

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS FOR THE BATCH FROM YEAR 2023 TO 2027

FOR

B.TECH. (COMPUTER SCIENCE & ENGINEERING)
(Credit Based Evaluation and Grading System)

SEMESTER: I-VIII

Programme Code: 1703

EXAMINATIONS: 2023-2027



Program Outcomes:

- The graduates are able to design, implement and evaluate a computer oriented system, process and program to meet their needs as well as IT industry requirements
- The graduates are able to apply knowledge of computation and mathematical approaches according to their desire outcomes
- The graduates are able to understand their professional responsibilities and having ability to make judgments in cyber and other security activities based on social and ethical principles
- The graduates are able to work efficiently in a team as a team member or team leader both in technical as well as management activities appropriate to the course
- The graduates are able to handle the various responsibilities like as legal, cyber security, professional and common social issues
- The graduates are able to interconnect as well as communicate effectively with a range of audiences
- The graduates are able to apply the course based computer engineering approach and its techniques to design software for its adaptation in multi-disciplinary environments.
- The graduates are able to opt and learn from swayam and other online learning platforms to enhance their online learning abilities

GURU NANAK DEV UNIVERSITY
AMRITSAR

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(ii) Subject to change in the syllabi at any time. Please visit the University website time to time.

B.Tech. (Computer Science & Engineering) (CBEGS)
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SEMESTER –I

Sr. No.	Course Code	Course Title	L	T	P	Credits
1.	CEL1020	Engineering Mechanics	3	1	0	4
2.	MEL1021	Engineering Graphics & Drafting Using Auto CAD	3	0	1	4
3.	MTL1001	Mathematics-I	3	1	0	4
4.	PHL1083	Physics	3	0	1	4
5.	MEL1010	Introduction to Engg. Materials	3	0	0	3
6.		Elective-I	2	0	0	2
List of Electives–I:						
1.	PBL1021	Punjabi Compulsory-I OR	2	0	0	2
2.	PBL1022	*ਮੁੱਢਲੀ ਪੰਜਾਬੀ /Mudhli Punjabi-I OR	2	0	0	
3.	HSL4060	*Punjab History & Culture (1450-1716)	2	0	0	
Total Credits:			17	2	2	21

***Special Note:**

- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ **Domicile/Non-Domicile of Punjab** ਹਨ ਅਤੇ ਉਨ੍ਹਾਂ ਨੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ) ਪੜ੍ਹਨਗੇ।
- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ **Non-Domicile of Punjab** ਹਨ ਅਤੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਜਾਂ ਪੰਜਾਬ ਹਿਸਟਰੀ ਐਂਡ ਕਲਚਰ ਵਿੱਚੋਂ ਕੋਈ ਇੱਕ ਵਿਸ਼ਾ ਚੁਣ ਸਕਦੇ ਹਨ।
- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ **Domicile of Punjab** ਹਨ, ਪੰਤੂ ਕਿਸੇ ਕਾਰਣ ਪੰਜਾਬ ਤੋਂ ਬਾਹਰ ਪੜ੍ਹੇ ਹਨ ਅਤੇ ਉਨ੍ਹਾਂ ਨੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦਾ ਹੀ ਵਿਸ਼ਾ ਪੜ੍ਹਨਗੇ।
- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ **Domicile of Punjab** ਹਨ ਅਤੇ ਪੰਜਾਬ ਦੇ ਕੇਂਦਰੀ ਵਿਦਿਆਲਿਆ ਜਾਂ ਕਿਸੇ ਹੋਰ ਸਕੂਲ ਵਿੱਚ ਪੜ੍ਹੇ ਹਨ ਅਤੇ ਕਿਸੇ ਕਾਰਣ ਉਨ੍ਹਾਂ ਨੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦਾ ਵਿਸ਼ਾ ਹੀ ਪੜ੍ਹਨਗੇ।

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SEMESTER-II

Sr. No.	Course Code	Course Title	L	T	P	Credits
1.	CYL1097	Engineering Chemistry	3	0	1	4
2.	MTL1002	Mathematics-II	3	1	0	4
3.	ECL1019	Basic Electrical & Electronics Engineering	4	0	1	5
4.	CSL1026	Fundamentals of Information Technology & Programming using Python	3	1	1	5
5.	ENL1001	Communicative English-I	2	0	0	2
6.		Elective-II	2	0	0	2
7.	MEP1002	Manufacturing Practices	0	0	1	1
List of Electives-II:						
1.	PBL1031	Punjabi Compulsory-II OR	2	0	0	2
2.	PBL1032	*ਮੁੱਢਲੀ ਪੰਜਾਬੀ/ Mudhli Punjabi-II OR	2	0	0	
3.	HSL5020	*Punjab History & Culture (1717-1947)	2	0	0	
Total Credits:			17	2	4	23

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- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ Non-Domicile of Punjab ਹਨ ਅਤੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਜਾਂ ਪੰਜਾਬ ਹਿਸਟਰੀ ਐਂਡ ਕਲਚਰ ਵਿੱਚੋਂ ਕੋਈ ਇੱਕ ਵਿਸ਼ਾ ਚੁਣ ਸਕਦੇ ਹਨ।
- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ Domicile of Punjab ਹਨ, ਪੰਤੂ ਕਿਸੇ ਕਾਰਣ ਪੰਜਾਬ ਤੋਂ ਬਾਹਰ ਪੜ੍ਹੇ ਹਨ ਅਤੇ ਉਨ੍ਹਾਂ ਨੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦਾ ਹੀ ਵਿਸ਼ਾ ਪੜ੍ਹਨਗੇ।
- ਜਿਹੜੇ ਵਿਦਿਆਰਥੀ Domicile of Punjab ਹਨ ਅਤੇ ਪੰਜਾਬ ਦੇ ਕੇਂਦਰੀ ਵਿਦਿਆਲਿਆ ਜਾਂ ਕਿਸੇ ਹੋਰ ਸਕੂਲ ਵਿੱਚ ਪੜ੍ਹੇ ਹਨ ਅਤੇ ਕਿਸੇ ਕਾਰਣ ਉਨ੍ਹਾਂ ਨੇ ਅੱਠਵੀਂ/ਦਸਵੀਂ ਜਮਾਤ ਤੱਕ ਪੰਜਾਬੀ ਵਿਸ਼ਾ ਨਹੀਂ ਪੜ੍ਹਿਆ ਹੈ, ਉਹ ਮੁੱਢਲੀ ਪੰਜਾਬੀ ਦਾ ਵਿਸ਼ਾ ਹੀ ਪੜ੍ਹਨਗੇ।

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		SEMESTER-III				
S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL2031	Data Structures & Programming Methodology	3	1	0	4
2.	CSL2033	Programming in C++	3	1	1	5
3.	ECL2091	Digital Circuits & Logic Design	4	0	1	5
4.	ENL2001	Written & Oral Technical Communication	4	0	1	5
5.	ESL2020	Environmental Studies (Value Added Course)	2	0	0	2
6.	SOL1006	Drug Abuse: Problem, Management and Prevention (Value Added Course)	2	0	0	2
7.	CSP2034	Mini Project	0	0	4	4
Total			17	3	7	27

SEMESTER-IV

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL2040	Operating System	4	0	1	5
2.	CSL2041	Data Communication	4	0	1	5
3.	CSL2043	System Programming	3	1	0	4
4.	CSL2044	Discrete Structures	3	1	0	4
5.	CSL2045	Computer Architecture	3	1	0	4
6.	PSL0059	Human Rights and Constitutional Duties (Value Added Course)	2	0	0	2
Total			18	4	2	24

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SEMESTER –V

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL3030	System Analysis And Design	3	1	0	4
2.	CSL3032	Relational Database Management Systems	4	0	1	5
3.	CSL3033	Design & Analysis of Algorithm	3	1	0	4
4.	CSL3051	Formal Languages & Automata Theory	3	1	0	4
5.	CSL3036	Programming in ASP.Net	4	0	1	5
6.		Interdisciplinary Course-I	4	0	0	4
Total			21	3	2	26

SEMESTER–VI

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL3042	Object Oriented Analysis & Design	3	1	0	4
2.	CSL3044	Object Oriented Programming using JAVA	3	1	1	5
3.	CSL3050	Software Engineering and Testing	4	0	1	5
4.		Elective–I (for code see Dept. Elective–I list)	3	1	0	4
5.	CSL3047	Real Time Systems	4	0	0	4
Total			17	3	2	22
		Electives–I				
1.	CSL3045	Natural Language Processing	3	1	0	4
2.	CSL3046	System Hardware Design	3	1	0	4
3.	CSL3048	Operation Research	3	1	0	4
4.	CSL3049	Language Processor	3	1	0	4

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SEMESTER –VII

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL4081	Computer Graphics	4	0	1	5
2.	CSL4074	Cloud Computing	3	1	1	5
3.	CSL4077	Artificial Intelligence	4	0	0	4
4.	CSL4078	Machine Learning	4	0	1	5
5.		Departmental Elective–II	3	1	0	4
Total			19	1	3	23
		List of Departmental Electives–II:				
1.	CSL4072	Internet Protocol	3	1	0	4
2.	CSL4073	Advanced Microprocessors	3	1	0	4
3.	CSL4076	Robotics	3	1	0	4

SEMESTER –VIII

S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSD4080	Industrial Training Cum Projects	0	0	30	30
Total						30

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SEMESTER-I

Course Name	:	Engineering Mechanics
Course Code	:	CEL1020
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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 Lecture
<p>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.</p>		
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, Varignon'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

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SEMESTER-I

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.

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SEMESTER-I

Course Name	:	Engineering Graphics & Drafting Using AutoCAD
Course Code	:	MEL1021
Credits (L-T-P)	:	4 (3-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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

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SEMESTER-I

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

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SEMESTER-I

Course Name	:	Mathematics-I
Course Code	:	MTL1001
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix and orthogonal matrix), Rank of a matrix, Guass-Jordan Method to find inverse of a matrix, Normal form of a matrix, Consistency of linear system of equations, Solutions of linear system of equations, Eigen values and Eigen vectors; Cayley-Hamilton theorem and its application, Reduction to diagonal form.	10
SECTION - B		
2	Differential Calculus: Partial derivatives, Homogeneous functions, Euler's theorem and its extension, Total derivatives, Composite functions, Jacobian, Taylor's and Maclaurin's expansions of single and two variables, Maxima and minima of functions of two variables, Lagrangian method of undetermined multipliers	10

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SEMESTER-I

SECTION – C		
3	Integral Calculus: Double integrals (Cartesian and polar), change of order of integration, change of variables, application of double integrals, Triple integrals, change of variables, Application of triple integrals, Beta and Gamma functions	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 equip the students to learn the integral calculus with double and triple integrals to solve complex problems.
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.

