



# **NAGARJUNA**

## **COLLEGE OF ENGINEERING & TECHNOLOGY**

**An Autonomous Institute under VTU**

### **Vision**

Leadership and Excellence in Education

### **Mission**

To fulfill the vision by imparting total quality education replete with the philosophy of blending human values and academic professionalism.

### **Scheme and Syllabus**

I<sup>st</sup> Semester B.E

Physics Cycle

Academic Year

2022-23

**Physics Cycle – Civil Engineering**

First Semester Physics Cycle Civil Engineering

Sl.No	Course & Course code		Course Title	TD /PSB	Teaching Hours/week				Examination				Credits
					Theory Lecture	Tutorial	Practical/Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	*ASC(IC)	22MATC11	Calculus & Linear Algebra for Civil	Mathematics	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	22PHYC12	Applied Physics for Civil	Physics	2	2	2	0	03	50	50	100	04
3	ESC	22CIV13	Engineering of Mechanics	Civil	2	2	0	0	03	50	50	100	03
4	ESC-1	22ESC145	Introduction to C-Programming	CSE	2	0	2	0	03	50	50	100	03
5	ETC-1	22ETC15B	Green Buildings	Civil	3	0	0	0	03	50	50	100	03
6	AEC	22ENG16	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMC	22KSK17	Samskrutika Kannada	Humanities	1	0	0	0	01	50	50	100	01
		22KBK17	Balake Kannada										
8	AEC	22IDT18	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
				TOTAL						400	400	800	20

**SDA**-Skill development Activities, **TD/PSB** – Teaching Department / Paper setting board, **ASC**-Applied Science course, **ESC**-Engineering Science Course, **ETC**-Emerging Technology Course, **AEC**-Ability Enhancement Course, **HSMC** – Humanity and Social Science and management Course, **SDC**-Skill development Course, **CIE**-Continous Internal Evaluation, **SEE**-Semester and Examination, **IC**-Integrated Course (Theory Course Integrated with Practical Course)

Course Title	CALCULUS AND LINEAR ALGEBRA for civil engineering stream			
Course Code	22MATC11		CIE Marks	50
Course Type	Integrated		SEE Marks	50
Teaching Hours/Week (L: T: P: S)	2:2:2:0		Total Marks	100
Total Hours of Pedagogy	Theory	40 hours	Exam Hours	03
	Practical	10 to 12 slots	Credits	04

#### **Course objectives:**

The goal of the course **Calculus and Linear Algebra for civil engineering stream** is to

- **Familiarize** the importance of calculus associated with one variable and two variables for civil engineering.
- **Analyze** Civil engineering problems applying Ordinary Differential Equations.
- **Develop** the knowledge of Linear Algebra referring to matrices.

#### **Teaching-Learning Process (General Instructions)**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students for group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

#### **Module-1**

##### **Differential Calculus:**

##### **Introduction to polar coordinates and curvature relating to Civil engineering.**

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

**- 08 Hours**

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Structural design and paths, Strength of materials, Elasticity.

[Text 1: 4.7, 4.8, 4.10, 4.11]

**(RBT Levels: L1, L2 and L3 )**

#### **Module-2**

##### **Series Expansion and Multivariable Calculus:**

##### **Introduction to series expansion and partial differentiation in the field of Civil engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems.

Indeterminate forms-L'Hospital's rule. Problems.

Partial differentiation, total derivative-differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems. **-08 Hours**

**Self-study:** Euler's Theorem and problems. Method of Lagrange undetermined multipliers

<p>with single constraint.</p> <p><b>Applications:</b> Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.</p> <p>[Text 1: 4.4, 4.5, 5.2, 5.5, 5.6, 5.7, 5.11]</p> <p><b>(RBT Levels: L1, L2 and L3 )</b></p>	
<b>Module-3</b>	
<p><b>Ordinary Differential Equations (ODE's) of first order:</b></p> <p><b>Introduction to first-order ordinary differential equations pertaining to the applications for Civil engineering.</b></p> <p>Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations– Integrating factor on <math>\frac{1}{N} \left( \frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} \right)</math> and <math>\frac{1}{M} \left( \frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right)</math>. Applications of ODE's-Orthogonal trajectories, Newton's law of cooling.</p> <p><b>Nonlinear differential equations:</b> Introduction to general and singular solutions; Solvable for p only; Clairaut's equations, reducible to Clairaut's equations- Problems. <b>-08 Hours</b></p> <p><b>Self Study:</b> Applications of ODE's: bending of the beam and whirling of shaft' Solution of non-linear ODE by the method of solvable for x and y.</p> <p><b>Applications:</b> Structural analysis, Dynamics, elasticity and earth quake engineering.</p> <p>[Text 1: 11.9, 11.10, 11.11, 11.12, 11.13, 11.14, 12.3, 12.6]</p> <p><b>(RBT Levels: L1, L2 and L3 )</b></p>	
<b>Module-4</b>	
<p><b>Integral Calculus:</b></p> <p><b>Introduction to Integral Calculus in Civil Engineering applications.</b></p> <p><b>Multiple Integrals:</b> Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates.</p> <p><b>Beta and Gamma functions:</b> Definitions, properties, the relation between Beta and Gamma functions. Problems. <b>- 08 Hours</b></p> <p><b>Self-study:</b> Applications to find Area and Volume by a double integral. Problems. Centre of gravity.</p> <p>[Text 1: 7.1, 7.2, 7.5, 7.7(2)(i), 7.14, 7.15, 7.16]</p> <p><b>Applications:</b> Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.</p> <p><b>(RBT Levels: L1, L2 and L3 )</b></p>	
<b>Module-5</b>	
<p><b>Linear Algebra:</b></p> <p><b>Introduction of linear algebra related to Civil Engineering applications.</b></p> <p>Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations; Gauss-elimination method, Gauss-Jordan method and Approximate solution by Gauss-Seidel method. Eigen values and Eigen vectors-Rayleigh's power method to find the dominant Eigen value and Eigen vector. <b>-8 Hours</b></p> <p><b>Self Study:</b> Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley-Hamilton theorem.</p> <p><b>Applications:</b> Structural Analysis, Balancing equations.</p> <p>[Text 1: 2.7, 2.10, 2.13, 28.6, 28.7, 28.9]</p> <p><b>(RBT Levels: L1, L2 and L3 )</b></p>	
<b>Teaching-Learning Process for all modules</b>	<b>Chalk and Talk/PowerPoint presentation/YouTube videos.</b>
<p><b>List of Laboratory experiments (2 hours/week per batch/ batch strength 15)10 lab sessions + 1 repetition class + 1 Lab Assessment</b></p> <ol style="list-style-type: none"> <li>1 2D plots for Cartesian and polar curves</li> <li>2 Finding angle between polar curves, curvature and radius of curvature of a given curve</li> <li>3 Finding partial derivatives, Jacobian and plotting the graph</li> <li>4 Applications to Maxima and Minima of two variables</li> <li>5 Solution of first-order differential equation and plotting the graphs</li> <li>6 Program to compute area, volume and centre of gravity</li> </ol>	

