

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS FOR THE BATCH FROM YEAR 2025 TO 2029

BACHELOR OF TECHNOLOGY IN
COMPUTER SCIENCE & ENGINEERING
(Credit Based Evaluation and Grading System)

Programme Code: 1703

SEMESTER: I-VIII
EXAMINATIONS: 2025-2029



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.

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Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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.	USE-0001	Entrepreneurship Mindset-I	0	0	2	2
6.		Elective-I	2	0	0	2
List of Electives–I:						
1.	PBL1021	Punjabi Compulsory-I OR	2	0	0	2
2.	PBL1022	* Mudhli Punjabi-I OR	2	0	0	
3.	HSL4060	* Punjab History & Culture (1450-1716)	2	0	0	
Total Credits:			14	2	4	20

***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.	USE0002	Entrepreneurship Mindset-II	0	0	2	2
List of Electives-II:						
1.	PBL1031	Punjabi Compulsory-II OR	2	0	0	2
2.	PBL1032	*Mudhli Punjabi-II OR	2	0	0	
3.	HSL5020	*Punjab History & Culture (1717-1947)	2	0	0	
Total Credits:			17	2	5	24

***Special Note:**

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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.	ESL2022	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.		Entrepreneurship Mindset-III	0	0	2	2	
Total			18	2	5	25	

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.		Entrepreneurship Mindset-IV	0	0	2	2
7.	PSL0059	Human Rights and Constitutional Duties (Value Added Course)	2	0	0	2
Total			19	3	4	26

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S. No.	Course Code	Course Title	L	T	P	Credits
1.	CSL3032	Relational Database Management Systems	4	0	1	5
2.	CSL3033	Design & Analysis of Algorithm	3	1	0	4
3.	CSL3051	Formal Languages & Automata Theory	3	1	0	4
4.	CSL3036	Programming in ASP.Net	4	0	1	5
5.		Entrepreneurship Mindset-V	0	0	2	2
Total			14	2	4	20

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.	CSD4081	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:
<ul style="list-style-type: none"> • To understand distributed force systems, centroid/ centre of gravity and method of finding centroids of composite figures and bodies. • To understand moment of inertia and method of finding moment of inertia of areas and bodies. • To understand dynamics of a particle. • To understand the kinetics of rigid bodies and simple problems.

Total No. of Lectures –36

Lecture wise breakup		Number of Lectures
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: 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 Auto CAD
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

Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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

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.

Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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
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		
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).

USE-0001 : ENTREPRENEURSHIP MINDSET-I

(Mandatory Skill Enhancement Course)

Credits: 0+0+2**Total Marks: 50**

Introduction: This course provides students with a holistic framework to develop entrepreneurial skills across the student's journey. The curriculum covers core principles of entrepreneurship, including identifying business opportunities, setting up operations, marketing, scaling, and financial management. The aim of this course is to ensure that, by the end, learners acquire essential entrepreneurial competencies such as **strategic thinking, practical application, founders & growth mindset, operational skills, and foundational financial literacy.**

Learning Objectives

By the end of this course, students will be able to:

- Understand and apply entrepreneurial principles to real-world business situations.
- Develop and implement business strategies across different industries.
- Use digital tools, including AI, to enhance and automate business operations.
- Build sustainable business models, manage financials, and scale operations.

Entrepreneurial Specialization Tracks: Skill Development and Business Implementation:

Throughout the program, students will select **one of the following five specialized tracks** using the **“Punjab Entrepreneurship Mindset Programme”** App, designed to provide a structured pathway for developing entrepreneurial skills and implementing business ventures.

- 1. E-commerce:** In this track, students will learn how to build, manage, and scale an online business. From setting up an e-commerce platform to managing digital marketing strategies, inventory, and customer experience, this specialization provides the tools needed to succeed in the rapidly growing digital marketplace.
- 2. Content Creation:** This track focuses on empowering students to create, curate, and market digital content across various platforms. Students will learn how to build a personal or brand identity, develop engaging content, and monetize their platforms, whether through social media, video production, blogging, or influencer marketing.
- 3. Professional Services:** In this track, students will learn how to capitalize on freelance and contract-based opportunities. They will explore strategies for building a sustainable service-based business, manage client relationships, and maximize the flexibility that comes with this track.

Retail Business: This track introduces students to the fundamentals of starting and managing small scale retail ventures. Learners will discover how to identify in-demand products, source suppliers, setup shop (physical or home-based), and attract local customers. Emphasis will be placed on practical steps like pricing, promotion, customer service, and building repeat sales to establish a steady income stream.

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- 4. Miscellaneous:** This track gives students the freedom to explore unique and diverse business ideas that don't fit into one category. Learners can identify opportunities around them, test simple solutions, and creates mall ventures based on local needs or personal interests. The focus is on creativity, problem- solving, and learning how to turn everyday ideas into earning opportunities.

The focus is on practical application, with students engaging in real-world projects that culminate in the creation and scaling of a business.

Registration on the APP:

For Android Users:

Step1: Click the following link to download and install the App:

https://drive.google.com/file/d/1zgfoFWN0Y1zWJNf_gMpbGvlyeQI0WPM2/view?usp=drivesdk

Step2: Register by providing your details and generate OTP. (If the OTP is not generated, use the last six digits of your mobile number as the OTP).

Step3: Open the tasks and complete it by giving your feedback and handling the AI based Quiz.

For I-Phone Users:

Step1: Click on this link <https://punjabstartup.com/>

Step2: Signup to create an account and generate OTP

Step3: Fill in our personal and educational details. After your account is created, open the tasks and complete it by giving your feedback and handling the AI based Quiz.

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Content Creation		
Week/ Milestone	Milestone	Description
1	Start your journey as a content creator	Learn how to reach thousands of followers online by creating content
2	Decide your content topic	Explore different topics and finalize one topic on which you will create content
3	Start your own content channel	Launch your official channel on YouTube or Instagram and start building your audience
4	Plan your first week content calendar	Learn how to create a simple weekly content calendar that would keep your audience engaged and make them follow you
5	Plan and record your first video	Learn how to create a clear and catchy script for your first video and shoot it using your phone
6	Edit and launch your first video	Learn how to edit your video with trendy music And cool effects and launch your channel with first video
7	Reach first 100 followers	Use WhatsApp and personal Instagram account to tell people about your channel and reach first 100 followers/subscribers
8	Master the skill of engaging people with your content	Learn how to connect with your audience so they stay engaged and feel involved
9	Follow latest trends and famous influencers to grow your channel	Learn how to use trending to pics and tag well- known channels or creators to boost your reach and attract more followers
10	Learn how you can make money from your content	Discover how to do brand deals and promote brands or products your followers truly care about
11	Make your first partnership	Reach out to 10 brands for partnership and turn one into your first paid deal
12	Plan your business growth	Create a 1-month plan on what to post on a weekly basis to grow your followers and earn money