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SEMESTER-I

Course Name	:	Physics
Course Code	:	PHL1083
Credits (L-T-P)	:	4 (3-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
<ul style="list-style-type: none"> • 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
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		
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

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SEMESTER-I

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).

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SEMESTER-I

Course Name	:	Introduction to Engineering Materials
Course Code	:	MEL1010
Credits (L-T-P)	:	3 (3-0-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
<p>At the end of this course, the student should be able to understand the:</p> <ol style="list-style-type: none"> 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
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: 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-ordination number. Single crystals, polycrystalline, non-crystalline, nano-crystalline materials. Imperfections in solids: point defects, line defects, surfaced effects.	9

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SEMESTER-I

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.).

SEMESTER-I

PBL1021 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ - I

ਸਮਾਂ: 3 ਘੰਟੇ
ਕਰੈਡਿਟ: 2

ਕੁਲ ਅੰਕ: 100

Mid Semester Marks: 30

End Semester Marks: 70

Mid Semester Examination: 30% weightage

End Semester Examination: 70% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚ 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 ਸੈਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

- I. ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
ਕਵਿਤਾ ਭਾਗ : 1-4 ਕਵੀ
(ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ)
- II. ਗੁਰਮੁਖੀ ਔਰਥੋਗਰਾਫੀ ਦੀ ਜੁਗਤ (ਪੈਂਤੀ, ਮੁਹਾਰਨੀ, ਬਿੰਦੀ, ਟਿੱਪੀ ਤੇ ਅੱਧਕ); ਵਿਸਰਾਮ ਚਿੰਨ੍ਹ, ਸ਼ਬਦ ਜੋੜ (ਸੁਧ-ਅਸੁਧ)

ਸੈਕਸ਼ਨ-ਬੀ

- I. ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
ਕਵਿਤਾ ਭਾਗ : 5-8 ਕਵੀ
(ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ, ਕਵਿਤਾ-ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ)
- II. ਲੇਖ ਰਚਨਾ (ਜੀਵਨੀ-ਪਰਕ, ਸਮਾਜਕ ਅਤੇ ਚਲੰਤ ਵਿਸ਼ਿਆਂ ਉੱਤੇ) : 10 ਲੇਖ ਲਿਖਵਾਉਣੇ
(ਕਲਾਸ ਵਿਚ ਅਤੇ ਘਰ ਲਈ ਅਭਿਆਸ)

ਸੈਕਸ਼ਨ-ਸੀ

- I. ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
ਕਹਾਣੀ ਭਾਗ : 1-4 ਕਹਾਣੀਆਂ
(ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ)
- II. ਸੁੱਧ, ਅਸੁੱਧ : ਦਿੱਤੇ ਪੈਰੋਂ ਵਿਚੋਂ ਅਸੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸੁੱਧ ਕਰਨਾ
(15 ਪੈਰਿਆਂ ਦੇ ਸੁੱਧ ਅਸੁੱਧ ਅਭਿਆਸ ਕਰਵਾਉਣੇ)

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SEMESTER-I

ਸੈਕਸ਼ਨ-ਡੀ

- I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਕਵਿਤਾ ਤੇ ਕਹਾਣੀ**
 (ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
 ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
 ਕਹਾਣੀ ਭਾਗ : 5-8 ਕਹਾਣੀਆਂ
 (ਕਹਾਣੀ ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ, ਸਾਰ)
 II. ਅਖਬਾਰੀ 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 ਫਾਊਂਡੇਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
3. ਬਲਦੇਵ ਸਿੰਘ ਧਾਲੀਵਾਲ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਇਤਿਹਾਸ**, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
4. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, **ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਸਫ਼ਰ ਤੇ ਸ਼ਾਸਤ੍ਰ ਭਾਗ-1**, ਸਿੰਘ ਬ੍ਰਦਰਜ਼, ਅੰਮ੍ਰਿਤਸਰ।
5. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, **ਕਾਲਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ**, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ।
6. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਣ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
7. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਣ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
8. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਬੋਧ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਅੰਮ੍ਰਿਤਸਰ।

ਪਾਠਕ੍ਰਮ ਪਰਿਣਾਮ (Course Outcomes):

ਇਹ ਪਰਚਾ ਪੰਜਾਬੀ ਸਾਹਿਤ ਅਤੇ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧਿਤ ਹੈ। ਇਸ ਪਰਚੇ ਅਧੀਨ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਨੇਮ ਵਿਧਾਨ ਦਾ ਬੋਧ ਗ੍ਰਹਿਣ ਕਰਦੇ ਹਨ ਅਤੇ ਇਸ ਬੋਧ ਸਦਕਾ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਅਮੀਰ ਦੁਨੀਆਂ ਨਾਲ ਸਾਂਝ ਸਥਾਪਤ ਕਰਨ ਦੇ ਸਮਰੱਥ ਹੁੰਦੇ ਹਨ। ਇਹ ਪਰਚਾ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸ਼ਖ਼ਸੀ ਉਸਾਰੀ ਵਿਚ ਅਹਿਮ ਭੂਮਿਕਾ ਅਦਾ ਕਰਦਾ ਹੈ। ਇਸ ਨੂੰ ਪੜ੍ਹਨ ਉਪਰੰਤ ਉਹ ਮਾਨਵੀ ਗੁਣਾਂ ਅਤੇ ਸਦਾਚਾਰਕ ਪਰਿਪੇਖ ਤੋਂ ਹੋਰਨਾਂ ਅਨੁਸ਼ਾਸਨਾਂ ਅਤੇ ਵਰਤਾਰਿਆਂ ਨੂੰ ਵਾਚਣ ਦਾ ਹੁਨਰ ਹਾਸਲ ਕਰਦੇ ਹਨ।

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SEMESTER-I
PBL1022 : ਮੁੱਢਲੀ ਪੰਜਾਬੀ - I
(In lieu of Compulsory Punjabi)

ਸਮਾਂ: 3 ਘੰਟੇ
ਕਰੈਡਿਟ: 2

ਕੁਲ ਅੰਕ: 100
Mid Semester Marks: 30
End Semester Marks: 70

Mid Semester Examination: 30% weightage
End Semester Examination: 70% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚ 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 ਸੈਟ 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 : ਸਾਧਾਰਨ ਸ਼ਬਦ, ਸੰਯੁਕਤ ਸ਼ਬਦ, ਮਿਸ਼ਰਤ ਸ਼ਬਦ
ਮੂਲ ਸ਼ਬਦ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ (ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ)

ਸੈਕਸ਼ਨ-ਸੀ

- (i) ਦਿੱਤੇ ਪੈਰੇ ਵਿਚੋਂ ਅਸੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸੁੱਧ ਕਰਨਾ
- (ii) ਸਮਾਨਾਰਥਕ ਤੇ ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ

ਸੈਕਸ਼ਨ-ਡੀ

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

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SEMESTER-I

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।

ਪਾਠਕ੍ਰਮ ਪਰਿਣਾਮ (Course Outcomes):

ਇਸ ਪਰਚੇ ਨੂੰ ਪੜ੍ਹਨ ਉਪਰੰਤ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਬਾਰੇ ਬੁਨਿਆਦੀ/ਮੁੱਢਲਾ ਗਿਆਨ ਹਾਸਲ ਕਰਦਾ ਹੈ। ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਣਮਾਲਾ ਅਤੇ ਸ਼ਬਦ ਬਣਤਰ ਦੇ ਗਿਆਨ ਰਾਹੀਂ ਜਿੱਥੇ ਉਹ ਇਕ ਨਵੀਂ ਭਾਸ਼ਾ ਨੂੰ ਸਿੱਖਣ ਦੀ ਮੁਹਾਰਤ ਹਾਸਲ ਕਰਦਾ ਹੈ, ਉੱਥੇ ਹੀ ਇਸ ਭਾਸ਼ਾ ਦੇ ਗਿਆਨ ਨਾਲ ਇਸ ਵਿਚ ਰਚੇ ਸਾਹਿਤ, ਸਮਾਜ, ਸੱਭਿਆਚਾਰ ਆਦਿ ਬਾਰੇ ਡੂੰਘੀ ਜਾਣਕਾਰੀ ਹਾਸਲ ਕਰਦਾ ਹੈ। ਵਿਦਿਆਰਥੀ ਇਕ ਤਰੀਕੇ ਨਾਲ ਪੰਜਾਬੀ ਜਨ ਜੀਵਨ ਤੇ ਮੁੱਲ-ਵਿਧਾਨ ਨਾਲ ਸਾਂਝ ਪਾਉਂਦਾ ਹੋਇਆ ਆਪਣੇ ਭਾਵਾਂ ਦਾ ਸੰਚਾਰ ਕਰਨ ਤੇ ਦੂਜਿਆਂ ਨੂੰ ਸਮਝਣ ਦੇ ਯੋਗ ਬਣਦਾ ਹੈ।

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SEMESTER– I

HSL4060: PUNJAB HISTORY AND CULTURE (1450-1716)
(Special Paper in lieu of Punjabi compulsory)

Credits: 2-0-0

M.Marks:100

Time: 3 hrs

Mid Semester Examination: 30% weightage

End Semester Examination: 70% 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, Guru Har Rai and Guru Harkrishan.
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
5. Anshu Malhotra & Farina (ed.), *Punjab Reconsidered, History, Culture and Practice*, Oxford University Press, New Delhi, 2012.
6. Louis E. French, *The Cherished Five in Sikh History*, Oxford University Press, USA, 2021.

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SEMESTER-II

Course Name	:	Engineering Chemistry
Course Code	:	CYL1097
Credits (L-T-P)	:	4 (3-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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
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	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/Demineralization methods. Numerical problems based on Lime-Soda and Zeolite softening methods.	2

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SEMESTER-II

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, Butyl 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

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SEMESTER-II

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 KMnO ₄ solution with oxalic acid
7	Find the strength of KMnO ₄ 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
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, New Delhi. 2014.
2	Physical Chemistry by A. Peter and J.de. Paula 10 th 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.

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SEMESTER-II

Course Name	:	Mathematics-II
Course Code	:	MTL1002
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester	:	30% weightage
End Semester	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

The goal of the course is to introduce the theory of differential equations along with their applications in modeling 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
<p>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.</p>		
SECTION-A		
1	Fourier Series: Euler's formula, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series	9
SECTION-B		
2	Ordinary Differential Equations : Exact equations, Equations reducible to exact equations, Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations).	9

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SEMESTER-II

SECTION-C		
3	Complex Analysis: De Moivre's theorem with applications, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Cauchy's integral theorem, Cauchy's integral formula (without proofs), Taylor series and Laurent series (without proofs) Residues and Residue theorem.	9
SECTION-D		
4	Integral Transforms: Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Fourier transforms, Finite Fourier Sine and Cosine Transforms, modulation theorem, shifting properties, Convolution theorem.	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 simplifications 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.