- 7 Evaluation of improper integrals
- 8 Numerical solution of system of linear equations, test for consistency and graphical representation
- 9 Solution of system of linear equations using Gauss-Seidel iteration
- 10 Compute eigen values and eigen vectors and find the largest and smallest eigen value by Rayleigh power method.

#### Course Outcomes:

After successfully completing the course, the students will be able to:

1. Apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
2. Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods.
3. Understand the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
4. Make use of matrix theory for solving for system of linear equations and Compute eigen values and eigen vectors
5. Use the modern mathematical tools by PYTHON software.

#### Assessment Details (both CIE and SEE)

Component		Assigned marks		Max. Marks	Min. Marks
CIE's	CIE 1	20	60	80	32
	CIE 2	20			
	CIE 3	20			
AAT's	AAT-1- Before CIE 1	10	20		
	AAT-2- Before CIE 2	10			
PRACTICAL	Practical and Preparation of laboratory record	Each Experiment 15 marks	Scale down to 15	20	08
	Lab test - At the end of the semester	50	Scale down to 05		
Continuous Internal Evaluation (CIE) Total Marks				100	40
Semester End Examination (SEE) Total Marks				100	35
Continuous Internal Evaluation Total Marks: 100. Reduced to 50 Marks					
Semester End Examination (SEE) Total Marks: 100. Reduced to 50 Marks					
Minimum Pass Marks (CIE+SEE): 40 %					

#### Suggested Learning Resources:

##### Text Books:

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

##### Reference Books:

1. **B.V. Ramana**: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed.
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Reprint, 2016.
3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup> Ed., 2022..
4. **C. Ray Wylie, Louis C. Barrett**: "Advanced Engineering Mathematics" McGraw – Hill Book Co. Newyork, 6<sup>th</sup> Ed., 2017.
5. **Gupta C.B, Sing S.R and Mukesh Kumar**: "Engineering Mathematic for Semester I

and II”, Mc-Graw Hill Education(India) Pvt. Ltd 2015.

**6. H.K. Dass and Er. Rajnish Verma:** “Higher Engineering Mathematics” S.Chand Publication 3<sup>rd</sup> Ed., 2014.

**7. James Stewart:** “Calculus” Cengage publications, 7<sup>th</sup> edition, 4<sup>th</sup> Reprint 2019.

**E-Resources:**

- <http://ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars

**CO- PO Mapping :**

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22MATC11.1	2	1										
22MATC11.2	3	2										
22MATC11.3	3	1										
22MATC11.4	3	3										1
22MATC11.5	1	2			3							

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped**

Course Title:	<b>Applied Physics for Civil Engineering</b>		
Course Code:	<b>22PHYC12/22</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03+02
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To study the essentials of photonics for engineering applications.</li> <li>To understand the types of oscillation, shock waves &amp; its generation, and applications.</li> <li>To study the principles of quantum mechanics</li> <li>To study the electrical properties of materials.</li> <li>To Study the elastic properties of materials and failures of engineering materials.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective <ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Laser and Optical Fibers:</b> <b>LASER:</b> Basic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients (derivation of expression for energy density), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Nd-YAG Laser, Application of Lasers. <b>Optical Fiber:</b> Principle and structure, Acceptance angle and Numerical Aperture (NA) and derivation of Expression for NA, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic Communication. Numerical Problems. <b>Pre-requisite: Properties of light</b> <b>Self-learning: Total Internal Reflection &amp; Propagation Mechanism (Optical Fibers)</b>			
<b>Module-2 (8 Hours)</b>			
<b>Quantum Mechanics:</b> de Broglie Hypothesis and Matter Waves, Photoelectric Effect, Compton Scattering, Dual nature, Heisenberg's Uncertainty Principle and its application (Nonexistence of electron inside the nucleus-Non Relativistic), Wave Function, Time independent Schrodinger wave equation (derivation) , Physical Significance of a wave function and Probability density, Eigen functions and Eigen Values, Particle inside one-dimensional infinite potential well, Waveforms and Probabilities. Numerical problems. <b>Pre-requisite: Wave-Particle dualism</b> <b>Self-learning: de Broglie Hypothesis</b>			
<b>Module-3 (8 Hours)</b>			
<b>Oscillations and Waves</b> <b>Oscillations:</b> Basics of SHM, derivation of equation for SHM, Equation of motion for free oscillations, Natural frequency of oscillations. <b>Damped Oscillations:</b> Theory of damped oscillations (derivation), over damping, critical & under damping (graphical representation), quality factor. <b>Forced Oscillations:</b> Theory of forced oscillations (derivation). <b>Shock waves:</b> Mach number, Properties of Shock waves, Construction and working of Reddy shock tube, applications of shock waves, Numerical problems. <b>Pre-requisites: Basics of Oscillations</b> <b>Self-learning: Simple Harmonic motion, differential equation for SHM</b>			
<b>Module-4 (8 Hours)</b>			