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E-commerce		
Week/ Milestone	Milestone	Description
1	Learn how to start selling online	Learn what an E-commerce business is and how you can start selling online in less than 30 days
2	Choose your product	Explore different products and finalize what you want to sell online
3	Find a supplier who will deliver the product for you	Identify suppliers who can send your product directly to the customer and help you launch your E-commerce business
4	Create your E-commerce store	Make a simple online store using Instamojo and learn how to upload product images and description on the store
5	Activate payments on your store	Learn how to link your bank account to a payment gateway and integrate that with your Instamojo store to Start receiving payments
6	Launch your online store	Connect your domain name to your Instamojo account, create your launch poster, and officially launch your E-commerce store
7	Get first 100 people visit your online store	Learn how to write simple and catchy messages to promote your store and send it to 100 people
8	Make your first sale	Convert one paying customer and learn how to process the order from beginning to delivery
9	Create and post your first ad	Learn how to design a simple promotional ad and post it to bring in more people and sales
10	Take feedback from customers	Engage with your paid customers, take product feedback, and upload success stories or reviews on your website
11	Get a repeat customer or referral	Build trust with your paid customers to get either a repeat order or a referral
12	Plan your business growth	Make a 1-month plan to promote and grow your E-commerce store and earn more money

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Professional Service		
Week/ Milestone	Milestone	Description
1	Start your journey in professional services	Learn what is a service and how you can earn money by offering your skill as a service
2	Choose your service skill	Choose one skill you are good at and turn it into a service that people will pay for
3	Find your ideal customer	Talk to people directly or through social media apps, understand who is willing to pay For your service and "WHY"
4	Build your online profile and show what you offer	Explore apps or websites such as WhatsApp Business, Upwork, or Urban Company, and learn how to create an online profile
5	Write your service description	Learn how to write your service in a simple and powerful way that gets people excited to try it
6	Finalize your pricing and launch your service	Learn how to set the right price that your customer finds fair and launch your service
7	Get first 100 leads for your service	Learn how to write catchy messages to promote your service in the market and get first100 leads
8	Offer a free service and learn from feedback	Give your service for free to real users and use their feedback to make it better
9	Make your first sale	Get one paying customer for your service and work really hard to get a 5 star rating and a video testimonial
10	Build trust with customers and get repeat orders	Use your trust and good relationship with existing customers to get your first repeat customer
11	Earn your first referral	Start offering bonus or other additional services to your existing customers and get Your first referral
12	Plan your business growth	Make a1month plan on how to get more customers and earn more money

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Retail Business		
Week/ Milestone	Milestone	Description
1	Learn how to start retail business	Understand how retail works, the types of business you can start, and talking to local shops
2	Choose your product and ideal customer	Look at products in demand in your area and choose what you'll focus on based on Your customer needs
3	Find a supplier for your product	Identify suppliers or wholesalers who can give you quality products/raw materials at good prices
4	Setup your business	Arrange your shop/home or prepare your product stocked with shopkeepers
5	Decide product prices and prepare stock	Decide the right selling price, maintain a simple record of sales, and get ready to handle cash or digital payments
6	Launch your business	Put up posters near your shop, and share the announcement with friends, family, and local Community groups
7	Promote your business in your area	Learn how to use simple ways to promote your business locally
8	Make your first sale	Ensure the buying process is smooth and the customer is happy
9	Take feedback from customers	Engage with your paid customers and take product feedback
10	Discover other platforms to grow your sales	Learn how to setup a free WhatsApp Business account for your shop and collect Orders there
11	Get a repeat customer or referral	Build trust with your paid customers to get either a repeat order or a referral
12	Plan your business growth	Make a 1-month plan to promote and grow your retail business and earn more money

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Miscellaneous		
Week/ Milestone	Milestone	Description
1	Start your journey as an entrepreneur	Learn what entrepreneurship means and how you can start earning by solving problems around you
2	Identify and valid a tea problem to solve	Look around yourself, talk to people, and pick one real problem that many people face
3	Define your customer and their pain points	Find out who will buy from you, what difficulties they face, and why they need your solution
4	Generate business ideas and finalize one idea	Think of different ways to solve the problem, compare options, and choose one idea to move ahead with
5	Define your product or service	Decide clearly what product or service you will Provide and how it will solve the customer's problem
6	Finalize your pricing and launch your business	Set a fair price for your product or service and take the first step to launch your business
7	Promote your business and get first 100 leads	Tell people about your business using word of mouth, posters, or social media, and collect interest from 100 people
8	Make your first sale	Get your first paying customer and deliver your product or service with full effort
9	Take feedback from customers and improve	Listen to what customers say after using your product/service and make it better step by step
10	Build trust with customers and get your first repeat order	Keep your promise, give good quality, and motivate your customer to buy from you again
11	Earn your first referral and expand your sales	Ask happy customer store commend you to friends and family so that you can grow your sales
12	Plan your business growth	Make a simple plan for the next month to get more customers, increase sales, and grow your business

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Evaluation Criteria

The evaluation will be conducted by a committee consisting of the class mentor, nodal officer and the principal HOD or his/her nominee.

Evaluation Component	Description	Weightage
Weekly Task Completion	Timely submission of weekly tasks, including activities, reflection prompts, graded quizzes etc	60%
Target Completion	Performance-based evaluation on hitting revenue or Profit targets (e.g.,generating ₹ 10,000revenue)	20%
Final Project	A comprehensive project depending the theme of the semester	20%

Evaluation mechanism

Weightage:

- A. 60% weightage (30 marks) for app based evaluation. (done by the app automatically after the cut off date)**
- B. 20% Weightage (10 marks) for profit-based evaluation, as per table below**
- | | |
|-------------------------------|-----------------|
| Profit ₹ 100 to ₹ 5000 | 5 marks |
| Profit above ₹ 5000 | 10 marks |
- C. 20% Weightage (10 marks) for project-based evaluation. Format for project report is as per Annexure.**

Weekly Component:

Each week of the course follows a structured format designed to guide students from learning to doing, using simple, mobile-accessible components:

Component	Duration	Description
Action Lab	~4hrs	- Hands-on task on the weekly concept - Includes step-by-step guidance, templates, and worksheets - Ends with a submission(e.g., video, reflection, or proof of action)
Learning Resources	Self-paced	-Videos, short readings, real-life stories, and tools to deepen understanding at their own pace
Check-in	Self-paced	-Quizzes & Reflection prompts

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Syllabus Overview for Semester 1-5

Semester	Learning Focus	Learner's demonstration	Revenue Target
1	Setup & Launch	Understand. Create. Start.	₹ 10,000
2	Marketing Basics	Engage. Share. Grow.	₹ 40,000
3	Operations & Scale	Earn. Deliver. Expand.	₹ 80,000
4	Organic Growth	Attract. Retain. Build.	₹ 160,000
5	AI Automation & Finance mastery	Simplify. Track. Sustain	₹ 400,000

Semester 1: Setup & Launch

In Term 1, students will explore what entrepreneurship means and how it connects to their daily lives. They will learn to identify problems, shape simple business ideas, and test the minimal settings. This semester builds the foundation—mindset, observation, value creation, and action.