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SEMESTER-II

Course Name	:	Basic Electrical & Electronics Engineering
Course Code	:	ECL1019
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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
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	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

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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
Practical's		
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	
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. Nagarkar & 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.	

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SEMESTER– II

Course Name	:	Fundamentals of Information Technology and Programming using Python
Course Code	:	CSL1026
Credits (L-T-P)	:	5 (3-1-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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
<p>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.</p>		
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

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SEMESTER– II

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.

SEMESTER– II
ENL1001: COMMUNICATIVE ENGLISH –I

Credits: 2-0-0
Total Marks-100

Mid Semester Examination: 30% weightage

End Semester Examination: 70% 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.

OBJECTIVES:

1. To improve the reading skills of students.
2. To make the students proficient in technical aspects of formal and informal communication.
3. To achieve the excellence in lexicon and syntax of English language.
4. To enhance and upgrade their writing abilities.

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.

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SEMESTER– II

OUTCOMES:

1. The students will be able to comprehend the reading passages at the end of semester.
2. The students will show better assimilation in technical aspects of formal and informal communication.
3. The students will demonstrate the ability of using lexicon in proper contexts.
4. The students would be able to potentiate their sociolinguistic competence.

Prescribed Text books:

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

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SEMESTER– II

Course Name	:	Manufacturing Practices
Course Code	:	MEP1002
Credits (L-T-P)	:	1 (0-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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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

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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 of any 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 Hajra and Chaudhary
3	Work shop technology by Chapmen

SEMESTER-II

PBL1031 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ - II

ਸਮਾਂ: 3 ਘੰਟੇ

ਕਰੈਡਿਟ: 2

ਕੁਲ ਅੰਕ: 100

Mid Semester Marks: 30

End Semester Marks: 70

Mid Semester Examination - 30% weightage

End Semester Examination - 70% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚ 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 ਵਾਰਤਕ**
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
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 ਵਾਰਤਕ**
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
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 ਵਾਰਤਕ**
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
1-4 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਸਾਰ)
- 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)।

SEMESTER-II

ਸੈਕਸ਼ਨ-ਡੀ

- I. **ਸਰਵੋਤਮ ਪੰਜਾਬੀ ਵਾਰਤਕ**
(ਸੰਪਾ. ਡਾ. ਰਮਿੰਦਰ ਕੌਰ, ਡਾ. ਮੇਘਾ ਸਲਵਾਨ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
5-8 ਰੇਖਾ ਚਿਤਰ
(ਨਾਇਕ ਬਿੰਬ, ਸਾਰ)
- II. **ਸਬਦ 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, ਸਿਧਾਂਤ 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 ਟਰਸਟ, ਇੰਡੀਆ।
7. ਅਬਨਾਸ ਕੌਰ, **ਪੰਜਾਬੀ ਰੇਖਾ ਚਿਤਰ**, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
8. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਣ** : ਮੁੱਢਲੇ ਸੰਕਲਪ, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
9. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, **ਪੰਜਾਬੀ ਵਿਆਕਰਣ** : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।

ਪਾਠਕ੍ਰਮ ਪਰਿਣਾਮ (Course Outcomes) :

ਇਸ ਪਰਚੇ ਨੂੰ ਪੜ੍ਹਨ ਉਪਰੰਤ ਵਿਦਿਆਰਥੀ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੇ ਵਿਭਿੰਨ ਰੂਪਾਂ ਜਿਵੇਂ ਕਵਿਤਾ, ਕਹਾਣੀ, ਨਿਬੰਧ ਅਤੇ ਰੇਖਾ-ਚਿਤਰ ਬਾਰੇ ਵਡਮੁੱਲਾ ਗਿਆਨ ਪ੍ਰਾਪਤ ਕਰਦਾ ਹੈ। ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਵਾਰਤਕ ਦੇ ਪ੍ਰਮੁੱਖ ਰੂਪਾਂ ਜਿਵੇਂ ਨਿਬੰਧ ਅਤੇ ਰੇਖਾ-ਚਿਤਰ ਬਾਣੀ ਗੁਜਰ ਕੇ ਉਹ ਆਧੁਨਿਕ ਭਾਸ਼ਾ, ਸਮਾਜ, ਸਭਿਆਚਾਰ ਆਦਿ ਬਾਰੇ ਸੰਜੀਦਾ ਸਮਝ ਗ੍ਰਹਿਣ ਕਰਦਾ ਹੈ। ਪੰਜਾਬੀ ਦੇ ਸਰਵੋਤਮ ਨਿਬੰਧਾਂ ਨੂੰ ਪੜ੍ਹਦਾ ਹੋਇਆ ਉਹ ਖੁਦ ਸਿਰਜਣਾਤਮਕ ਸ਼ਕਤੀ ਦਾ ਧਾਰਨੀ ਬਣ ਜਾਂਦਾ ਹੈ। ਪੰਜਾਬੀ ਰੇਖਾ-ਚਿਤਰ ਜਿੱਥੇ ਉਸਨੂੰ ਵੱਖ-ਵੱਖ ਸ਼ਖਸੀਅਤਾਂ ਬਾਰੇ ਗਿਆਨ ਦਿੰਦੇ ਹਨ, ਉਥੇ ਉਹ ਕਿਸੇ ਸ਼ਖਸੀਅਤ ਦੇ ਵੱਖ-ਵੱਖ ਪਹਿਲੂਆਂ ਨੂੰ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਨ ਦੇ ਢੰਗਾਂ ਨੂੰ ਸਮਝਦਾ ਹੋਇਆ ਸੰਤੁਲਿਤ ਸ਼ਖਸੀਅਤ ਉਸਾਰੀ ਦੇ ਨਿਯਮਾਂ ਨੂੰ ਸਿੱਖਦਾ ਹੈ। ਇਸ ਪ੍ਰਕਿਰਿਆ ਦੌਰਾਨ ਉਹ ਸਿਰਜਣਾਤਮਕ ਪ੍ਰਤਿਭਾ ਨੂੰ ਹਾਸਿਲ ਕਰਕੇ ਮਨੁੱਖਤਾਵਾਦੀ ਜ਼ਾਵੀਏ ਦਾ ਧਾਰਨੀ ਬਣ ਜਾਂਦਾ ਹੈ ਅਤੇ ਆਪਣੇ ਸਮਾਜ-ਸਭਿਆਚਾਰ ਦੇ ਵਿਕਾਸ ਵਿਚ ਅਹਿਮ ਯੋਗਦਾਨ ਪਾਉਂਦਾ ਹੈ।

SEMESTER-II

PBL1032 : ਮੁੱਢਲੀ ਪੰਜਾਬੀ - II (In lieu of Compulsory Punjabi)

ਸਮਾਂ : 3 ਘੰਟੇ

ਕਰੈਡਿਟ : 2

ਕੁਲ ਅੰਕ : 100

Mid Semester Marks - 30

End Semester Marks - 70

Mid Semester Examination - 30% weightage
End Semester Examination - 70% weightage

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੇ ਚਾਰ ਭਾਗ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚ 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

SEMESTER-II

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।

ਪਾਠਕ੍ਰਮ ਪਰਿਣਾਮ (Course Outcomes) :

ਇਸ ਪਰਚੇ ਦਾ ਮੂਲ ਸੰਬੰਧ ਵਿਦਿਆਰਥੀ ਦੇ ਅੰਦਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਮੁੱਢਲੇ ਨੇਮ-ਵਿਧਾਨ ਅਤੇ ਵਿਭਿੰਨ ਵਿਆਕਰਨਕ ਸੰਕਲਪਾਂ ਪ੍ਰਤੀ ਅੰਤਰਦ੍ਰਿਸ਼ਟੀ ਪੈਦਾ ਕਰਨ ਨਾਲ ਹੈ। ਇਸਦੇ ਅੰਤਰਗਤ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀਆਂ ਸ਼ਬਦ-ਸ਼੍ਰੇਣੀਆਂ ਤੋਂ ਜਾਣੂ ਹੁੰਦੇ ਹਨ। ਇਸ ਉਪਰੰਤ ਸਾਧਾਰਨ ਜੀਵਨ ਨਾਲ ਸੰਬੰਧਤ ਸ਼ਬਦਾਵਲੀ ਪ੍ਰਤੀ ਗਿਆਨ ਹਾਸਲ ਕਰਦੇ ਹਨ। ਅਗਲੇ ਪੜਾਅ 'ਤੇ ਉਹ ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ ਦੇ ਨੇਮ-ਵਿਧਾਨ ਤੋਂ ਜਾਣੂ ਹੁੰਦੇ ਹਨ ਅਤੇ ਅੰਤ ਪੈਰਾ ਰਚਨਾ/ਸੰਖੇਪ ਰਚਨਾ ਦੇ ਨੇਮਾਂ ਨੂੰ ਸਿੱਖਦੇ ਹੋਏ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸ਼ੁੱਧ ਰੂਪ ਵਿਚ ਬੋਲਣ ਤੇ ਲਿਖਣ ਦੇ ਯੋਗ ਹੁੰਦੇ ਹਨ। ਇਸ ਪ੍ਰਕਾਰ ਇਸ ਪਰਚੇ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਸ਼ਬਦ ਇਕਾਈ ਤੋਂ ਆਰੰਭ ਕਰਦਿਆਂ ਵਾਕ ਬਣਤਰ ਦੇ ਨੇਮ-ਵਿਧਾਨ ਤਕ ਪਹੁੰਚਦੇ ਹਨ। ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਉਪਰੋਕਤ ਨੇਮ-ਵਿਧਾਨ ਦੀ ਸੋਝੀ ਅਧੀਨ ਉਹ ਸਾਧਾਰਨ ਜੀਵਨ ਵਿਚ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤੋਂ ਅਤੇ ਸੰਚਾਰ ਕਰਨ ਦੇ ਸਮਰੱਥ ਹੁੰਦੇ ਹਨ।

SEMESTER-II
HSL5020: PUNJAB HISTORY AND CULTURE (1717-1947)
(Special Paper in lieu of Punjabi compulsory)

Time: 3 hrs

M. Marks: 100

Credits: 2-0-0

Mid Semester Examination: 30% weightage

End Semester Examination: 70% 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.
5. Rajmohan Gandhi, *Punjab: A History from Aurangzeb to Mountbatten*, Aleph Book Company, 2013.
6. Priya Atwal, *Royals and Rebels, The Rise and Fall of the Sikh Empire*, Harper Collins, 2021.
7. Sarbjeet Singh, *The Camel Merchant of Philadelphia*, Tranquebar Westland Publication Pvt. Ltd., 2019.