**Electrical Properties of Materials and Applications**

Free Electron concept, Electrical conductivity in metals, Resistivity and Mobility, Concept of Phonon, Matthiessen's rule. Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Silsbee Effect, Types of Superconductors, Temperature dependence of critical field, BCS theory (Qualitative), Quantum Tunneling, High-Temperature superconductivity, Josephson Junction, DC and AC SQUIDS (Qualitative), MAGLEV, Applications in Quantum Computing (Mention). Numerical problems.

**Pre-requisites: Basics of Electrical conductivity**

**Module-5 (8 hours)****Self-learning: Resistivity and Mobility****Elasticity:**

Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation between  $Y$ ,  $n$  and  $\sigma$  (with derivation), beams, bending moment and derivation of expression Cantilever and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - ductile fracture, brittle fracture, stress concentration, fatigue and factors affecting fatigue (only qualitative explanation) Numerical problems.

**Pre-requisites: Elasticity, Stress & Strain**

**Self-learning: Stress-Strain Curve**

**Laboratory Component:**

- a) Exercise
- b) Demonstration (DM)
- c) Virtual Lab (VL)
- d) Open Ended (OE)

**List of Experiments:**

1. Wavelength of LASER using Grating
2. Charging and Discharging of a Capacitor
3. Series LCR
4. Parallel LCR
5. Photo-Diode Characteristics
6. Single Cantilever (DM)
7.  $n$  by Tensional Pendulum (DM)
8. Four Probe Method (VL)
9. Numerical Aperture using Optical fiber (VL)
10. Planck's Constant using LEDs (OE)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	<b>Understand</b> the fundamentals of photonics, oscillation, waves, quantum mechanics, elasticity and material properties.
CO2	<b>Apply</b> the concept of photonics, oscillation, waves, quantum mechanics, elasticity and transport phenomena in metals.
CO3	<b>Determine</b> the desired parameters to use it in various engineering applications.
CO4	Usage of <b>Modern tools</b> to develop the concept of physics & to perform as a <b>member of team</b> to build a model.
CO5	<b>Conduct, analyze and interpret</b> the data and results for applied physics experiments.

**Assessment Details (both CIE and SEE)**

Component	Type of Assessment	Max. Marks	Total	Reduced Marks	Total
CIE-Theory	CIE-1	20	80	30	50
	CIE-2	20			
	CIE-3	20			
	AAT-1(Surprise Test/Quiz)	10			
	AAT-2 (Self Study Topic Assignment)	10			
CIE-Lab	Record & Performance	15	15	20	
	Lab Test	20	5		
SEE	End Exam	100		50	50
<b>Grand Total</b>				<b>100</b>	



**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8<sup>th</sup> Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. Concepts of Modern Physics, Arthur Beiser, McGraw-Hill, 6<sup>th</sup> Edition, 2009.
4. Lasers and Non-Linear Optics, B B Loud, New age international, 2011 edition.
5. A textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
6. Engineering Physics, S P Basavaraj, 2005 Edition,
7. Introduction to Superconductivity, Michael Tinkham, McGraww Hill, INC, II Edition

**Web links and Video Lectures (e-Resources):**

**LASER:** <https://www.youtube.com/watch?v=WgzynzePiyc>

**Superconductivity:** <https://www.youtube.com/watch?v=MT5Xl5ppn48>

**Optical Fiber:** [https://www.youtube.com/watch?v=N\\_kA8EpCUQo](https://www.youtube.com/watch?v=N_kA8EpCUQo)

**Quantum Mechanics:** <https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s>

**Oscillations and waves :** <https://openstax.org/books/college-physics-2e> NPTEL

**Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>

**Virtual LAB:** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

**Virtual LAB:** <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

<http://nptel.ac.in> <https://swayam.gov.in>

[https://virtuallabs.merlot.org/vl\\_physics](https://virtuallabs.merlot.org/vl_physics).

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1												2
CO2	3	1										2
CO3	3	3										2
CO4	1				2			1	3			2
CO5	1			2	2			1				2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Course Title:	<b>ENGINEERING MECHANICS</b>		
Course Code:	<b>22CIV13</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• To develop students' ability to analyze the problems involving forces, moments with their applications.</li> <li>• To analyse the member forces in trusses</li> <li>• To make students to learn the effect of friction on different planes</li> <li>• To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.</li> <li>• To make the students learn about kinematics and kinetics and their applications.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes. 1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes. 2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle. 3. Encourage collaborative (Group) Learning in the class. 4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it. 6. Topics will be introduced in multiple representations. 7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 9. Individual teachers can device innovative pedagogy to improve teaching-learning.			
<b>Module-1 (8 Hours)</b>			
<b>Title of the module</b> <b>Resultant of coplanar force system:</b> Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples. <b>Pre-requisite: Fundamentals of Physics like force, Newton's of motion, etc.,</b> <b>Self-learning: Numerical Examples</b>			
<b>Module-2 (8 Hours)</b>			
<b>Title of the module</b> <b>Equilibrium of coplanar force system:</b> Introduction to force, Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples. <b>Pre-requisite: Force system</b> <b>Self-learning: Numerical Examples</b>			
<b>Module-3 (8 Hours)</b>			

**Title of the module**

**Analysis of Trusses:** Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples. **Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

**Pre-requisite: Basics of trigonometry, Force system**

**Self-learning: Numerical Examples**

**Module-4 (8 Hours)****Title of the module**

**Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples. **Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.

**Pre-requisite: Basics of Geometrical figures**

**Self-learning: Numerical Examples**

**Module-5 (8 hours)****Title of the module**

**Kinematics:** Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion Projectiles: Introduction, numerical examples on projectiles.