Semester 2: Marketing Basics

In Term 2, students will learn how to attract customers and grow their visibility using digital platforms and community-based marketing strategies. Students will also begin to run paid advertising campaigns and learn how to optimize their marketing efforts.

Semester 3: Operations & Scale

This semester focuses on the day-to-day operations of running a business, including order fulfillment, customer service, and logistics. Students will also focus on scaling operations as demand grows, with an emphasis on managing resources effectively.

Semester 4: Organic Growth

Students will learn how to grow their businesses organically, using referrals, partnerships, and community engagement. This semester focuses on building a loyal customer base and using word-of-mouth marketing to increase reach and credibility.

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Semester 5: AI Automation & Financial Mastery

The final semester prepares students for long-term sustainability. Students integrate AI to improve productivity, automate routine tasks, and enhance decision-making. They also dive deep into financial planning, learning to set income goals, track expenses, understand profit margins, and create simple financial forecasts. This semester helps students solidify their entrepreneurial identity design systems for financial stability and scalability.

Course Outcomes

After studying this course, students will be able to:

- Launch and manage a business within their chosen track.
- Identify profitable opportunities and develop innovative solutions.
- Implement marketing and sales strategies using both digital and traditional methods.
- Use financial metrics to track performance and make informed business decisions.
- Scale a business using operational systems and automation tools.

Suggested Readings

- Simon Sinek, *Start with Why: How Great Leaders Inspire Everyone to Take Action*, Portfolio/Penguin
- Eric Ries, *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, Crown Business
- Jonah Berger, *Contagious: How to Build Word of Mouth in the Digital Age*, Simon & Schuster
- Phil Knight, *Shoe Dog: A Memoir by the Creator of Nike*, Scribner
- Jason Fried and David Heinemeier Hansson, *Rework: Change the Way You Work Forever*, Crown Business
- Héctor García and Francesc Miralles, *Ikigai: The Japanese Secret to a Long and Happy Life*, Penguin Books
- Tim Ferriss, *Tools of Titans (Selected Chapters)*, Houghton Mifflin Harcourt
- Peter Thiel and Blake Masters, *Zero to One: Notes on Startups, or How to Build the Future*, Crown Business
- Anil Lamba, *Romancing the Balance Sheet*, Anil Lamba Publications
- The Better India/Your Story, *Young Entrepreneurs Series* (Collection of Articles) Real Indian stories
Of youth starting businesses, snackable reads that show what's possible.

ANNEXURE

PROJECT REPORT ON ENTREPRENEURSHIP MINDSET”

IN TRACK NAME

Submitted

In Partial fulfillment of the requirements for (Course Name)



Department Name/College Name

Guru Nanak Dev University

Amritsar

Supervised By:

Submitted By:

Name:

Roll No/Student ID:

Class:

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STUDENT DECLARATION

This is to certify that the project titled “[Insert title and track name]” which has been undertaken and completed under the **Entrepreneurship Mindset** program during the academic year _____ in partial fulfillment of the requirements of [Course Name] [Semester] is a bonafide piece of research.

I have duly acknowledged all sources of information and assistance received during the preparation of this project. In case this project report or any of it is found to be copied or quoted without any reference, I shall be solely held accountable for the repercussions arising there from.

Date

[Signature]

Name

Roll No

Class

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CERTIFICATE OF COMPLETION

This is to certify that **[Student Name]**, bearing Roll No./Student ID **[Insert No.]**, of **[Institution Name]**, has successfully completed the project titled “**[Insert Project Title]**” under the **Entrepreneurship Mindset** program during the academic year _____.

The work embodied in this report is carried out under my supervision and guidance.

[Signature]

Supervisor Name

[Signature]

Student Name

Roll No:

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USE: 0001: ENTREPRENEURSHIP MINDSET-I

SPECIMEN FOR PROJECT REPORT

Chapter 1: Introduction

M.M: 20

1.1 Background of the Business: *Describe your core product/service and how it operates.*

1.2 Reason and Motivation: *Explain what inspired you or the gap you identified.*

1.3 Unique Selling Proposition (USP): *State what makes your business different.*

1.4 Futuristic Vision: *Describe your future goals and expansion plans.*

Chapter 2: The Entrepreneurial Journey

2.1 Foundation: Learning and Problem Identification: *Describe how you identified the problem or opportunity and what you learned.*

2.2 Blueprint: Defining the Customer and Finalizing the Idea: *Define your target customer and finalize your business idea.*

2.3 Launch: Product/Service Definition and Going Live: *Explain how you introduced your product/service to the market.*

2.4 First Success: Initial Promotion and Securing the First Sale: *Mention your initial promotions, first sale, or milestone achieved.*

2.5 Building the Business: Incorporating Feedback and Securing Repeat Orders: *Describe how you improved using feedback and gained repeat customers.*

Chapter 3: Financial Performance and Revenue Analysis

3.1 Initial Capital: *Show how much money you invested and where it was used.*

3.2 Budget Allocation: *Break down your expenses by category (e.g., marketing, inventory).*

3.3 Revenue Streams: *Explain how your business earns income and its pricing approach.*

3.4 Profit & Loss Statement: *Present your revenue, expenses, and resulting profit/loss.*

Chapter 4: Summary and Conclusion

4.1 Key Challenges and Solutions: *Highlight major difficulties and how you overcame them.*

4.2 Personal Learning: *Reflect on what you and your team learned from the experience.*

4.3 Future Growth Plan: *Outline your roadmap for expanding or improving your venture.*

4.4 Conclusion: *Summarize your key insights and the overall impact of your entrepreneurial journey.*

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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 ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਦੋ

- 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. ਸ਼ੁੱਧ, ਅਸ਼ੁੱਧ : ਦਿੱਤੇ ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਕਰਨਾ
(15 ਪੈਰ੍ਹਿਆਂ ਦੇ ਸ਼ੁੱਧ ਅਸ਼ੁੱਧ 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 ਫਾਉਂਡੇਸ਼ਨ, 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 ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ**, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।
7. ਮਿੰਨੀ ਸਲਵਾਨ, **ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ**, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ
8. **ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਬੋਧ**, ਕਸਤੂਰੀ ਲਾਲ ਐਂਡ ਸੰਨਜ਼, ਅੰਮ੍ਰਿਤਸਰ।

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 ਸੈੱਟ ਕਰਨ ਵਾਲਾ ਜੇਕਰ ਚਾਹੇ ਤਾਂ ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਵੱਧ ਤੋਂ ਵੱਧ ਚਾਰ ਉਪ-ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕਰ ਸਕਦਾ ਹੈ।

ਸੈਕਸ਼ਨ-ਏ

ਪੌੜੀ 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 ਪੈਰ੍ਹੇ ਵਿਚੋਂ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ 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
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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 DhanpatRai Publishers, NewDelhi.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, SpringerVerlag, 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
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	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 1 st 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	<p>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.</p> <p>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.</p>	12
SECTION – B		
2	<p>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.</p> <p>Semiconductors: Introduction to semiconductors, Intrinsic Semiconductor, n-type and p-type semiconductors, Effect of Doping, Fermi levels, Charge flow in semiconductors.</p>	12

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SECTION – C		
3	<p>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</p> <p>Bipolar Junction Transistors: Junction Transistor, Current components, transistor as an amplifier, CB, CE and CC configurations and characteristics.</p>	12
SECTION – D		
4	<p>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.</p> <p>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.</p>	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
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	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.