B.Tech. (Computer Science & Engineering) (CBEGS)
Syllabus for the Batch form Year 2023 to Year 2027

SEMESTER– III

Course Name	:	DATA STRUCTURES & PROGRAMMING METHODOLOGY
Course Code	:	CSL2031
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics of algorithms as well as data structures. The students are able to write algorithms. Students will learn some of the design principles for writing efficient and optimized algorithm.

Total No. of Lectures –40

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: 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).	10
SECTION – B		
2	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.	10
SECTION – C		
3	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.	10

B.Tech. (Computer Science & Engineering) (CBEGS)
Syllabus for the Batch form Year 2023 to Year 2027

SEMESTER– III

SECTION – D		
4	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.	10

Course Outcomes:	
1	Comprehend concepts related to write algorithms/pseudo code.
2	Design programs involving decision control statements, loop control statements, case control structures, arrays, strings, stacks, queues using array and linked list , tree structure implementation using pointers, use of dynamics memory allocation
3	Comprehend the concepts of linear and Non-Linear data structures

Suggested / Reference Books:	
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,
3	Baase, S Computer Algorithms; Introduction to Design and Analysis, Addison – Wesley,
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,
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

B.Tech. (Computer Science & Engineering) (CBEGS)
Syllabus for the Batch form Year 2023 to Year 2027

SEMESTER– III

Course Name	:	PROGRAMMING IN C++
Course Code	:	CSL2033
Credits (L-T-P)	:	3-1-1
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the difference between structures as well as object oriented programming. The students are able to write the programs in C++ and also able to use the various data types to solve the data structure problems. Emphasis is placed on the dynamic memory allocation in C++ and the storage of data on external drives.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	Difference between C, C++ and VC++, <u>Classes and Objects</u> ; Access Specifiers, , Brief introduction to data types, operators and control statements in C++. Advanced preprocessor statements, Features of C++, I/O statements in C++, Manipulators, <u>Arrays and Strings</u> .	10
SECTION - B		
2	Function Overloading, Inline Functions, Friend Functions and Friend Class. Constructors & Destructors: Types of Constructors.	10
SECTION - C		
3	Inheritance, Types of Inheritance, Ambiguity in Inheritance. Polymorphism: Virtual Functions, Pure virtual Functions, Operator Overloading.	10

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SEMESTER– III

SECTION – D		
4	Pointers, Array of pointers. Dynamic memory allocation in C++.File handling in C++, Templates and Exception Handling.	10

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

Suggested Books	
1	Object Oriented programming in C++ - Robert Lafore
2	Programming ANSI and TURBO C++ - Kamdhane
3	Let Us C++ - YashwantKanetkar
4	The C++ Programming Language - BjarneStroustrup

Course Outcomes:	
1	Implementation of both the static and dynamic programming used un various application of computers
2	Understanding of low level programming approach and its implementation
3	Implementation of data structure using C++

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SEMESTER–III

Course Name	:	DIGITAL CIRCUITS AND LOGIC DESIGN
Course Code	:	ECL2091
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is aimed to introduce important initial understanding of digital electronics 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 –40

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	Data and number representation–binary, Octal, Hexadecimal (conversions, addition & subtraction) complements, BCD, ASCII, Excess-3 code, Gray codes, logic gates, Boolean Algebra.	10
SECTION – B		
2	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.	10

SECTION – C		
3	Combinational circuit design, Adder, Subtractor, Encoder, Decoder, Multiplexer, Demultiplexer. Sequential circuits: flip–flops, counters, shift registers, State diagram for sequential circuits.	10

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SEMESTER–III

SECTION – D		
4	A/D and D/A conversion techniques. Memory system – RAM, ROM, EPROM, EEPROM, PLDs, PAL, PLA, PGAs. Introduction to VLSI Design.	10
Practical's		
1	Realization of selected circuits using TTL and MOS components.	
2	Familiarization with CAD design tools.	
3	Design exercises using EPLDs and FPGAs.	
4	Compare two six bit numbers and display the larger number on seven segment display.	
5	Design a mod – 7 counter. Generate a pulse for every 1 ms.	
6	Use 2 to 1 Mux and implement 4 to 1 Mux.	
7	Pattern recognizer.	
8	4 bit ALU.	
9	Serial to parallel shifter and parallel to serial shifter.	
10	Priority resolver.	
11	Binary to gray code converter.	
12	Traffic light controller.	
13	Pattern Generator.	
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	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 Jersey, 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.	

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SEMESTER– III

Course Name	:	WRITTEN & ORAL TECHNICAL COMMUNICATION (Communication Skills for Scientists and Engineers)
Course Code	:	ENL2001
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
At the end of this course, the student should be able to understand the basics of technical report writing as well as able to give presentation. Students are able to prepare their resume and presentation.

Total No. of Lectures –40

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	Communication- Meaning of Communication, Types of Communication – Verbal and Non-verbal, Barriers to Communication.	10
SECTION - B		
2	Paragraph writing, Essay Writing, Official Correspondence, Note-taking from lectures, Resume writing, Precis writing.	10
SECTION - C		
3	Antonyms, Synonyms, Homonyms, Homophones, One-word Substitution, Formation of Nouns, Verbs, Adjectives, Adverbs and the usage.	10

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SECTION - D		
4	Group Discussions, Preparing for Interview, Conferences and Seminars, Oral Presentation and Slide Preparation.	10

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

Course Outcomes:	
1	Technical Report Writing
2	Know about the preparation of technical presentation and the way to deliver the seminar
3	Enhance the technical writing skills
4	Writing of resume and preparation for interviews

Suggested / Reference Books:	
1	The Chicago Manual of Style, 13 th 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:", 3 rd Edition, McMillan, 1979.
5	Turbian K.L., "A Manual for Writers of Term Papers, Thesis and Dissertations" Univ. of
6.	IEEE Transactions on "Written and Oral Communication" has many papers.

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**SEMESTER–III
ESL2020: Environmental Studies
(Value Added Course)**

Time: 3 Hrs.

Credits: 2-0-0

**Exam Pattern: End Semester Examination- 75 marks
Project Report/Field Study- 25 marks [based on submitted report]
Total Marks- 100**

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.

Note (I): As per the decision of the Academic Council meeting dated 17-01-2022, Item: ‘X’ atleast one visit is compulsory for students in the Pushpa Gujral Science City, Kapurthala during the entire course w.e.f. the Batch 2021-22.

Project Report / Internal Assessment:

Field work – 25 marks [Field work equal to 5 lecture hours]

The candidate will submit a hand written field work report showing photographs, sketches, observations, perspective of any topic related to Environment or Ecosystem. The exhaustive list for project report/area of study are given just for reference:

1. Visit to a local area to document environmental assets: River / Forest/ Grassland / Hill / Mountain / Water body / Pond / Lake / Solid Waste Disposal / Water Treatment Plant / Wastewater Treatment Facility etc.
2. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of tree in your areas with their botanical names and soil types
5. Study of birds and their nesting habits
6. Study of local pond in terms of wastewater inflow and water quality
7. Study of industrial units in your area. Name of industry, type of industry, Size (Large, Medium or small scale)
8. Study of common disease in the village and basic data from community health centre
9. Adopt any five young plants and photograph its growth
10. Analyze the Total dissolved solids of ground water samples in your area.
11. Study of Particulate Matter (PM_{2.5} or PM₁₀) data from Sameer website. Download from Play store.
12. Perspective on any field on Environmental Studies with secondary data taken from Central Pollution Control Board, State Pollution Control Board, State Science & Technology Council etc.

SEMESTER–III

SECTION- A

1. The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

2. Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems.

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

SECTION- B

3. Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

4. Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

SEMESTER-III

SECTION- C

5. Environnemental Pollution

Définition

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

6. Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

SECTION-D

7. Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

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Field Work

- Visit to a local area to document environmental assets river/forest/ grassland/ hill/ mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

Field work comprises of 5 hours of field work / visit/ assignment to be submitted by each candidate to the Teacher in-charge for evaluation latest by 1st week of before the commencement of theory exam.

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. &Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.
4. Joseph, K. &Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press, New Delhi.
7. Sharma, J. P., Sharma. N.K. &Yadav, N.S. 2005. Comprehensive Environmental Studies, Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut.
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi.

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SEMESTER–III

LEARNING OUTCOME

Course Name	:	Environmental Studies
Course Code	:	ESL2020

Course Objectives:

At the end of this course, the students should be able to understand the scope and importance of environmental studies, different natural resources (forests, minerals, energy, water, land, food, biodiversity) and their utilization as well as conservation methods; importance of ecosystem structure and function; different types of environmental pollution (air, water, soil, thermal, nuclear and noise), Environmental Law and remedial methods. The students will also have to be introduced to various Acts and Last but not least the students should be made aware of the consequences of population explosion; diseases such as HIV/AIDS and various family welfare programs.

Learning Outcome:

- The present subject will help the student to gain knowledge about the effects of environmental pollution and remediation.
- Visiting to a local polluted site (including urban / rural / industrial / agricultural) will help to students to identify the causes, effects and remedial measures.
- After understanding the role of individual in conservation of environment, every individual would be able to follow the sustainable lifestyle patterns.
- The knowledge on environmental protection Acts and Rules will give them valuable glance on legal aspects towards conservation of environment.

SEMESTER-III
SOL1006 -Drug Abuse: Problem, Management and Prevention
(Value Added Course)

Time: 3 Hours

Credit 2-0-0

Total Marks-50

Mid Term Semester: 10 Marks

End Term Semester: 40 Marks

Mid Semester Examination: 30% weightage

End Semester Examination: 70% 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

a) Meaning of Drug Abuse:

- (i) Meaning, Nature and Extent of Drug Abuse in India and Punjab.
- (ii) Consequences of Drug Abuse for:
 - Individual : Education, Employment, Income.
 - Family : Violence.
 - Society : Crime.
 - Nation : Law and Order problem.

SECTION – B

b) Management of Drug Abuse:

- (i) Medical Management: Medication for treatment and to reduce withdrawal effects, Rehabilitation.
- (ii) Psychiatric Management: Counselling, Behavioural and Cognitive therapy.
- (iii) Social Management: Group therapy and Environmental Intervention.

SECTION – C

a) Prevention of Drug abuse:

- (i) Role of family: Parent child relationship, Family support and Supervision.
- (ii) School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination.

SECTION –D

b) Controlling Drug Abuse:

- (i) Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Educational and awareness program.
- (ii) Legislation: NDPs act, Statutory warnings, Policing of Borders, Checking Supply/Smuggling of Drugs.

SEMESTER-III

COURSE OUTCOME:

- This course will help the students to have knowledge about Drug Abuse and its impact on Individual, Family and Society at large.
- Further, the course will help students to know about the management and prevention of Drug Abuse.
- The course aims to create awareness among the students about menace of Drug Abuse.