**Kinetics:** Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.

**Pre-requisite: Fundamentals of physics, Concepts of motion**

**Self-learning: Numerical Examples**

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Compute the resultant of a force system and resolution of a force
CO2	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
CO3	Analyse the frictional resistance offered by different planes
CO4	Locate the centroid and compute the moment of inertia of sections
CO5	Analyze the bodies in motion

**Assessment Details (both CIE and SEE)**

Component	Type of Assessment	Max. Marks	Total	Reduced Marks	Total
<b>CIE-Theory</b>	<b>CIE-1</b>	<b>20</b>	<b>80</b>	<b>30</b>	<b>50</b>
	<b>CIE-2</b>	<b>20</b>			
	<b>CIE-3</b>	<b>20</b>			
	AAT-1(Surprise Test/Quiz)	<b>10</b>			
	AAT-2 (Self Study Topic Assignment)	<b>10</b>			
<b>CIE-Lab</b>	Record & Performance	<b>15</b>		<b>20</b>	
	Lab Test	<b>5</b>			
<b>SEE</b>	End Exam	<b>100</b>		<b>50</b>	<b>50</b>
<b>Grand Total</b>				<b>100</b>	

**Suggested Learning Resources:****Text Books**

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

**Reference Books:**

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International
6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- <https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=ksmsp9OzAsI>

- <https://www.youtube.com/watch?v=x1ef048b3CE>
- [https://www.youtube.com/watch?v=l\\_Nck-X49qc](https://www.youtube.com/watch?v=l_Nck-X49qc)
- [https://play.google.com/store/apps/details?id=appinventor.ai\\_jgarc322.Resultant\\_Force](https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force)
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- [https://www.youtube.com/watch?v=0RZHHgI8m\\_A](https://www.youtube.com/watch?v=0RZHHgI8m_A)
- <https://www.youtube.com/watch?v=BlS5KnQOWkY>

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	3										
CO2	2	3										
CO3	2	3										
CO4	2	3										
CO5	2	3										

Level 3- Highly Mapped,    Level 2-Moderately Mapped,    Level 1-Low Mapped

Course Title:	<b>Introduction to C Programming</b>		
Course Code:	<b>22ESC145</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T: P: S)	2:0:2:0	Exam Hours	3+2
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• CLO 1: Elucidate the basic architecture and functionalities of a computer.</li> <li>• CLO 2: Apply programming constructs of C language to solve the real-world problems.</li> <li>• CLO 3: Explore user-defined data structures such as arrays, structures and pointers in implementing solutions to problems.</li> <li>• CLO 4: Design and develop solutions to problems using structured programming constructs such as functions and procedures.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.</li> <li>9. Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the operations of C Programs.</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Introduction to Computer Systems and C Programming Language:</b> Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/Output statements in C.			
<b>Pre-requisite:</b> Basic Mathematics, Basics of Computer Organization <b>Self-learning:</b> Sample programs to demonstrate the compilation and execution of C programs, use of variables, constants and Input/Output statements in C.			
<b>Module-2 (8 Hours)</b>			
<b>Operators and Expressions, Decision Control and Looping Statements</b> <b>Operators and Expressions:</b> Operators in C, Type conversion and typecasting. <b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.			
<b>Pre-requisite:</b> Basic Mathematics, Basics of Computer Organization <b>Self-learning:</b> Sample C programs to demonstrate the use of expressions, decision control and looping constructs.			
<b>Module-3 (8 Hours)</b>			
<b>Arrays and Functions</b> <b>Functions:</b> Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. <b>Arrays:</b> Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays.			
<b>Pre-requisite:</b> Basic Mathematics, Basics of Computer Organization <b>Self-learning:</b> Sample C programs to demonstrate the use of arrays and program modularization.			

Module-4 (8 Hours)
<b>Strings and Pointers</b> <b>Strings:</b> Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. <b>Pointers:</b> Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers.  <b>Pre-requisite: Basic Mathematics, Basics of Computer Organization</b> <b>Self-learning: Sample programs to demonstrate the use of strings and pointers.</b>
Module-5 (8 hours)
<b>Structure, Union, and Enumerated Data Type:</b> Introduction, structures and functions, Unions, unions inside structures, Enumerated data type. <b>Files:</b> Introduction to files, using files in C, reading and writing data files, Detecting end of file.  <b>Pre-requisite: Basic Mathematics, Basics of Computer Organization</b> <b>Self-learning: Sample programs to demonstrate the use of structures, unions and file access.</b>

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Elucidate the basic architecture and functionalities of a computer.
CO2	Apply programming constructs in C to solve the real-world problem.
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting.
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions.
CO5	Design and develop solutions to problems using modular programming constructs.

**Assessment Details (both CIE and SEE)**

Component	Type of Assessment	Max. Marks	Total	Reduced Marks	Total
<b>CIE-Theory</b>	<b>CIE-1</b>	<b>20</b>	<b>80</b>	<b>30</b>	<b>50</b>
	<b>CIE-2</b>	<b>20</b>			
	<b>CIE-3</b>	<b>20</b>			
	AAT-1(Surprise Test/Quiz)	<b>10</b>			
	AAT-2 (Self Study Topic Assignment)	<b>10</b>			
<b>CIE-Lab</b>	Record & Performance	<b>15</b>		<b>20</b>	
	Lab Test	<b>5</b>			
<b>SEE</b>	End Exam	<b>100</b>		<b>50</b>	<b>50</b>
<b>Grand Total</b>				<b>100</b>	

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90- 100% respectively.
  - Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.
- Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**.