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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**

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)।

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

ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਸਤਿੰਦਰ ਸਿੰਘ, ਪੰਜਾਬੀ ਵਾਰਤਕ ਦਾ ਇਤਿਹਾਸ, ਪੰਜਾਬੀ ਅਕਾਦਮੀ, ਦਿੱਲੀ।
2. ਪ੍ਰੋ. ਪਿਆਰਾ ਸਿੰਘ, ਪੰਜਾਬੀ ਵਾਰਤਕ : ਸਿਧਾਂਤ ਇਤਿਹਾਸ ਪ੍ਰਵਿਰਤੀਆਂ, ਨਿਊ ਬੁੱਕ ਕੰਪਨੀ, ਜਲੰਧਰ।
3. ਇੰਦਰਪ੍ਰੀਤ ਸਿੰਘ ਧਾਮੀ, ਪੰਜਾਬੀ ਰੇਖਾ ਚਿਤਰ : ਰੂਪ ਤੇ ਪ੍ਰਕਾਰਜ, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
4. ਬਲਬੀਰ ਸਿੰਘ ਦਿਲ, ਪੰਜਾਬੀ ਨਿਬੰਧ : ਸਰੂਪ, 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 ਟਰੱਸਟ, ਇੰਡੀਆ।
7. ਅਬਨਾਸ ਕੌਰ, ਪੰਜਾਬੀ ਰੇਖਾ ਚਿੱਤਰ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
8. ਮਿੰਨੀ ਸਲਵਾਨ, ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਮੁੱਢਲੇ ਸੰਕਲਪ, ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ।
9. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ।

ਪਾਠਕ੍ਰਮ ਪਰਿਣਾਮ (Course Outcomes) :

ਇਸ ਪਰਚੇ ਨੂੰ ਪੜ੍ਹਨ ਉਪਰੰਤ ਵਿਦਿਆਰਥੀ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੇ ਵਿਭਿੰਨ ਰੂਪਾਂ ਜਿਵੇਂ ਕਵਿਤਾ, ਕਹਾਣੀ, ਨਿਬੰਧ ਅਤੇ ਰੇਖਾ-ਚਿੱਤਰ ਬਾਰੇ ਵਡਮੁੱਲਾ ਗਿਆਨ ਪ੍ਰਾਪਤ ਕਰਦਾ ਹੈ। ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਵਾਰਤਕ ਦੇ ਪ੍ਰਮੁੱਖ ਰੂਪਾਂ ਜਿਵੇਂ ਨਿਬੰਧ ਅਤੇ ਰੇਖਾ-ਚਿੱਤਰ 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-ਚਿੱਤਰ 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।

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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

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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/ਸੰਖਿਪ 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।

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

Time: 3 hrs

Credits: 2-0-0
M. 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.

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 Mountbetten*, 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.

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SEMESTER-II
USE-0002: ENTREPRENEURSHIP MINDSET-II
(Mandatory Skill Enhancement Course)

Credits: 0+0+2

Total Marks: 50

Semester Snapshot - Semester 2

Entrepreneurship 102/201 (Marketing Basics)

Introduction

This semester helps learners understand marketing as a practical life skill - not just “advertising.” It teaches them how to communicate value, attract the right customers, and grow something small into something sustainable. Learners explore the basics of customer psychology, messaging, content creation, and simple sales strategies. Through hands-on activities, they will practice real marketing techniques for their micro-hustle or a simulated business idea, learning how to get attention, build trust, and generate sales.

Learners Objective

- Understand the core concepts of marketing using simple, relatable real-world examples.
- Learn how customers think, choose, and buy—and how businesses influence decisions ethically.
- Identify and define a target customer clearly instead of “selling to everyone.”
- Create clear messaging: what they sell, who it helps, and why it matters.
- Use basic marketing channels (offline + online) to attract customers.
- Run a simple marketing campaign and measure what worked.
- Build confidence in selling, promoting, and talking about their product/service.

Outcome

By the end of this semester, learners will be able to market a product/service using basic strategies, attract real customers, and improve their results through feedback and experimentation.

Guiding Principles/Approach

This syllabus is built on action-based learning, clarity-first communication, and customer-first thinking. Learners don’t just *study* marketing - they *practice* it in real situations through small experiments and repeated improvement. The course is designed to feel approachable and practical: learners create simple content, test messaging, talk to real people, and observe what influences decisions.

Instead of heavy theory, students build marketing skills through doing: customer discovery, storytelling, channel experiments, and reflection. The curriculum emphasizes confidence-building, ethical marketing, and communication as a leadership skill. By helping learners see results quickly (even small wins like one customer or one inquiry), the program builds motivation, creativity, and real-world business readiness.

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Semester 2 Curriculum

Recap Milestone

The recap milestone focuses on revising all the 12 milestones of semester 1 and also helps students understand the upcoming 12 milestones journey of semester 2.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
Recap	Recap and Introduction	Revise what you learned in Semester 1 and plan what you will do in Semester 2	1	Revise first 12 milestones of Semester 1	Watch a video on "Semester 1 summary"
					Download 12 summary cards of Semester 1 milestones
					Write 3 key learnings of Semester 1
					Write 3 things you will improve in semester 2
			Attempt Semester 1 Recap Quiz		
			2	Set your goals for Semester 2	Learn how to 4X your revenue in Semester 02 using Marketing
					Read how famous brands use marketing to increase revenue
					Set your marketing goals
Attempt Semester 2 Readiness Quiz					

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Milestone 13: Marketing Fundamentals

Marketing Fundamentals milestone focuses on helping students understand the basics of marketing and how they can use marketing to scale their businesses and generate revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
13	Learn marketing fundamentals to scale your business	Learn how you can use multiple types of marketing to scale your business and grow your revenue	1	Understand what is marketing	Watch a video on marketing fundamentals
					Read examples of famous marketing campaigns in India
					Explain what you learned about marketing
					Attempt task 01 quiz
			2	Learn different types of digital marketing	Watch a video on what is digital marketing
					Read a document on types of digital marketing
					Write what what kind of digital marketing works best for your business and why
					Attempt task 02 quiz
			3	Write 3 marketing ideas for your business	Read a document on how businesses like yours are using marketing to generate revenue
					Write 3 marketing ideas to scale your business
					Validate your ideas with 3-5 people
					Shortlist the best idea and explain how it will generate revenue
Share your experience of doing this milestone					
Attempt task 03 quiz					