References:

1. Ahuja, Ram (2003), Social Problems in India, Rawat Publication, Jaipur.
2. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
3. Inciardi, J.A. 1981. The Drug Crime Connection. Beverly Hills: Sage Publications.
4. Jayachandran, J. (2020), The Media Coverage of Drugs and Alcohol in Punjab during COVID-19 Pandemic. Asian Politics & Policy, 12: 469-476. <https://doi.org/10.1111/aspp.12537>
5. Kapoor. T. (1985) Drug epidemic among Indian Youth, New Delhi: Mittal Pub.
6. Kessel, Neil and Henry Walton. 1982, Alcoholism. Harmond Worth: Penguin Books.
7. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention, Jaipur: Rawat Publication.
8. National Household Survey of Alcohol and Drug abuse. (2003) New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
9. Ross Coomber and Others. 2013, Key Concept in Drugs and Society. New Delhi: Sage Publications.
10. Sain, Bhim 1991, Drug Addiction Alcoholism, Smoking obscenity New Delhi: Mittal Publications.
11. Sandhu, Ranvinder Singh, 2009, Drug Addiction in Punjab: A Sociological Study. Amritsar: Guru Nanak Dev University.
12. Singh, Chandra Paul 2000. Alcohol and Dependence among Industrial Workers: Delhi: Shipra.
13. Sussman, S and Ames, S.L. (2008). Drug Abuse: Concepts, Prevention and Cessation, Cambridge University Press.
14. Verma, P.S. 2017, "Punjab's Drug Problem: Contours and Characteristics", Economic and Political Weekly, Vol. LII, No. 3, P.P. 40-43.
15. World Drug Report 2016, United Nations office of Drug and Crime.
16. World Drug Report 2017, United Nations office of Drug and Crime.

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SEMESTER– III

Course Name	:	Mini Project
Course Code	:	CSP2034
Credits (L-T-P)	:	4 (0-0-4)
Total Marks	:	100

Course Objectives:
At the end of this course, the student should be able to understand the Design / Fabrication / Implementation work under the guidance of faculty member. The students have an exposure to work in a group and to understand the working of IT industry.

Guidelines
A candidate should work on the Mini Project in the Campus under the guidance of their guide

Examination		Credits
Final Project Report	Final Project Report & Viva Voce of 4 credits	4

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

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SEMESTER – IV

Course Name	:	Operating System
Course Code	:	CSL2040
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics of operating systems as well as its various types. The students are able to write programs in C/C++ languages. This course introduces operating systems using the Windows/Linux/DOS. Emphasis is placed on common algorithms and programming principles utilizing the standard library with TurboC3.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	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.	10
SECTION - B		
2	Resource allocation graph, Deadlocks: Deadlock Avoidance and Deadlock Handling Process Synchronisation: Race Condition, Critical Section, Semaphores, Classical problems of synchronization, Monitors	10

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SEMESTER – IV

SECTION – C		
3	Memory Management: External fragmentation, Internal fragmentation, Compaction, Paging, Segmentation, Virtual memory, Demand paging.	10
	Device Management: Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O Device handlers.	
SECTION - D		
4	Disk Scheduling: FCFS, SSTF, SCAN, C–SCAN, N–Stop Scan	10
	Introduction to Multiprocessor and Distributed Operating Systems	
	Case Studies: Windows 8x/XP/2000, UNIX, LINUX to be discussed briefly.	

Course Outcomes:	
1	Implement the different scheduling algorithms.
2	Implement the Banker's algorithm.
3	Implement the different memory management techniques ((First Fit, Best Fit, Worst Fit).
4	Implement the different disk management techniques (FCFS, SSTF, LOOK, SCAN, C-LOOK, C-SCAN).

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

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SEMESTER – IV

Course Name	:	DATA COMMUNICATION
Course Code	:	CSL2041
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students with the Data Communication. The students are able to learn about LAN Standards and network devices. The various routing algorithms are highlighted. This course introduces concept of cryptography and data compression.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>kInstructions 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.</p>		
SECTION - A		
1	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.	10
SECTION - B		
2	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	10

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SECTION - C		
3	Virtual Circuits and datagrams, Routing Algorithms, Congestion Control Algorithms. Internetworking. Elements of Transport Protocol	10
SECTION - D		
4	Fundamental of Data Compression Techniques and Cryptography. Domain Name System, Electronic Mail, FTP, Worldwide web (WWW), IPv4, IPv6	10

Course Outcomes:	
1	Students have hands on practice for preparing cross cable & straight cable using various communication media.
2	Students have in depth knowledge of simulating and implementing various routing algorithms.
3	Students have comprehensive awareness of various servers (DHCP, Proxy and FTP)
4	Students thoroughly learn about the networking using various topologies.

Suggested / Reference Books:	
1	Tannanbaum, A.S. : Computer Networks, Prentice Hall, 1992 2 nd Ed.
2	Tannanbaum, A.S. : Computer Networks, Prentice Hall, 1992 3 rd 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.

Practical's
Students should be asked to prepare the LAN Cables, Implementation of Structure Cabling, and Configuration of switches, router, and other network devices. Writing Program in C++ to implement various networking algorithms.

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SEMESTER – IV

Course Name	:	System Programming
Course Code	:	CSL2043
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is introduced to enlighten the students about various system software, their roles and working, their design and implementation algorithms. The main software focussed are assemblers, compilers, loaders and linkers, Macro-processors, editors and debuggers.

Total No. of Lectures –40

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: 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.	10
SECTION - B		
2	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.	10
SECTION - C		
3	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.	10

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SEMESTER – IV

SECTION - D		
4	<p>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.</p> <p>Editors & Debuggers: Introduction to a text editor & its types, Interactive debugging systems</p>	10

Course Outcomes:	
1	The students should be able to understand the execution process of HLL programs.
2	Increase students' awareness about the working of scanners and parsers
3	Students understand the basic design and implementation of various system software.

Suggested / Reference Books:	
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–
3	Calingaret, P, Assemblers, Compilers and Program Translation Rockville, MD, Computer
4	Donovan J.J., Systems Programming, New York, McGraw Hill, 1972.
5	Grosline G.W., Assembly and Assemblers, The Motorola 68000 Family, Prentice Hall,

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SEMESTER – IV

Course Name	:	Discrete Structures
Course Code	:	CSL2044
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester	:	30% weightage
End Semester	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
At the end of this course, the student should be able to understand the basics of Discrete Structures. The students are able to understand the Groups, Rings, Graph, Lattices and Boolean algebra, Recurrence Relations and Generating Functions.

Total No. of Lectures –40

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	Groups and Rings: Groups, monoids, and Submonoids, Semigroup, Subgroups and Cosets. Congruence relations in semigroups. Morphisms. Normal subgroups. Cyclic groups, permutation groups, dihedral groups, Rings, subrings, morphism of rings, ideals and quotient rings.	10

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SEMESTER – IV

SECTION – B		
2	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.	10
SECTION – C		
3	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.	10
SECTION – D		
4	Recurrence Relations and Generating Functions: Polynomial expressions, telescopic form, recursion theorem, closed form expression, generating function, solution of recurrence relation using generating function	10

Course Outcomes:

1	Understand the basics of Discrete Structures.
2	Understand the concepts of Groups, Rings, Graph, Lattices and Boolean algebra, Recurrence Relations and Generating Functions.

Suggested / Reference Books:

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).

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SEMESTER – IV

Course Name	:	Computer Architecture
Course Code	:	CSL2045
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
At the end of this course, the student should be able to understand the basics of computer Architecture. The subject explores how machines are designed, built, and operate. The students will get familiar with CPU Architecture, Programming & controlling the basic computer. Emphasis is placed on memory organization and I/O Organization.

Total No. of Lectures –40

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	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.	10
SECTION - B		
2	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.	10

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SEMESTER – IV

SECTION – C		
3	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.	10
SECTION - D		
4	Parallel & Multiprocessing Environment: Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, interprocessor communication & synchronization.	10

Course Outcomes:	
1	Students got detailed information of registers, operations, instructions.
2	Students got in depth knowledge of different types of memories along with concept of paging and segmentation
3	The course will conclude with a look at the recent switch from sequential processing to parallel processing by looking at the parallel computing models and their programming implications.

Suggested / Reference Books:	
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.

SEMESTER-IV

PSL0059: HUMAN RIGHTS AND CONSTITUTIONAL DUTIES (Value Added Course)

Credit: 2

Total Marks: 50

Mid Semester: 10 Marks

End Semester: 40 Marks

Mid Semester Examination: 30% weightage

End Semester Examination: 70% 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 HUMAN RIGHTS

Foundational Aspects: Meaning, Nature, Characteristic, Classification.

International Framework: Constituents of the Universal Declaration of Human Rights (UDHR).

SECTION-B

INDIAN PERSPECTIVE OF HUMAN RIGHTS

Constitutional Realisation in India: Fundamental Rights (Part III, Constitution of India).

Protective Mechanism in India: The composition, Powers and Functions of the National Human Rights Commission of India (NHRC).

SECTION – C

INTRODUCTION TO HUMAN DUTIES

Conceptual Perspective: Meaning, Nature & Characteristics of Human Duties.

Intellectual discourses: Classification of Human Duties; Relevance of Human Duties

SECTION – D

INDIAN PERSPECTIVE OF HUMAN DUTIES

Constitutional Recognition in India: Fundamental Duties in Indian Constitution, Part IV A.

Intellectual Discourse: Critical Analysis and Significance of Fundamental Duties

SEMESTER-IV

Course Outcome:-

The course is designed as a compulsory subject for students of the university at the UG level. The primary outline of the course is that it provides basic understanding to the students about the conceptual frameworks of human rights. The course also provides the students knowledge about the Indian framework of human rights. In addition to this, the course provides thorough understanding about the nature, types of human duties. The course also introduces the students to the fundamental duties incorporated in the Indian constitution

Readings List:

1. United Nations. *The United Nations and Human Rights 1945-1995*. Geneva: United Nations Blue Books Series, Vol. VII, 1996.
2. Sastry, S. N. *Introduction to Human Rights and Duties*. Pune: University of Pune Press, 2011.
3. Mertus, Julie. *The United Nations and Human Rights-A Guide for a New Era*. London: Routledge, 2009.
4. Donnelly, Jack. *Universal Human Rights in Theory and Practice*. New York: Cornell University Press, 2013.
5. Hammarberg, Thomas. *Taking Duties Seriously- Individual Duties in International Humanitarian Law*. Versoix: International Council on Human Policy, 1999.
6. Miller P. Frederic, et al. *Fundamental Rights, Directive Principles and Fundamental Duties in India*. New York: VDM Publishing, 2009.
7. Cinganelli, Davis Louis. *Human Rights- Theory and Measurements*. London: Macmillan Press, 1988.
8. Ishay, M. R. *The History of Human Rights*. New Delhi: Orient Longman, 2004.
9. Mohapatra, Arun Ray. *National Human Rights Commission of India: Formation, Functioning and Future Perspectives*. New Delhi: Atlantic, 2004.
10. Deol, Satnam Singh. *Human Rights in India-Theory and Practice*. New Delhi: Serials Publications, 2011.

