. Charles M, Gilmore, microprocessors Principles and Applications, McGraw Hill International Editions, 2ndEdtion, 1995.
14. PowerPC 403GA Embedded Controller User's Manual. PowerPC Tools - Development Tools For PowerPC Microprocessor (Nov. 1993).PowerPC 601 RISC Microprocessor User's Manual - 1993.

CSL - 476 ROBOTICS (ELECTIVE - II)

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

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

COURSE CONTENTS :

SECTION–A

Introduction to Robotics, Introduction to Manipulators & Mobile Robots, Classification of Robots, Robot Applications. Industrial application environment and workcells, feeders and Orienting devices.

Robot Anatomy, Robot and Effectors, Transmission and actuators, with special reference to servomotors.

SECTION–B

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 inRobotics.

SECTION–C

Machine Vision : Introduction to machine Vision, The sensing and digitizing function inMachine Vision, Image Processing and analysis, Training and Vision system, Robotics Application. Low & High Level vision.

SECTION-D

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. Sitha rama Iyengar, Alberto Elefes, Autonomous Mobile Robots, Perception, mapping & Navigation, IEEE Computer Society Press.
6. S. Sitha rama Iyengar, Alberto Elefes, Autonomous Mobile Robots-Control, Planning and Architecture, IEEE Computer Society Press.
7. Various Research papers in area of Robotics.

CSD - 480 INDUSTRIAL TRAINING-CUM-PROJECTS

CREDITS		
L	**T**	**P**
0	0	35

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 8 credits.

Credits for Final Project Report & Viva Voce: 18

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