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks** shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for **10 marks**. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 03 hours**) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.



**Semester End Examination:**

Theory SEE will be conducted as per the scheduled time table, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics under that module.**
- The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)**

**Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 30 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.

**Suggested Learning Resources:****Text Books**

1. Computer fundamentals and programming in C, “Reema Thareja”, Oxford University, Second edition, 2017.

**Reference Books**

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, Prentice Hall of India.

**Web links and Video Lectures (e-Resources):**

1. [elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html](http://elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html)
2. <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods.
3. <https://cse02-iiith.vlabs.ac.in/>

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning:**

1. Quizz
2. One Minute Paper
3. Assignment
4. Seminar
5. Think-Pair-Share
6. Collaborative Learning

**Laboratory Component:****Note:** The experiments have to be classified into

- e) Exercise
- f) Demonstration (DM)
- g) Virtual Lab (VL)
- h) Open Ended (OE)

**List of Experiments:**

1. C Program to find Mechanical Energy of a particle using  $E = mgh + \frac{1}{2}mv^2$ .
2. C Program to convert Kilometers into Meters and Centimeters.
3. C Program to check whether the given character is Lowercase or Uppercase or Special Character.
4. Given the values  $x, y, p, q$  of a simple chemical equation of the type:  $b_1A_x + b_2B_y \rightarrow b_3A_pB_q$ , find the values of constants  $b_1, b_2, b_3$  such that the equation is balanced on both sides and it must be the reduced form.
5. Implement Matrix multiplication and validate the rules of multiplication. (VL)
6. Compute  $\sin(x)/\cos(x)$  using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
7. Sort the given set of N numbers using Bubble sort. (DM)
8. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
9. Implement structures to read, write and compute average-marks of the students, list the students scoring above and below the average marks for a class of N students.
10. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
11. Simulate a Simple Calculator to demonstrate at least 5 arithmetic operations of your choice. (OE)

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4		6		8		10	11	12
CO1									2	1		
CO2	2											
CO3					2							
CO4		2										
CO5		1										

**Level 3-Highly Mapped,****Level 2-Moderately Mapped,****Level 1-Low Mapped**

Course Title:	<b>GREEN BUILDINGS</b>		
Course Code:	22ETC 15B	CIE Marks	50
Course Type:	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S):	3:0:0:0	Exam Hours	3
Total Hours of Pedagogy:	40 Hours	Credits	3
<b>Course objectives</b> <ul style="list-style-type: none"> <li>Understand the Concept &amp; Objectives of the terms cost effective construction and green building.</li> <li>Apply cost effective technologies and methods in construction.</li> <li>Understand the Problems due to Global Warming.</li> <li>State the Concept of Green Building rating systems, utility of solar energy, water and waste management in buildings.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective <ol style="list-style-type: none"> <li>Flipped Class</li> <li>Chalk and Talk</li> <li>Blended Mode of Learning</li> <li>Simulations, Interactive Simulations and Animations</li> <li>NPTEL and Other Videos for theory topics</li> <li>Smart Class Room</li> <li>Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Introduction to the Concept of Cost Effective Construction</b> Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials.			
<b>Module-2 (8 Hours)</b>			
<b>Environment Friendly and Cost Effective Building Technologies</b> Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies – Cost ford - Nirmithi Kendra – Habitat.			
<b>Module-3 (8 Hours)</b>			
<b>Global Warming</b> Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials. Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Building.			

<b>Module-4 (8 Hours)</b>
<b>Green Building Rating Systems</b> BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only).
<b>Module-5 (8 hours)</b>
<b>Utility of Solar Energy in Buildings</b> Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. Green Composites for Buildings Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Identify and select the different building materials for construction.
CO2	Apply environmental friendly and cost effective building technologies.
CO3	Analyze the effect of global warming due to different building materials.
CO4	Comprehend the concepts of sustainability in green buildings.
CO5	Utilize alternate source of energy and effective use water.

**Assessment Details (both CIE and SEE)**

Component	Type of Assessment	Max. Marks	Total	Reduced Marks	Total
<b>CIE-Theory</b>	<b>CIE-1</b>	<b>20</b>	<b>100</b>	<b>50</b>	<b>50</b>
	<b>CIE-2</b>	<b>20</b>			
	<b>CIE-3</b>	<b>20</b>			
	AAT-1(Surprise Test/Quiz)	<b>10</b>			
	AAT-2 (Self Study Topic Assignment)	<b>10</b>			
	AAT-3 (Field survey and report presentation)	<b>20</b>			
<b>SEE</b>	End Exam	<b>100</b>		<b>50</b>	<b>50</b>
<b>Grand Total</b>				<b>100</b>	

**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

- HarharaIyer G, Green Building Fundamentals, Notion Press.
- Dr. Adv. Harshul Savla, Green Building: Principles & Practices.
- D. A. Vallero and C. Brasier: "The Science of Sustainability and Green Engineering". Willy, John willey and sons, Inc.
- K. S. Jagadish, "Alternative Building Materials and Technologies", New age international publishers.

**Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=THgQF8zHBW8>
- [https://www.youtube.com/watch?v=DRO\\_rIkYwxQ](https://www.youtube.com/watch?v=DRO_rIkYwxQ)

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

For Example:

<http://nptel.ac.in><https://swayam.gov.in>**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1						2						2
CO2						3	3	3				2
CO3						2	2					2
CO4						2	3	2				2
CO5						2	2	2				3

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Course Title:	<b>Communicative English</b>		
Course Code:	22ENG16	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
<p>Course objectives: The course Communicative English (22ENG16) will enable the students,</p> <ol style="list-style-type: none"> <li>1. To know about Fundamentals of Communicative English and Communication Skills in general.</li> <li>2. Understanding how to connect &amp; communicate when meeting for the first time. &amp; English grammar and essentials of important language skills.</li> <li>3. How to describe self &amp; how show case interest &amp; hobbies. Learning the Usage of Adjectives, Adverbs, Articles Tense : Continuous Tenses</li> <li>4. Understanding/ learning to describe thinks &amp; others . incorporating Grammar in communication</li> <li>5. Improving Communication &amp; Presentation skills &amp; eliminating MTI .</li> </ol>			
<p><b>Teaching-Learning Process :</b>            These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make            Teaching –Learning more effective:            Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.</p> <p>(i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.</p> <p>Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.</p>			
<p>Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.</p>			
<b>Module-1 (04 hours of pedagogy)</b>			
<p><b>Introduction to Communicative English :</b></p> <p>Introduction, Language as a Tool, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English (Communication Channels). Interpersonal and Intrapersonal Communication Skills, How to improve and Develop Interpersonal and Intrapersonal Communication Skills.</p>			
<b>Module-2 (05 hours of pedagogy)</b>			
<p><b>Speaking activity</b>            Social graces, Greeting, Self-introduction, introducing others Asking for and Giving Information. Grammar and Vocabulary in Use: Parts of Speech, Nouns, Pronouns Articles, Asking question. (WH, Aux Verbs)</p>			
<b>Module-3 (05 hours of pedagogy)</b>			
<p><b>Speaking activity</b>            Speaking about Routine, Hobbies, Likes and Dislikes            Grammar and Vocabulary in Use: Verb= Main / Assistant, Forms of Verbs, Tense: Simple present tense, Writing exercises: Subject Verb Agreement, Positive and Negative sentences, Question tags</p>			

**Module-4****(05 hours of pedagogy)****Basic English Communicative Grammar and Vocabulary PART - II: Words**

formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

**Module-5 (05 hours of pedagogy)****Communication Skills for Employment:**

Information Transfer: Oral Presentation - Examples and Practice. Extempore / Public Speaking, Difference between Extempore / Public Speaking, Communication Guidelines for Practice. Mother Tongue Influence (MTI) – Various Techniques for Neutralization of Mother Tongue Influence – Exercises..

**Course outcome (Course Skill Set)**

At the end of the course Communicative English (22ENG16) the student will be able to:

1. Understand and apply the Fundamentals of Communication Skills in their communication skills.
2. Identify the nuances of phonetics, and intonation and enhance pronunciation skills.
3. To impart basic English grammar and essentials of language skills as per present requirement.
4. Understand and use all types of English vocabulary and language proficiency.
5. Adopt the Techniques of Information Transfer through the presentation.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE -1 at the 5 <sup>th</sup> week	-----	20 marks
CIE -2 at the 10 <sup>th</sup> week	-----	20 marks
CIE -3 at the 15 <sup>th</sup> week	-----	20 marks
AAT-1 at the end of 4 <sup>th</sup> week	-----	20 marks
AAT-2 at the end of 4 <sup>th</sup> week	-----	20 marks
Total	-----	100 marks

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**Suggested Learning Resources:****Textbook:**

- 1) Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
- 2) A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

**Reference Books:**

1. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
5. Practical English Usage by Michael Swan, Oxford University Press – 2016

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ☐ Contents related activities (Activity-based discussions)
- ☐ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ☐ Organising Group wise discussions Connecting to placement activities
- ☐ Quizzes and Discussions, Seminars and assignments

**COs & POs Mapping**

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	-	-	-	-	-	-	-	-	2	2	1	2			
2	-	-	-	-	-	-	-	-	2	2	1	2			
3	-	-	-	-	-	-	-	-	2	3	1	2			
4	-	-	-	-	-	-	-	-	2	2	1	2			
5	-	-	-	-	-	-	-	-	2	3	1	2			

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped**



Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	22KSK17	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01
Total Hours of Pedagogy	25	Credits	01

### ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವೃತ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
4. ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

### ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

### ಘಟಕ -1 ಲೇಖನಗಳು

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ವಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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**ಘಟಕ -2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ**

1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು : ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರದಾಸರು  
ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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**ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ**

1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ಯ ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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**ಘಟಕ -4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ**

1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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**ಘಟಕ -5 ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ**

1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ
2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.
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ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (course Outcomes):

1. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
4. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಮೌಲ್ಯಮಾಪನದ ವಿಧಾನ (Assessment Details- both CIE and SEE) :

(methods of CIE - MCQ, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and 35% marks in SEE to pass. Theory Semester End Exam (SEE) is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.

**Continuous Internal Evaluation:**

Three Tests each of **20 Marks (duration 01 hour)**

- a. First test at the end of 5<sup>th</sup> week of the semester
- b. Second test at the end of the 10<sup>th</sup> week of the semester
- c. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks** : 1. First assignment at the end of 4<sup>th</sup> week of the semester

2. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

3. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ - Semester End Exam (SEE):

SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject.

1. The question paper will have 50 questions. Each question is set for 01 mark.

SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 Hour.