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Milestone 14: WhatsApp Community Marketing

WhatsApp Community Marketing milestone focuses on helping students learn how to build a WhatsApp community for their users and use it to generate trust, engagement, and sales.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
14	Build and activate your WhatsApp community	Build a WhatsApp community for your users and use it to generate trust, engagement, and sales	1	Create your WhatsApp community	Watch a video on why you should build a WhatsApp Community
					Read a document on how to create a WhatsApp community
					Enter the name of your community
					Upload your WhatsApp community link
					Attempt task 01 quiz
			2	Invite people to join your WhatsApp community	Read a few sample invite and welcome messages
					Draft an invite message to invite 50 people to join your community
					Draft a welcome message for your community members
					Upload a screenshot of your welcome message
					Attempt task 02 quiz
			3	Engage your community users and start building trust	Learn 'how to engage people in your community'
					Read top 10 community engagement ideas for your business
					Write 5 types of content to post weekly in your community
					Create and upload your weekly calendar
					Attempt task 03 quiz
			4	Get 3 sales from your WhatsApp Community	Learn how to do soft-selling on community
					Create a community-only offer
					Learn how to convert interested people into paid customers
					Write a simple plan to generate 3 sales per month from the community
					Share your experience of doing this milestone
Attempt task 04 quiz					

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Milestone 15: Generating Content for Marketing using AI

AI-led Content creation and marketing milestone focuses on helping students learn how to use AI tools to generate creative ideas and create professional videos, posters, and blogs.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
15	Use AI to generate content for marketing	Learn how to use AI tools to generate creative ideas and create professional videos, posters, and blogs	1	Learn what is content marketing	Watch a video on 'what is content marketing'
					Learn which content works for brand awareness or revenue generation
					Write 3 types of content you believe your customers like
					Attempt task 01 quiz
			2	Generate content ideas to attract customers	Learn how to use AI to generate content marketing ideas for your business
					Generate 10 small content ideas to attract your customers
					Discuss the ideas with your users and take feedback
					Shortlist top 3 content ideas to attract customers
					Attempt task 02 quiz
			3	Create your first brand video using AI	Watch a video on "How to use AI tools to create simple short videos"
					Read this guide on how to ask AI to write a video script
					Generate 5 ideas for your AI videos and write them here
					Upload your AI generated video link
					Attempt task 03 quiz
			4	Create a brand poster using AI	Learn how to create a poster using AI
					Write a prompt for the poster will you create using AI
Upload the AI poster you have created					

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					Post this poster in your WhatsApp community
					Attempt task 04 quiz
			5	Write a blog using AI	Learn how to use prompt engineering to write content for your business
					Read list of topics on which you can write a blog
					Write the topic on which you will write a short blog
					Write the first version of your blog
					Share your blog with your friends and faculty
					Share your experience of doing this milestone
					Attempt task 05 quiz

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Milestone 16: Social Media Marketing

Social Media Marketing milestone focuses on helping students learn what social media marketing is and how to create a social media weekly plan that engages users and improves brand visibility.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
16	Plan your social media marketing strategy	Learn what is social media marketing and how can you execute it to scale your business	1	Learn what is social media marketing	Watch a video on "Introduction to Social media marketing"
					Learn different types of social media marketing
					Read a document on how to use social media marketing to generate revenue
					Write your understanding of social media marketing
					Write one social media marketing idea for your business
					Attempt Task 01 Quiz
			2	Research your competitors	Learn how to research your competitors
					Find your competitors
					Write top 3 things your competitors are posting
					Find one unique gap that you can capture
			3	Finalize your content pillars	Watch a video on 'what are content pillars'
					Read examples of 'content pillars'
					Write 5 content pillars for your social media strategy
			4	Create your weekly social media plan	Attempt task 03 quiz
					Watch a video on 'how to create a weekly social media plan'
					Look at examples of 'social media calendar'
					Create and upload your weekly calendar
					Upload the link of your Instagram Channel
			Share your experience of doing this milestone		
			Attempt task 04 quiz		

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Milestone 17: Trust-led Marketing

Trust-led Marketing milestone focuses on helping students build trust through social media proofs, testimonials, or basic engagement and later converting them into leads and sales.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
17	Generate leads and turn them into sales	Use testimonials, conversations, and daily posts to generate leads and close sales.	1	Use social proof to build trust	Identify 2 happy customers
					Create a testimonial post with CTA
					Post testimonial on social media
					Post testimonial on the community
					Attempt task 01 quiz
			2	Make people share their problems	Learn how to ask open-ended questions
					List 5 customer problems
					Post these problems in community and social media
					Evaluate top 2 problems customers face
					Encourage people to share their problems
			3	Help your users with 3-5 days content sprint and generate leads	Brainstorm or use AI to create a solution document for each problem
					Post solution to 1 problem on a daily basis
					DM people to check if your solution is helping them
					Write how many leads did you generate
					Attempt task 03 quiz
			4	Convert leads into sales	Learn how to convert leads into sales
					Soft sell your offering in community and social media
					DM people how can your product help them better
					Follow up after 24 to 48 hours
					Write how many leads you converted into sales
Share your experience of doing this milestone					
Attempt task 04 quiz					

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Milestone 18: Viral/Trend Marketing

Viral Marketing milestone focuses on helping students learn how to launch viral campaigns for their businesses using the latest trends and make their brand go viral without spending any money.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
18	Make your brand go viral	Design viral marketing campaigns to reach 5X users without spending any money	1	Learn viral marketing	Understand what is virality and how it works
					Read about top 10 viral marketing campaigns in India
					Write 3 reasons why people share content
					Attempt task 01 quiz
			2	Design 2 viral campaigns for your business	Learn 5 types of common viral marketing strategies
					Read 10 viral marketing ideas for your business
					Design 2 viral campaigns for your business
					Take feedback from people and finalize one campaign
					Set your campaign targets
			3	Launch one viral campaign to increase customer reach	Create your campaign launch video or poster
					Create your campaign launch message
					Launch your campaign on your social media platform
					Launch your campaign in your WhatsApp community
					Attempt task 03 quiz
			4	Promote your campaign to make it viral	Share your campaign in other groups and forums
					Measure your campaign performance
Learn how to improve your campaign					
Analyze your campaign and record final metrics					
Enter the summary of your campaign					
Share your experience of doing this milestone					
Attempt task 04 quiz					

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Milestone 19: BTL/Offline Marketing

BTL/Offline Marketing milestone focuses on helping users learn about BTL (below the line) or offline marketing and use it to reach out to local customers and generate revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
19	Drive revenue through offline/BTL marketing	Use offline activities to reach local customers and generate sales	1	Understand offline or BTL marketing	Watch a video on what is BTL marketing
					Read about famous BTL marketing campaigns
					Write how you can use BTL marketing for your business
					Attempt task 01 quiz
			2	Pick your offline marketing idea	Learn about common offline tactics for your business
					Write 1 offline marketing idea you can execute
					Design your brand poster for offline marketing
					Create your offline marketing offer or pitch
					Practice your pitch with friends and take feedback
			3	Execute offline marketing in local market	Attempt task 02 quiz
					Identify people or locations in local for offline marketing
					Pitch to at least 10 real customers
					Collect contact details for WhatsApp Community invite
					Close at least one sale
					Write your offline marketing metrics
Share your experience of doing this milestone					
Attempt task 03 quiz					

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Milestone 20: Collaboration and Affiliate Marketing

Collaboration and Affiliate Marketing milestone focuses on helping users learn about affiliate marketing and how to collaborate with individuals/businesses to reach more customers and generate revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
20	Grow through collaboration and affiliation marketing	Use partners and affiliates to reach new audiences and generate sales	1	Understand affiliate marketing and collaboration	Watch a video on what is affiliate marketing
					Read about top collaboration or affiliate marketing campaigns
					Learn 10 common types of collaboration or affiliate marketing for your business
					Pick 3 types that can work for your business
					Attempt task 01 quiz
			2	Design your affiliation model	Learn how to start an affiliation program
					Decide your commission structure
					Write a pitch for partnership
					Attempt task 03 quiz
			3	Finalize one person or business for collaboration	Learn how to find a right partner for collaboration
					Create a list of 5 to 10 people or businesses for collaboration
					Send your partnership pitch to potential partners
					Write the name of one final partner
					Attempt task 03 quiz
			4	Execute the collaboration	Explain how will the partner market your brand
					Post the link or screenshot of successful collaboration
					Respond to new leads within 24 hours
					Close at least one sale
					Attempt task 04 quiz
			5	Measure your collaboration	Write number of leads generated
Write number of sales closed and revenue generated					
Write what worked and how to improve collaboration					
Share your experience of doing this milestone					
Attempt task 05 quiz					

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Milestone 21: Advertising Marketing (Meta)

Advertising Marketing milestone focuses on helping users learn how to post a paid ad on Meta (Instagram and Facebook) promoting their business and reach to more users or generate revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
21	Run your first ad on Instagram	Learn how to boost posts or run simple video ads to reach new viewers	1	Setup your Meta Business Suite	Watch a video on why to run ads on Meta
					Learn different types of ads
					Read the guide on Meta Ad account setup
					Setup your Meta Ad account
					Attempt task 01 quiz
			2	Design your first paid ad	Watch samples of good ad designs for your business
					Finalize your ad objective
					Upload the final draft of your ad with final copy and creatives
					Attempt task 02 quiz
			3	Define your target audience and budget	Watch a video on 'how to target the right people for ad'
					Define your target audience
					Learn how to decide the right budget for your ad
					Decide your final budget
			4	Launch your ad	Attempt task 03 quiz
					Learn how to create and launch your ad
					Create your ad and review ad preview
					Upload the screenshot of launched ad
			5	Manage incoming leads from ad	Attempt task 04 quiz
					Draft a message for incoming leads
					Send draft message to leads within 24 hours
					Pitch your offer to leads and follow up
					Close at least one sale
			6	Measure your ad performance	Attempt task 05 quiz
					Learn metrics to measure ad performance
Write money spent and leads or impressions					
Mention CPL or CPM					
Write revenue generated and number of sales closed					
Write what worked and how to improve ads in future					
Share your experience of doing this milestone					
Attempt task 06 quiz					

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Milestone 22: Psychological Marketing

Psychological Marketing milestone focuses on helping users identify psychological triggers like urgency, pricing, and offers, and use them to increase conversions and revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
22	Use Psychological Triggers to Increase Sales	Learn how to use urgency, pricing, and offers to increase conversions and revenue	1	Understand the psychological triggers	Learn why people buy products
					Share a story of one product you purchased because of a trigger
					Identify buying triggers for your business
					Attempt task 01 quiz
			2	Execute FOMO or urgency marketing	Learn how to create a FOMO or urgency marketing campaign
					Write how will you create FOMO or urgency for your customers
					Create one FOMO/urgency marketing campaign
					Launch your campaign on social media and community
			3	Execute one offer or discount marketing campaign	Attempt task 02 quiz
					Learn how to create offer or discounting marketing campaigns
					Write how will you create an offer/discount campaign
					Create one offer/discount campaign for your customers
					Launch your campaign on social media and community
					Share your experience of doing this milestone
			Attempt task 03 quiz		

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Milestone 23: Data-Driven Marketing

Data-Driven Marketing milestone focuses on helping users analyze the data of the last 10 milestones and run specific campaigns or ideas that resulted in lead generation or revenue.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title
23	Use Data-Driven Marketing to Grow Faster	Analyze data of the last 10 milestones to identify top campaigns or ideas and decide what to continue, improve, or stop.	1	Analyze your marketing data	Learn how businesses make decisions using data
					List 3 things that worked well and why
					List 3 things that didn't work well and why
					Attempt task 01 quiz
			2	Re-execute top performing campaign	Re-execute top 1-2 campaigns for 1 week
					Write how it helped generate leads or revenue
					Attempt task 02 quiz
			3	Improve one low performing campaign and relaunch it	Pick one low performing campaign and write how to improve it
					Improve the campaign and relaunch it
					Measure its performance and see if it was better
Share your experience of doing this milestone					
					Attempt task 03 quiz

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Milestone 24: Closure and Next Step

The final milestone focuses on helping users reflect on their learnings and also create an action plan for the next few months to continue to scale and grow their business.

Milestone #	Milestone Name	Milestone Description	Task #	Task Title	Activity title		
24	Plan your next growth phase	Document your 12 weeks of learning and create a 1 month plan to scale and grow your business	1	Review your progress	List all the ideas you executed		
					Write which milestone helped you the most and how		
					Write which milestone helped you the least and why		
					Write your key learnings from this semester		
					Create a not-to-do list for your business		
							Attempt task 01 quiz
			2	Create your 1 month marketing plan	Learn how to create a 1 month marketing plan		
					Set your marketing goal		
					Create and upload your 1 month plan to achieve this goal		
					Share your experience of doing this milestone		
Attempt final semester quiz							

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Evaluation Criteria

The evaluation will be conducted by a committee consisting of the class mentor, nodal officer and the principal HOD or his/her nominee.

Evaluation Component	Description	Weightage
Weekly Task Completion	Timely submission of weekly tasks, including activities, reflection prompts, graded quizzes etc	60%
Target Completion	Performance-based evaluation on hitting revenue or Profit targets (e.g., generating ₹ 10,000 revenue)	20%
Final Project	A comprehensive project depending the theme of the Semester	20%

Evaluation Mechanism: The score generated by the app will be final.

Weekly Component:

Each week of the course follows a structured format designed to guide students from learning to doing, using simple, mobile-accessible components:

Component	Duration	Description
Action Lab	~4hrs	<ul style="list-style-type: none"> - Hands-on task on the weekly concept - Includes step-by-step guidance, templates, and worksheets - Ends with a submission (e.g., video, reflection, or proof of action)
Learning Resources	Self-paced	<ul style="list-style-type: none"> - Videos, short readings, real-life stories, and tools to deepen understanding at their own pace
Check-in	Self-paced	<ul style="list-style-type: none"> - Quizzes & Reflection prompts

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Syllabus Overview for Semester 1-5

Semester	Learning Focus	Learner's demonstration	Revenue Target
1	Setup & Launch	Understand. Create. Start.	₹ 10,000/-
2	Marketing Basics	Engage. Share. Grow.	₹ 40,000/-
3	Operations & Scale	Earn. Deliver. Expand.	₹ 80,000/-
4	Organic Growth	Attract. Retain. Build.	₹ 160,000/-
5	AI Automation & Finance mastery	Simplify. Track. Sustain	₹ 400,000/-

Semester 1: Setup & Launch

In Term 1, students will explore what entrepreneurship means and how it connects to their daily lives. They will learn to identify problems, shape simple business ideas, and test the mineral settings. This semester builds the foundation—mindset, observation, value creation, and action.

Semester 2: Marketing Basics

In Term 2, students will learn how to attract customers and grow their visibility using digital platforms and community-based marketing strategies. Students will also begin to run paid advertising campaigns and learn how to optimize their marketing efforts.

Semester 3: Operations & Scale

This semester focuses on the day-to-day operations of running a business, including order fulfillment, customer service, and logistics. Students will also focus on scaling operations as demand grows, with an emphasis on managing resources effectively.

Semester 4: Organic Growth

Students will learn how to grow their businesses organically, using referrals, partnerships, and community engagement. This semester focuses on building a loyal customer base and using word-of-mouth marketing to increase reach and credibility.

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Semester 5: AI Automation & Financial Mastery

The final semester prepares students for long-term sustainability. Students integrate AI to improve productivity, automate routine tasks, and enhance decision-making. They also dive deep into financial planning, learning to set income goals, track expenses, understand profit margins, and create simple financial forecasts. This semester helps students solidify their entrepreneurial identity design systems for financial stability and scalability.

Course Outcomes:-

After studying this course, students will be able to:

- Launch and manage a business within their chosen track.
- Identify profitable opportunities and develop innovative solutions.
- Implement marketing and sales strategies using both digital and traditional methods.
- Use financial metrics to track performance and make informed business decisions.
- Scale a business using operational systems and automation tools.

Suggested Readings:-

- Simon Sinek, *Start with Why: How Great Leaders Inspire Everyone to Take Action*, Portfolio/Penguin
- Eric Ries, *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, Crown Business
- Jonah Berger, *Contagious: How to Build Word of Mouth in the Digital Age*, Simon & Schuster
- Phil Knight, *Shoe Dog: A Memoir by the Creator of Nike*, Scribner
- Jason Fried and David Heinemeier Hansson, *Rework: Change the Way You Work Forever*, Crown Business
- Héctor García and Francesc Miralles, *Ikigai: The Japanese Secret to a Long and Happy Life*, Penguin Books
- Tim Ferriss, *Tools of Titans (Selected Chapters)*, Houghton Mifflin Harcourt
- Peter Thiel and Blake Masters, *Zero to One: Notes on Startups, or How to Build the Future*, Crown Business
- Anil Lamba, *Romancing the Balance Sheet*, Anil Lamba Publications
- The Better India/Your Story, *Young Entrepreneurs Series* (Collection of Articles) Real Indian stories of youth starting businesses, snack able reads that show what's possible.

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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

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

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SEMESTER– III

SECTION – D		
4	<p>Trees: Binary trees, Representation in memory, Traversing, Traversal algorithms using stacks, Binary Search trees: Searching, Inserting and Deleting. Heap and Heap sort.</p> <p>Graphs: Graph Theory Terminology, Sequential Representation, Warshall's Algorithm, Linked Representation, Traversing a graph, Hashing.</p>	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	Bertziss, 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

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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
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	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 1 st 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
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		
SECTION - D		
4	Group Discussions, Preparing for Interview, Conferences and Seminars, Oral Presentation and Slide Preparation.	10
3	Antonyms, Synonyms, Homonyms, Homophones, One-word Substitution, Formation of Nouns, Verbs, Adjectives, Adverbs and the usage.	10

Practical's

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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
ESL2022 : Environmental Studies (Value Added Course) (CBEGS)

Time: 3 Hrs.

Credits: 2-0-0

Max. Marks : 50

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. The multidisciplinary nature of environmental studies

- Definition, scope and importance, Need for public awareness

2. Natural Resource and associated problems

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

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SEMESTER–III

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

Section-C

5. Environmental Pollution

- Definition, 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.
- Waste land reclamation
- Consumerism and waste products
- 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

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SEMESTER–III

8. Introduction to Environmental Laws, Environmental Audit and Impact Assessment

- Constitutional provisions- Article 48A
- Article 51A(g) and other derived environmental rights
- 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
- Environmental risk assessment, Pollution control and management
- Waste Management- Concept of 3R (Reduce, Recycle and Reuse)
- Ecolabeling /Ecomark scheme

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.

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SEMESTER–III

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.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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.

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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.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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**ENTREPRENEURSHIP MINDSET – III
(Mandatory Skill Enhancement Course)**

**Credits: 0+0+2
Total Marks: 50**

The Paper will be provided later.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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
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 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. Device Management: Dedicated devices, shared devices, virtual devices, channels, I/O traffic controller, I/O scheduler, I/O Device handlers.	10
SECTION - D		
4	Disk Scheduling: FCFS, SSTF, SCAN, C–SCAN, N–Stop Scan Introduction to Multiprocessor and Distributed Operating Systems Case Studies: Windows 8x/XP/2000, UNIX, LINUX to be discussed briefly.	10

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 Edition, 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.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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
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	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	<p>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.</p>	10
SECTION – C		
3	<p>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.</p>	10
SECTION – D		
4	<p>Recurrence Relations and Generating Functions: Polynomial expressions, telescopic form, recursion theorem, closed form expression, generating function, solution of recurrence relation using generating function</p>	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	<p>Memory Organisation: Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation.</p> <p>I/O Organization: Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA, I/O Processors.</p>	10
SECTION - D		
4	<p>Parallel & Multiprocessing Environment: Introduction to parallel processing, pipelining, RISC Architecture, vector & array processing, Multiprocessing concepts, memory & resource sharing, interprocessor communication & synchronization.</p>	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.

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SEMESTER – IV

**ENTREPRENEURSHIP MINDSET – IV
(Mandatory Skill Enhancement Course)**

**Credits: 0+0+2
Total Marks: 50**

The Paper will be provided later.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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

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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.

Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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
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	<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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SEMESTER- V**

SECTION – B		
2	<p>SQL: Introduction, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL) statements, Views, Sub-queries, Access Rights, Indexes</p> <p>Normalization: Purpose of Normalization, 1NF, 2NF, 3NF, BCNF.</p>	10
SECTION – C		
3	<p>Query Optimization: Introduction of Query Processing, Heuristic Approach to Query Optimization, Cost Estimation, Pipelining.</p> <p>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</p>	10
SECTION - D		
4	<p>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.</p> <p>Database Recovery of database: Introduction, Need for Recovery,</p>	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

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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	<p>Hard Problems: Basic Concepts, Nondeterministic Algorithms, Classes NP – Hard and NP – Complete, NP–Hard Graph Problems (CNDP, DHC, TSP and AOG).</p> <p>Approximation Algorithms: Introduction, Absolute Approximation (Planer Graph Coloring and NP–Hard Absolute Approximations), – Approximations (Scheduling Independent Tasks and Bin Packing).</p>	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.	Purdum, 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.

Bachelor of Technology in Computer Science & Engineering (CBEGS)**Syllabus for the Batch form Year 2025 to Year 2029****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 be able to understand ambiguity problems and its solution. This course also introduces further extensions and applications of formal languages by introducing advanced 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.

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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>	
<p>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

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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</p> <p>Constructing ASP.NET Web Pages Web Forms, Using the HTML Server Controls.</p> <p>Web Server Controls: Standard Web Server Controls, List Controls, Advanced Controls</p> <p>Creating a Web User Control, Master Pages, Using Cascading Style Sheets (CSS), Types of Style Sheets and Selectors</p> <p>Core Web Application Features: Working with User Sessions, Using the Cache Object, Using Cookies</p> <p>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</p> <p>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,</p> <p>Using the Data-bound and Data-aware Controls: Repeater Control, Grid View, Formatting Data Controls, Using Stored Procedures.</p> <p>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

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
SEMESTER – V

SECTION – D		
4	<p>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.</p> <p>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</p>	10
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: <u>Beginning ASP.NET 4.5: in C# and VB</u> , John Wiley.	
7	Walther, Active Server Pages 2.0 Unleashed, BPB Publications.	

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch from Year 2025 to Year 2029**

SEMESTER – V

**ENTREPRENEURSHIP MINDSET – V
(Mandatory Skill Enhancement Course)**

**Credits: 0+0+2
Total Marks: 50**

The Paper will be provided later.

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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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SEMESTER – VI

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 Rambaugh, Michael Balaha (PHI , EEE)
2	“Object Oriented Software Construction” Hertfordshire PHI International 1988.
3	“Object Oriented Programming” Brad J.Cox Addison Wessley,1986.

**Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029**

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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SEMESTER – VI

SECTION – C		
3	<p>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,</p> <p>Event Handling: The Delegation Event Model, Event Classes, Event Listener Interfaces</p>	10

SECTION – D		
4	<p>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.</p>	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

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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

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SEMESTER – VI

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

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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
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 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. Need for task scheduling: Issues and scheduling methodologies. Priority based scheduler, value based scheduler & Pre-emptive scheduling multiprocessor environment. Deterministic scheduling, Hardware Schedulers. [25%]	10

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SEMESTER – VI

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.	

Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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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SEMESTER – VI

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.

Bachelor of Technology in Computer Science & Engineering (CBEGS)
Syllabus for the Batch form Year 2025 to Year 2029
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.
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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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SEMESTER – VI

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:	
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.	

Bachelor of Technology in Computer Science & Engineering (CBEGS)
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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

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
<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 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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SEMESTER – VI**

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.

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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
<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	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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SEMESTER– VI

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 constant 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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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. i. WAP to draw different geometric structure using given output primitives. ii. WAP to show the light coming from one source of light in a dark room. iii. WAP to draw 2D car and move on the road OR to show the landing and take-off of the airplane. iv. WAP to show a moving 2D cartoon in rainy season.
2	Implement DDA line generating algorithm.
3	Implement Bresenham's line generating algorithm.
4	Implement Mid-point circle- generating algorithm.
5	WAP to draw 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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SEMESTER– VII

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	<p>Programming Models in Cloud: Introduction to Thread Programming, Task Programming and Map–Reduce Programming.</p> <p>Advance Topics in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Federated Cloud Computing, Mobile Cloud Computing, Fog computing, Big Data Analytics.</p>	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:	
1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, Mastering Cloud Computing: Foundation and Application Programming, Tata McGraw Hill, ISBN–13: 978–1–25–902995–0, New Delhi, India, Feb 2013.	
Reference Books:	
1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–6529803, New Delhi, India, 2011.	
2. 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
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	<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

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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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SEMESTER– VII

SECTION – D		
4	Probabilistic Reasoning: Representation, Bayesian Networks, Construction of Bayesian Networks, Conditional Independence, Bayesian Networks with continuous variables. Making Simple Decisions: Beliefs, Desires and Uncertainty, Utility Theory, Utility Functions, Multi- attribute Utility Functions, Decision Networks, Value of Information. Making Complex Decisions: Stochastic Problems, Value Iteration, Policy Iteration, Game Theory. Frame-based Expert systems: Inheritance in frame-based expert systems, Methods and Continued demons, Interactions of frames and rules.	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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<p>Course Objectives:</p> <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>
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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	<p>Unsupervised Learning Algorithms: K-means Clustering, Hierarchical clustering</p> <p>Ensemble Machine Learning models: Ensemble Machine Learning techniques such as Bagging, Boosting and Voting.</p> <p>Model Selection : Metrics, Feature Selection, Principal Component Analysis, Confusion Matrix ,Overfitting,Underfitting,Bias-Variance Tradeoff.</p>	10
SECTION - C		
3	<p>Deep Learning: Basics of Deep learning, Why deep learning, Difference between machine learning and deep learning ,Classification of DL approaches.</p> <p>Types : Recursive Neural Networks(RvNNs), Convolutional Neural</p>	10
SECTION - D		
4	<p>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.</p>	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
<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	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
2	Rafiqzaman, Microprocessors & Micro Computers Development Systems, Harper Row, 1994
3	Rafiqzaman, 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
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 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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SEMESTER– VII

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 Elfes, 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	
5	M.P. Groover, M. Weins, R.N. Nagel, N.C. Odrey, Industrial Robotics, McGraw Hill,	
6	Various Research papers in area of Robotics	

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SEMESTER- VIII

Course Name	:	Industrial Training-cum-Projects
Course Code	:	CSD4081
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 05 credits.	05
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 15 credits	15

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