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SEMESTER– V

Course Name	:	System Analysis & Design
Course Code	:	CSL3030
Credits (L-T-P)	:	4(3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the concepts of different types of system involved and how to create the project report during the six months training. This course introduces the analysis and design methodologies which is feasible, cost effective and risk manageable along with security measures for any software project. Case studies are the key aspects covered during every phase of software.

Total No. of Lectures –40

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	Definition, Characteristics, Elements and Types of system, System Development life cycle. Role of System Analyst.	10
SECTION - B		
2	System planning and initial investigation, information gathering tools, Feasibility Study and its importance , Cost Benefit Analysis.	10
SECTION - C		
3	Introduction, Methodology, Tools for structured design- Data Flow Diagrams, Flowcharts, Structure Charts, Decision Tree, Decision Table, Structured English, Data Dictionary. Test Plan, Activity network for system testing. Implementation & Maintenance, Documentation Tools used in SDLC.	10

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SEMESTER– V

SECTION - D		
4	Introduction, Threats to System, Control Measures, Disaster Recovery, Audit Trails, Risk Management Case Studies: Library Management System, University Management System, Health Care Management System	10

Course Outcomes:		
1	Concept of Management Information System, Decision Support System , Role of Analyst using different case study is involved	
2	Able to create own documentation or report after completing any project/ training	
3	Different design methodologies such as Data Flow Diagram, Decision Tree, Table and many more use to show the implementation into more impressive way.	

Suggested / Reference Books:	
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
5	“Understanding Dynamic System: Approaches to Modelling, Analysis and Design”
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.

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SEMESTER– V

Course Name	:	RELATIONAL DATABASE MANAGEMENT SYSTEMS
Course Code	:	CSL3032
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the database concepts and its practical implementation using MySQL or Oracle . The students are able to implement SQL Commands, SQL queries and PL/SQL concepts using MYSQL or Oracle. This course introduces implementation using MySQL Workbench and MYSQL Server. Emphasis is placed on the advanced database concepts and SQL queries utilizing the MYSQL.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>Introductory Concepts: Database, Database Management System (DBMS), Advantages and Disadvantages of DBMS, Database System Structure, DBA and responsibilities of DBA.</p> <p>Three level ANSI–SPARC Architecture Schemas, Mapping, instances and Database Independence, Entity–Relationship Model, Relational Data Model, Keys, Integrity Constraints, Relational Algebra, Relational Calculus.</p>	10

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SECTION – B		
2	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.	10
SECTION – C		
3	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	10
SECTION - D		
4	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,	10

Course Outcomes:	
1	Students will get the enormous knowledge about the various concepts of databases such as Architecture of Database System, Data Models, Relational Algebra and Relational Calculus.
2	Learn and apply MYSQL on the database concepts using different SQL Commands
3	Implement advanced SQL concepts using MYSQL or Oracle
4.	Students will get the vast knowledge about the Transaction Management and Concurrency Control and Database Recovery and Security concepts
Suggested / Reference Books:	
1	Ivan Bayross, “SQL/PLSQL: The Programming Language of Oracle, 3 rd Revised Edition,
2	Elmars & Navathe, “Fundamentals of Database Systems” 4 th Edition, 2004.
3	C.J.Date “Introduction to database system”, 8 th Edition, Galgotia Publications, 2004.
4	Connolly & Begg “Database Systems – A practical approach to design, Implementation and Management, 3 rd Edition, Pearson Education India, 2003.
5	Silberschatz, Korth, Sudershan “Database System Concepts” 4 th Edition, McGraw
6	Microsoft SQL Server 2012 Step by Step, Microsoft Press, Patric LeBlanc

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SEMESTER– V

Course Name	:	DESIGN AND ANALYSIS OF ALGORITHM
Course Code	:	CSL3033
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

The objective of the course is to teach techniques for effective problem solving in computing. It covers good principles of algorithm design, elementary analysis of algorithms, and advanced data structures.

Total No. of Lectures –40

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: 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 of pivot element.	10
SECTION - B		
2	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.	10
SECTION - C		
3	Backtracking: General Method, 8-Queens Problem, Graph Coloring, Subset-Sum Problem. Branch-and-Bound: General Method, Travelling Salesman Problem, Knapsack Problem, Assignment Problem	10

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SEMESTER– V

SECTION – D		
4	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), – Approximations (Scheduling Independent Tasks and Bin Packing).	10
Course Outcomes:		
1	Analyze the complexity of algorithms, to provide justification for the selection, and to implement the algorithm in a particular context.	
2	Apply various algorithmic design paradigms such as greedy, dynamic, backtracking etc. to solve common engineering problems.	
3	Identify basic properties of graphs and apply their algorithms to solve real life problems.	
4	Demonstrate the application of algorithms and selection of appropriate data structures under several categories such as string matching, randomized algorithms and genetic	

Suggested / Reference Books:	
1	Aho , Hopcroft and Ullman “The Design and Analysis of Computer Algorithms”, 2003.
2	Horowitz, S. Sahni, Sanguthevar Rajasekaran “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	Python Essential Reference, by David Beazley , 4th edition
6.	Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinechart and Winston, 1985.
7	D. E. Kunth, The Art of Computer Programming, Vols .I and 3, 1968, 1975.

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SEMESTER– V

Course Name	:	Formal Languages & Automata Theory
Course Code	:	CSL3051
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics and foundations of computing systems, their mathematical representation using automata and their languages. The students should also able to understand ambiguity problems and its solution. This course also introduces further extensions and applications of formal languages by introducing advance topics.

Total No. of Lectures –40

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	Operations on Languages: Automata and their Languages, The Equivalence of the Automata, Minimization of Automata and the appropriate grammars. Moore and Mealy Machines. Linear Grammars and regular Languages. Regular Expressions Context Sensitive Languages.	10
SECTION - B		
2	Unrestricted Languages: Context Free Languages: Derivation Graph and Normal forms: The Chomsky & Griebach Normal Forms. The Kuroda Normal Form. The Dyck Language.	10
SECTION - C		
3	Closure properties of Language Classes, One sided Context Sensitive Grammars; Finite Pushdown Automata, 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.	10

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SEMESTER – V

SECTION - D		
4	Derivation Languages: Rewriting Systems, Algebraic properties, Canonical Derivations, Context Sensitivity. Cellular Automata: Formal Language aspects, Algebraic Properties Universality & Complexity Variants.	10

Course Outcomes:	
1	Knowledge: Acquire a full understanding and frame of mind of Automata Theory as the basis of all computer science languages design - Have a clear understanding of the Automata theory concepts such as RE's, DFA's, NFA's, Turing machines, Grammar, halting problem, computability and complexity.
2	Cognitive skills (thinking and analysis) <ul style="list-style-type: none"> • Be able to design FAs, NFAs, Grammars, languages modelling, small compilers basics • Be able to design sample automata • Be able to minimize FA's and Grammars of Context Free Languages.
3	Professional Skill <ul style="list-style-type: none"> • Perceive the power and limitation of a computer • Solve the problems using formal language
4	Attitude- Develop a view on the importance of computational theory.

Suggested / Reference Books:	
1.	K.L.P. Mishra, Theory of Computer Science: Automata, Languages and Computation, Prentice Hall India Learning Private Limited (2006).
2.	Jeffrey Ullman and John Hopcroft, Introduction to Automata Theory, Languages, and Computation, 3e, Pearson Education India (2008).
3.	Peter Linz, An Introduction to Formal Languages and Automata, 6/e, Jones & Bartlett (2016).
4.	John Martin, Introduction to Languages and the Theory of Computation, McGraw-Hill Higher Education (2007).
5.	G.E. Reevesz, 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.

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SEMESTER– V

Course Name	:	Programming in ASP.NET
Course Code	:	CSL3036
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the .NET framework and its programming concepts. The students are able to write programs using .NET framework. This course introduces computer programming using the .NET framework and SQL Server database. Emphasis is placed on the programming principles utilizing the .NET framework and SQL Server database.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
1	<p align="center">SECTION - A</p> <p>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</p>	10

SEMESTER – V

SECTION - B		
2	<p>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.</p>	10
SECTION – C		
3	<p>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.</p>	10

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SEMESTER – V

SECTION – D		
4	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.	10
	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	
Course Outcomes:		
1	Students will get the enormous knowledge about the various concepts of .NET framework such as websites, web applications, web forms, files, security using various tools and techniques	
2	Learn and apply SQL Server database concepts like database, tables, queries, stored procedures etc.	
3	Implement and integrate .NET Framework with SQL Server database.	
Suggested / Reference Books:		
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:	
5	Professional ASP.NET 4.5 in C# and VB, Wrox Publications.	
6.	ImarSpaanjaars: Beginning ASP.NET 4.5: in C# and VB , John Wiley.	
7	Walther, Active Server Pages 2.0 Unleashed, BPB Publications.	

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SEMESTER– VI

Course Name	:	OBJECT ORIENTED ANALYSIS AND DESIGN
Course Code	:	CSL3042
Credits (L-T-P)	:	4(3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the concepts of creating different types of diagrams involved in analysis and design methodologies. This course introduces the techniques used to design different programming languages. The implementation strategies using various programming languages and database back-end are introduced.

Total No. of Lectures –40

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 to Object Oriented concepts, comparison of object oriented vs Procedural software development techniques. Advantages of Object Oriented Methodology. Modeling as a Design technique, Object modeling technique.	10
SECTION - B		
2	Object & Classes, Links & Associations, Generalization & Inheritance, Aggregation, Abstract Classes, example of an Object Model. Events and States, Operations, Nested State Diagrams, Concurrency, example of the Dynamic Model.	10

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SECTION – C		
3	Functional Models, Data Flow Diagrams, Specifying Operations & Constraints, example of a Functional Model. 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.	10
SECTION - D		
4	Implementation of the design using a Programming Language or a Database System. Comparison of Object Oriented vs Non Object Oriented Languages.	10

Course Outcomes:	
1	Front-end and Back-end programming language design using 12 different diagrams are discussed.
2	Able to design any kind of software project in more impressive way.
3	Documentation is more interactive and conceptually easy to present

Suggested / Reference Books:	
1	“Object Oriented Modeling& Design” by James Rumbaugh, Michael Balaha (PHI , EEE)
2	“Object Oriented Software Construction” Hertfordshire PHI International 1988.
3	“Object Oriented Programming” Brad J.Cox Addison Wessley,1986.

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SEMESTER– VI

Course Name	:	OBJECT ORIENTED PROGRAMMING USING JAVA
Course Code	:	CSL3044
Credits (L-T-P)	:	5 (3-1-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

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

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>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.</p>	10
SECTION - B		
2	<p>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.</p>	10

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SECTION – C		
3	Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Interthread communication, Suspending Resuming and Stopping Threads. Socket Programming: Networking in Java, server and client communication using socket in Java, Working with Server and Client Socket Connection, Event Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces	10

SECTION – D		
4	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.	10

Course Outcomes:	
1	Write, compile and debug programs in Java, use different data types, operators and I/O function in a computer program.
2	Comprehend the concepts of classes, objects and apply basics of object oriented programming, polymorphism and inheritance.
3	Implement various data structures using Java language.
4	Demonstrate use of multithreaded programming, exception handling, event handling, abstract window toolkit, servlets and JDBC.

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

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SEMESTER– VI

Course Name	:	SOFTWARE ENGINEERING AND TESTING
Course Code	:	CSL3050
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the Software Engineering Concepts and its practical implementation using Selenium tool .The students are able to do practical experiments on Software Designing and Software Project Management. This course introduces Software Testing Strategies and building and running test cases using Selenium tool.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>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</p> <p>Software Product metrics- Object-oriented design metrics, operation-oriented metrics and interface design metrics-metrics for source coding, metrics for testing, metrics for maintenance</p>	10

SEMESTER – VI

SECTION – B		
2	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	10
SECTION – C		
3	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.	10
SECTION - D		
4	<p>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.</p> <p>Test Automation Tool: Introduction to Selenium Tool, Selenium IDE, Selenium Remote control, Selenium Grid.</p>	10
Course Outcomes:		
1	Students will get the enormous knowledge about the various concepts of Software Engineering such as Software Development Life Cycle, Software Project Management, Risk Management, Verification and Validation, Software Metrics.	
2	Students are able to do the practical experiments on Software Designing and Software Project Management.	
3	Students will get the vast knowledge about the Software testing and strategies, Debugging process and Software Testing Life Cycle	
4	Students are able to do the practical work with Selenium tool- Building & Running Test Cases, Selenium Commands – “Selenese” - Script Syntax	

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SEMESTER – VI

Suggested / Reference Books:	
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

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SEMESTER – VI

Course Name	:	REAL TIME SYSTEMS
Course Code	:	CSL3047
Credits (L-T-P)	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the basics of real time systems and real time programming. Further, emphasis is placed on various methodologies and algorithms used for scheduling in RTOS. Students will get familiarity with various architectural requirements and reliability issues for RTS design.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>Introduction to Real-time systems: Issues of Real-time Systems, tasks & Task parameters, Real-time Systems components Soft and hard real time system, periodic and aperiodic tasks. Specification of time constraints.</p> <p>Need for task scheduling: Issues and scheduling methodologies. Priority based scheduler, value based scheduler & Pre-emptive scheduling multiprocessor environment. Deterministic scheduling, Hardware Schedulers. [25%]</p>	10

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SECTION – B		
2	Real time Operating Systems: A case study of generalized Executive for multiprocessors(GEM). Programming using Real time OS Constructors. Microprocessor based Real time scheduler. Real Time Languages: Case study of a language having facilities for Management, Euclid and Ada for real time programming.	10
SECTION - C		
3	Architectural requirements of Real Time Systems: Tightly coupled systems, hierarchical systems, arbitration schemes, Reliability issues, HW/SW faults, diagnosis, functional testing etc. Fault tolerant architectures: TMR systems.	10
SECTION - D		
4	Real Time Knowledge based systems: Integration of real time and knowledge based systems. Neural networks and fuzzy logic in real time systems.	10
Course Outcomes:		
1	Students have got detailed understanding of design issues of real time systems, its components and time constraints	
2	Students have in depth knowledge of working of scheduling algorithms and RTOS	
3	Students have comprehensive awareness about programming of real time systems in ADA and case studies of intergration of RTS, KBS and fuzzy logic	
Suggested / Reference Books:		
1	Levi S.T. and Aggarwal A.K. Real Time System Design, McGraw Hill International Edition, 1990.	
2	Stankovic J.A. and Ramamritham K., Hard Real Time Systems, IEEE Press, 1988.	

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SEMESTER – VI

Course Name	:	NATURAL LANGUAGE PROCESSING
Course Code	:	CSL3045
Credits (L-T-P)	:	4(3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the concepts of Artificial Intelligence, Semantics and applications involved. The components and knowledge based representation is the core part of this subject. The baseline of this course is the combination of different languages such as Data Structure, Automata, Knowledge based covered using different application.

Total No. of Lectures –40

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 to the methods and techniques of Natural Processing – semantics, pragmatics, Applications of Natural Language Processing.	10
SECTION - B		
2	Lexicography, syntax, Semantics, pragmatics: word level representation of natural languages prosody & natural languages. Chomsky Hierarchy, Left Associative Grammars, Ambiguous Grammars. Resolution of Ambiguities.	10
SECTION - C		
3	Semantic Network Logic and inference. Pragmatics, Graph Models and Optimization. Prolog for natural semantic. Recognition and parsing of natural language structures: ATN & RTN, General techniques of parsing: CKY, Earley & Tomita's Algorithm.	10

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SECTION - D		
4	Machine translation; User Interfaces, Natural languages Querying Tutoring and Authoring Systems. Speech Recognition Commercial use of NLP.	10

Course Outcomes:		
1	Concepts of combination of various courses are understood	
2	Working of several application areas are implemented	
3	Advance concepts of Machine to Speech Recognition is involved	

Suggested / Reference Books:		
1	J. Allen, Natural Language understanding, Benjamin/Cummings, 1987.	
2	G. Gazder, Natural Language Processing in Prolog, Addison Wesley, 1989.	
3	MdijArbib & Kfaury, Introduction to Formal Language Theory, Springer Verlag, 1988.	

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SEMESTER – VI)

Course Name	:	SYSTEM HARDWARE DESIGN
Course Code	:	CSL3046
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

To provide students an exposure to analysis and design techniques used in digital system hardware design.

Total No. of Lectures –40

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	CMOS Technology: Logic levels, Noise Margin, Power dissipation, Supply currents, Speed delays, Interconnect analysis.	10
SECTION - B		
2	Power/ Ground/ Droop/ Bounce, Coupling analysis, Transmission line effects /cross talk, Power/ground distribution.	10
SECTION - C		
3	Signal distribution, Logic Design \ Random logic \ programmable logic, Microcontrollers.	10
SECTION - D		
4	Memory subsystem design, Noise tolerant design, Worst case timing, Thermal issues in design, Real life system design examples.	10

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Course Outcomes:	
1	Recognize issues to be addressed in a combined hardware and software system design.
2	Draw the schematic diagram of an electronic circuit and design its PCB layout.
3	Apply hands-on experience in electronic circuit implementation and its testing.

Suggested / Reference Books:
<ol style="list-style-type: none">1. K.L.P. Mishra, Theory of Computer Science: Automata, Languages and Computation, Prentice Hall India Learning Private Limited (2006).2. Jeffrey Ullman and John Hopcroft, Introduction to Automata Theory, Languages, and Computation, 3e, Pearson Education India (2008).3. Peter Linz, An Introduction to Formal Languages and Automata, 6/e, Jones & Bartlett (2016).4. John Martin, Introduction to Languages and the Theory of Computation, McGraw-Hill Higher Education (2007).5. G.E. Reevesz, 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.

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SEMESTER – VI

Course Name	:	OPERATION RESEARCH (ELECTIVE – I)
Course Code	:	CSL3048
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This module aims to introduce students to use quantitative methods and techniques for effective decisions-making; model formulation and applications that are used in solving business decision problems. The module cover topics that include: linear programming, Transportation, Assignment, and CPM/ MSPT techniques. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

Total No. of Lectures –40

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 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:	10
SECTION - B		
2	Sensitivity analysis. Duality theory. Revised Simplex. Dual Simplex. Transportation and Assignment Problems.	10

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SECTION – C		
3	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.	10
SECTION - D		
4	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.	10

Course Outcomes:

1	Knowledge and understanding - Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
2	Cognitive skills (thinking and analysis) - Be able to build and solve Transportation Models and Assignment Models.
3	Communication skills (personal and academic) - Be able to design new simple models, like: CPM, MSPT to improve decision –making and develop critical thinking and objective analysis of decision problems.
4	Practical and subject specific skills (Transferable Skills) - Be able to implement practical cases, by using TORA, WinQSB

Suggested / Reference Books:

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.

SEMESTER– VI

CSL3049: LANGUAGE PROCESSOR (ELECTIVE – I)

Course Name	:	LANGUAGE PROCESSOR (ELECTIVE – I)
Course Code	:	CSL 3049
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

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.

Total No. of Lectures –40

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	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.	10
SECTION - B		
2	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.	10

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SECTION – C		
3	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.	10
SECTION - D		
4	Code optimization: Global data flow analysis. A few selected optimizations like command sub expression removal, loop invariant code motion, strength reduction etc.	10

Course Outcomes:	
1	Students are able to work with parser and its programming techniques
2	Students got in depth knowledge of implementing various programs by allocating memory dynamically in different aspects
3	Students will be able to understand the optimization of code as well the reeducation of code.

Suggested / Reference Books:	
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
4	Waite W.N. and Goos G., Compiler Construction Springer Verlag

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SEMESTER– VII

Course Name	:	Computer Graphics
Course Code	:	CSL4081
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

The goal of this course is to provide an introduction to the theory and practice of computer graphics. The course will assume a good background in programming in C++. Students must be familiar with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.

Total No. of Lectures –40

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	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	10
SECTION - B		
2	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.	10

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SEMESTER– VII

SECTION – C		
3	Three Dimensional Transformations & Viewing: Translation, Rotation, Scaling, Reflection and composite transformations. Parallel and Perspective Projections, Viewing Transformation: View Plan, View Volumes and Clipping.	10

SECTION - D		
4	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.	10

Practical's	
1	To work with output primitives available in the graphic library of Borland's C++ IDE. <div style="margin-left: 40px;"> 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. </div>
2	Implement DDA line generating algorithm.
3	Implement Bresenham's line generating algorithm.
4	Implement Mid-point circle- generating algorithm.
5	WAP to draw a building with filled patterns using output primitives/DDA/Bresenham's
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
8	Program of line clipping using Cohen-Sutherland algorithm
9	.Implement general computer animation functions

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

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Course Outcomes:	
1	Students are able to work with output primitives available in the graphic library of Borland's C++ IDE.
2	Students got in depth knowledge of implementing various line generating, Circle drawing ellipse algorithms.
3	Students adapt and combine 3D projection and computer animation functions to implement the programs.

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

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SEMESTER-VII

Course Name	:	Cloud Computing
Course Code	:	CSL4074
Credits (L-T-P)	:	5 (3-1-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics and foundations of cloud computing platforms. The students should also able to understand advancements in the cloud computing systems. This course also introduces further extensions to cloud computing platforms by introducing advance topics in cloud.

Total No. of Lectures –40

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: 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-	10
SECTION - B		
2	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	10
SECTION - C		
3	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.	10

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SECTION - D		
4	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, Big Data Analytics.	10

Course Outcomes:	
1	To understand the basic building blocks and evolution of cloud computing as well as aspects of cloud security.
2	Able to implement virtualization by creating different types of virtual machines on physical hosts.
3	To understand and write programs using Thread Programming, Task Programming and Map–Reduce Programming. language
4	To understand the advancements in the cloud computing platforms.

Suggested / Reference Books:
Textbooks: 8. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, Mastering Cloud Computing: Foundation and Application Programming, Tata McGraw Hill, ISBN–13: 978–1–25–902995–0, New Delhi, India, Feb 2013.
Reference Books: 1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–6529803, New Delhi, India, 2011. 2. Rajkumar 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, WileyIndia Pvt. Ltd, ISBN–13: 978–0–47–0597422, New Delhi, India, 2011.

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SEMESTER– VII

Course Name	:	Artificial Intelligence
Course Code	:	CSL4077
Credits (L-T-P)	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics of smart systems as well as Artificial Intelligence.

Total No. of Lectures –45

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>Introduction: Definition, Foundations, 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, Sensor less problems, Contingency problems.</p> <p>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.</p>	12

SEMESTER– VII

SECTION – B		
2	<p>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.</p> <p>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.</p> <p>Adversarial Search: Games, optimal decisions in games, minimax algorithm, multiplayer games, alpha-beta pruning, evaluation functions, cutting o search, expectiminimax algorithm, dice/card games.</p>	12
SECTION - C		
3	<p>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.</p> <p>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.</p>	11

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SECTION – D		
4	<p>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.</p> <p>Frame-based Expert systems: Inheritance in frame-based expert systems, Methods and Continued demons, Interactions of frames and rules.</p>	10

Course Outcomes:	
1	Able to understand the different searching algorithms (Breadth First Search, Depth First Search etc.)
2	Able to understand different AI systems.

Suggested / Reference 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 Wesl
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.

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SEMESTER– VII

Course Name	:	Machine Learning
Course Code	:	CSL4078
Credits (L-T-P)	:	5 (4-0-1)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:
<p>Introduce fundamentals of Machine Learning for real time problem solving Provide thorough understanding of different kinds of machine learning algorithms and its mathematical concepts in order to get deep insights in the area of data analytics. Understanding of deep learning and reinforcement learning models to further enhance problem solving capabilities in different areas of research. To have understanding of performance measures for evaluating the performance of deep learning algorithms</p>

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	<p>Introduction: Introduction to Machine learning, Application areas, types: supervised learning, unsupervised learning, semi-supervised and reinforcement learning.</p> <p>Supervised Learning algorithms: Naïve Bayes, Decision Tree, KNN, SVM, Bayesian Network , MultiLayer perceptron or back propogation neural network, linear regression, logistic regression.</p>	10

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SECTION - B		
2	Unsupervised Learning Algorithms: K-means Clustering, Hierarchical clustering Ensemble Machine Learning models: Ensemble Machine Learning techniques such as Bagging, Boosting and Voting. Model Selection : Metrics, Feature Selection, Principal Component Analysis, Confusion Matrix ,Overfitting,Underfitting,Bias-Variance Tradeoff.	10
SECTION - C		
3	Deep Learning: Basics of Deep learning, Why deep learning, Difference between machine learning and deep learning ,Classification of DL approaches. Types : Recursive Neural Networks(RvNNs), Convolutional Neural	10
SECTION - D		
4	Reinforcement Learning: Introduction, Markov decision process (MDP), Bellman equations, Value iteration and policy iteration, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs, Temporal Difference Learning.	10
Course Outcomes:		
1	The students will be able to solve various real time problems related to image classification, signal processing and classification, marketing, finance, healthcare and other engineering problems in the field of data analytics.	
2	The theoretical understanding of machine learning and deep learning algorithms and its implementation in Python make the students familiar with its deep insights and enable them to further enhance their problem-solving capability.	

Suggested / Reference Books:	
1	Zurada, J.M., Introduction to Artificial Neural Network System, Jaico Publication (2006).
2	Sivanandam S.N., Principles of Soft computing, Wiley India.
3	Ethem Alpaydin, Introduction to Machine Learning, Third Edition, Prentice Hall of India.
4	Yegnanarayana, B., Artificial Neural Networks, Prentice-Hall of India Private Limited
5	Petterson, D.W., Introduction to Artificial Intelligence and Expert Systems, Prentice Hall
6.	Anuradha Srinivasaraghavan, Vincy Joseph, Machine Learning, Wiley India.
7	Dr. S Lovelyn Rose, Dr. L Ashok Kumar, Dr. D Karthika Renuka, Deep Learning using

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SEMESTER– VII

Course Name	:	INTERNET PROTOCOL(ELECTIVE II)
Course Code	:	CSL4072
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the basics of internet and the internet protocols, implementation of protocols in the real life using the TCP/IP model. Further, emphasis is placed on various IP Addressing Schemes, Virtual network and security. Students will get familiarity with networking and internetworking devices.

Total No. of Lectures –40

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 & 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.	10
SECTION - B		
2	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).	10

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SECTION – C		
3	Internet as virtual Network, Detailed concept of Routers & Bridges. Protocols Layering, Difference between X.25 and Internet layering.	10
SECTION - D		
4	Gate to Gate Protocol (GGP), Exterior Gateway Protocol (EGP). Managing Internet, reliable transactions & Security on Internet.	10

Course Outcomes:	
1	Students have got detailed understanding of internet and internet services.
2	Students have in depth knowledge of Classless Addressing Schemes (IPv4)
3	Students have comprehensive awareness about routing protocols like GGP and EGP.

Suggested / Reference Books:	
1	Internet working with TCP/IP Vol. - I
2	Principal Protocols & Architecture Comer & Stevens.

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SEMESTER– VII

Course Name	:	ADVANCED MICROPROCESSORS (ELECTIVE II)
Course Code	:	CSL4073
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

This course is designed to enlighten the students about the advancement in microprocessor operation. The students are able to know about the current microprocessor its working and the functioning of 8,16 and 32 bit microprocessor with their internal working.

Total No. of Lectures –40

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	Review of 8 bit microprocessor and support components. Selected Case Studies of 16 bit microprocessors and support	10
SECTION - B		
2	Contents. RISC Architectures and Case Studies : RISC Vs CISC. Selected Case Studies of 32/64 bit microprocessors and support	10
SECTION - C		
3	Power PC 601 Alpha 21064, Pentium super space, Transputer Architectures and Case Studies: High Performance Embedded Microcontrollers, Case	10

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SECTION – D		
4	403 GA Development Systems and support. Selected Applications.	10
Course Outcomes:		
1	Students have got detailed understanding of past and present microprocessors	
2	Students have in depth knowledge of working of microprocessor and microcontroller	
3	Students have comprehensive awareness about the CISC and RISC architectures	

Suggested / Reference Books:	
1	J.T. Cain, Selected reprints on microprocessors and microcomputers, IEEE Computer Society
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, 2 nd Edition (May 1994)
13	PowerPC 403GA Embedded Controller User's Manual. PowerPC Tools - Development
14	Tools For PowerPC Microprocessor (Nov. 1993).PowerPC 601 RISC Microprocessor User's Manual - 1993.

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SEMESTER– VII

Course Name	:	ROBOTICS (ELECTIVE - II)
Course Code	:	CSL4076
Credits (L-T-P)	:	4 (3-1-0)
Total Marks	:	100
Mid Semester Examination	:	30% weightage
End Semester Examination	:	70% weightage

Internal Marks: 30	External Marks: 70
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Course Objectives:

At the end of this course, the student should be able to understand the basics working and principals of robots. The students should also able to understand advancements in the robotics and the use of various sensors, motion control as well as to handle the robot with handheld devices.

Total No. of Lectures –40

Lecture wise breakup		Number of Lectures
<p>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.</p>		
SECTION - A		
1	Introduction to Robotics, Introduction to Manipulators & Mobile Robots, Classification of Robots, Robot Applications. Industrial application environment and work cells, feeders and Orienting devices. Robot Anatomy, Robot and Effectors, Transmission and actuators, with special reference to servomotors.	10
SECTION - B		
2	Robot Arm Kinematics, World, Tool and Joint coordinators, DH transformation and Inverse Kinematics. Fundamentals of Closed loop control, PWM amplifiers, PID control.	10

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SECTION – C		
3	Robotics Sensors : Range, Proximity, Touch, Force & Torque Sensing, Uses of sensors in Robotics. Studies. Machine Vision : Introduction to machine Vision, The sensing and digitizing function in Machine Vision, Image Processing and analysis, Training and Vision system, Robotics Application. Low & High Level vision.	10
SECTION – D		
4	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.	10
Course Outcomes:		
1	Students have got the depth knowledge of robotics	
2	Students are able to design the robots and the programing for to handle the robots	
3	Students have comprehensive awareness about the different methods and models used for robotics.	
Suggested / Reference Books:		
1	S. Sitharamalyengar, Alberto Elefes, Autonomous Mobile Robots, Perception, mapping & Navigation, IEEE Computer Society Press.	
2	Andrew C. Straugard, Robotics & AI, Prentice Hall, Inc.	
3	K.S. Fu, RC Gonzalez, CSG Lee, Robotics Control, Sensing, Vision and Intelligence, McGraw Hill, International Edition, 1987.	
4	Klafter D. Richard, Chmielewski T. A. and Negin Michael “Robotic Engineering”, Prentice Hall of India Ltd., 1993.	
5	M.P. Groover, M. Weins, R.N. Nagel, N.C. Odrey, Industrial Robotics, McGraw Hill, 1986.	
6	Various Research papers in area of Robotics	

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SEMESTER– VIII

Course Name	:	Industrial Training-cum-Projects
Course Code	:	CSD4080
Credits (L-T-P)	:	30 (0-0-30)
Total Marks	:	100

Course Objectives:

At the end of this course, the student should be able to understand the working of IT industry as well to work in a research group. The students should also able to publish research papers those who are opting research projects. The students have an exposure to work in the IT industry.

Guidelines

A candidate should work on the Project in the IT Industry or in Research organization for 5 months and 6-8 hours on each working day.

Examination		Credits
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 10 credits.	10
IIInd 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 10 credits.	10
Final Report	Final Project Report & Viva Voce of 20 credits	20

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