**ಪಠ್ಯಪುಸ್ತಕ :**

**ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**

ಡಾ. ಹಿ.ಬಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

**COs and POs Mapping**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1										2		
CO2										2		
CO3										2		
CO4										2		

Level 3- Highly Mapped,

Level 2-Moderately Mapped,

Level 1-Low Mapped

ಬಳಕೆ ಕನ್ನಡ baLake Kannada (Kannada for Usage)			
ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)			
ವಿಷಯ ಸಂಕೇತ (Course Code)	22KBK17	ನಿರಂತರ ಅಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು (Continuous Internal Evaluation Marks)	50
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours/Week (L:T:P:S))	1:0:0:0	ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು (Semester End Examination Marks)	50
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	16 ಗಂಟೆಗಳ	ಒಟ್ಟು ಅಂಕಗಳು (Total Marks)	100
Credits	01	ಪರೀಕ್ಷೆಯ ಅವಧಿ (Exam Hours)	1 ಗಂಟೆ
<p>ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು (Course Learning Objectives)</p> <ul style="list-style-type: none"> <li>To create awareness regarding the necessity of learning the local language for a comfortable and healthy life.</li> <li>To enable learners to Listen and understand the Kannada language properly.</li> <li>To speak, read and write the Kannada language as per requirement.</li> <li>To train the learners for correct and polite conservation</li> </ul>			
<p>ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching – Learning Process – General Instructions):</p> <p>These are sample strategies, which teachers can use to accelerate the attainment of the course outcomes.</p> <ol style="list-style-type: none"> <li>ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ಸೂಚಿಸಿದ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.</li> <li>ಪ್ರಮುಖ ಅಂಶಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲಕ ವಿಷಯಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸು ತಕ್ಕದ್ದು.</li> <li>ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.</li> <li>ಭಾಷಾ ಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.</li> </ol>			
Module – 1			
<ol style="list-style-type: none"> <li>Introduction, Necessity of Learning a local language, Methods to learn the Kannada language.</li> <li>Easy learning of a Kannada Language: A few tips. Hints for correct and polite and polite conservation Listening and Speaking Activities.</li> <li>Key to Transcription</li> <li>ವೈಯಕ್ತಿಕ ಸ್ವಾಮ್ಯಸೂಚಕ ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು- Personal Pronouns, Possessive Forms, Interrogative words.</li> </ol>			
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ಬೋರ್ಡ್ ವಿಧಾನ ಪ್ರಮುಖ ಅಂಶಗಳು ಚಾರ್ಟ್ ಗಳನ್ನು ಬೆಳೆಸುವುದು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು		
Module-2			
<ol style="list-style-type: none"> <li>ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns.</li> <li>ಗುಣ ಪರಿಮಾಣ ವಿಶೇಷಣಗಳ ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and colour Adjectives Numerals.</li> <li>ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿಪ್ರತ್ಯಯಗಳು - ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - ( ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case.</li> </ol>			

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ಪೋರ್ಟ್ ವಿಧಾನ ಪ್ರಮುಖ ಅಂಶಗಳು ಚಾರ್ಟ್ ಗಳನ್ನು ಬೆಳೆಸುವುದು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು
Module – 3	
<ol style="list-style-type: none"> <li>1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases and Numerals</li> <li>2. ಸಂಖ್ಯೆ ಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers.</li> <li>3. ನ್ಯೂನ ನಿಷೇದಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective/ Negative Verbs and colour Adjectives.</li> </ol>	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ಪೋರ್ಟ್ ವಿಧಾನ ಪ್ರಮುಖ ಅಂಶಗಳು ಚಾರ್ಟ್ ಗಳನ್ನು ಬೆಳೆಸುವುದು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು
Module – 4	
<ol style="list-style-type: none"> <li>1. ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅಪರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)</li> <li>2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication</li> <li>3. ಇರು ಮತ್ತು ಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು ಸಂಭಾವ್ಯ ಸೂಚಕ ಮತ್ತು ನಿಷೇದಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs</li> <li>4. ಹೋಲಿಕೆ ತರತಮ ಸಂಬಂಧಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇದಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ Comparative, Relationship, Identification and Negation words.</li> </ol>	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ಪೋರ್ಟ್ ವಿಧಾನ ಪ್ರಮುಖ ಅಂಶಗಳು ಚಾರ್ಟ್ ಗಳನ್ನು ಬೆಳೆಸುವುದು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು
Module – 5	
<ol style="list-style-type: none"> <li>1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು- Helping Verbs “iru and iralla” corresponding Future and Negation Verbs.</li> <li>2. -----ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳಿಗೆ ಭೂತ ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ – Formation of past, Future and present Tense Sentences with Verb Forms.</li> <li>3. Kannada Vocabulary list: ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada words in conversation.</li> </ol>	
ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ಪೋರ್ಟ್ ವಿಧಾನ ಪ್ರಮುಖ ಅಂಶಗಳು ಚಾರ್ಟ್ ಗಳನ್ನು ಬೆಳೆಸುವುದು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯಮಾಧ್ಯಮದ ವಿಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು
<p>ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು</p> <p>Skill set) : At the end of the Course, The Student will able</p> <ol style="list-style-type: none"> <li>1. To understand the necessity of learning of local language for comfortable life.</li> <li>2. To listen and understand the Kannada language properly</li> <li>3. To speak, read and write the Kannada language as per requirement.</li> <li>4. To communicate (converse) in the Kannada language in their daily with Kannada speakers.</li> <li>5. To speak in polite conversation.</li> </ol>	



## (Assessment Details- both CIE and SEE)

The Weight age of continuous Internal Evaluation (CIE) is 50% and for the Semester end exam (SEE) 50% The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18% marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of CIE (Continuous Internal Evaluation) and SEE (Semester end examination) has taken together.

## Continuous Internal Evaluation :

Three tests each of 20 Marks (duration 01 hour)

- First test at the end of the 5<sup>th</sup> week of the semester
- Second test is at the end of the 10<sup>th</sup> week of the semester.
- Third test at the end of the 15<sup>th</sup> week of the semester.

Two assignments each of 10 Marks: 1. First assignment at the end of the 4<sup>th</sup> week of the semester.

- Second assignment at the end of the 9<sup>th</sup> week of the semester group  
discussion/ Seminar/ Quiz any one of three suitably planned to attain the Cos and Pos for 20 Marks. (duration 1 hour)
- At the end of the 13<sup>th</sup> week of the semester the sum of three tests, Two assignments and quiz/ seminar/ group discussion will be out of 100 marks and will be scaled down to 50 marks.

CIE methods/ question paper is designed to attain the different levels of bloom's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್‌ಅಂತ್ಯ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ Semester End Exam (SEE)

SEE will be conducted by University as per the scheduled timetable, with common question paper s from the subject.

- The question paper will have 50 questions. Each question is set for the 01 mark.
- SEE Pattern will be in MCQ model for 50 marks Duration of the exam is 01 Hour.

## Text Book :

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು : ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಸಾರಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಬೆಳಗಾವಿ.

CO-PO MAPPING FOR BALAKE KANNADA

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	3	-	-	-	-	-

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

## INNOVATION AND DESIGN THINKING

Course Code	L:T:P: S	CIE Marks	SEE Marks	Total Marks	Exam Hours
22IDT18	1:0:0:0	50	50	100	01
Total Hours of Pedagogy		15	Credits		01

**Course Learning Objectives:**

The course will enable the students to

1. Understand the fundamental concept of innovation and design thinking.
2. Brief the basic concepts and techniques of analysis.
3. Explain the concept of business process modelling in agile environment.
4. Understand the strategies in design thinking and innovations.
5. Discuss the methods of implementing design thinking in the real world.

**Module-1 (3 hours)****Process of Design:**

Understanding Design Thinking, Shared Model in team, based Design, Theory and practice in design thinking, explore presentations and signers across globe, MVP or prototyping.

**Module-2 (3 hours)****Tools for Design Thinking:**

Real-time design interaction capture and analysis, Enabling efficient collaboration in digital space, empathy for design, collaboration in disturbed design.

**Module-3 (3 hours)****Design thinking in IT:**

Design thinking to business process modelling, agile in virtual collaboration environment, scenario based prototyping.

**Module-4 (3 hours)****Design thinking for strategic innovations:**

Growth, storytelling representation, strategic foresight, change, sense making, maintenance relevance, value redefinition, extreme competition, experience design, standardization, humanization, creative culture, rapid prototyping, strategy and organization, business model design.

**Module-5 (3 hours)****Design thinking workshop:**

Design thinking workshop Empathize, Design, Ideate, Prototype and Test.

**Course Outcomes:**

At the end of the course, the student will be able to:

1. Appreciate various design process procedure.
2. Analysis the problem with different techniques.
3. Generate and develop business process modelling scenario-based prototyping.
4. Identify the strategies followed in various fields of design thinking.
5. Draw technical drawing for design ideas.

**Assessment Details both (CIE and SEE):****Scheme of Evaluation****Continuous Internal Evaluation (CIE) :**

CIE-1 at the end of 5 <sup>th</sup> Week	-	20 marks
CIE-2 at the end of 10 <sup>th</sup> Week	-	20 Marks
CIE-3 at the end of 15 <sup>th</sup> Week	-	20 Marks
AAT-1 at the end of 4 <sup>th</sup> Week	-	20 Marks
AAT-2 at the end of 9 <sup>th</sup> Week	-	20 Marks
Total	-	100 Marks

The sum of three tests and two AATs will be out of 100 marks and will be **scaled down to 50 marks**

**Semester End Examination (SEE):**

- The question paper shall be set for 50 marks. The duration of SEE is 01hour.
- The question paper will have 50 questions. The pattern of question paper is MCQ.

**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) Text Books:**

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009. Third Edition, 2012.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

**Reference Books:**

1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

**Web links and Video Lectures (e-Resources):**

- [www.tutor2u.net/business/presentations/. /productlifecycle/default.html](http://www.tutor2u.net/business/presentations/. /productlifecycle/default.html)
- [https://docs.oracle.com/cd/E11108\\_02/otn/pdf/. /E11087\\_01.pdf](https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf)
- [www.bizfilings.com > Home > Marketing > Product Development](http://www.bizfilings.com > Home > Marketing > Product Development)
- <https://www.mindtools.com/brainstm.html>
- <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competition>
- [www.vertabelo.com/blog/documentation/reverse-engineering](http://www.vertabelo.com/blog/documentation/reverse-engineering)
- <https://support.microsoft.com/en-us/kb/273814>
- <https://support.google.com/docs/answer/179740?hl=en>
- <https://www.youtube.com/watch?v=2mjSDIBaUIM>
- [thevirtualinstructor.com/foreshortening.html](http://thevirtualinstructor.com/foreshortening.html)
- <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
- <https://dschool.stanford.edu/use-our-methods/ 6. https://www.interactiondesign.org/literature/article/5-stages-in-the-design-thinking-process 7.>
- <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8.>
- <https://www.nngroup.com/articles/design-thinking/ 9.>



- <https://designthinkingforeducators.com/design-thinking/10>.
- [www.designthinkingformobility.org/wp-content/uploads/2016/10/NapkinPitch\\_Worksheet.pdf](http://www.designthinkingformobility.org/wp-content/uploads/2016/10/NapkinPitch_Worksheet.pdf)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- <http://dschool.stanford.edu/dgift/>

**COs and POs Mapping (CO-PO mappings are only Indicative)**

COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1		1	1	1			1	1	1	1
CO2	2	1	1		2		1		2	1	1	1
CO3	1	1	2	1	2	1			1	1	1	1
CO4	1	1	1	2	1	1	1		1	1	2	1
CO5	1	1	1	2	2	1	1	1	1	2	1	1

**Level 3-Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped**