



**Government of Karnataka
Department of Technical Education**

C-25 Diploma in Mechanical Engineering

Scheme of Studies

(Effect from the AY 2025-26)



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Curriculum Structure

I Semester Scheme of Studies – Mechanical Engineering

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours/week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	SC	25SC11I	Engineering Mathematics-I	4	0	4	8	6	50	20	50	20	-	-	100
2	ENG	25EG01I	Essential English Communication	4	0	4	8	6	50	20	-	-	50	20	100
3	ME	25ME01I	Computer Aided Engineering Drawing	3	0	4	7	5	50	20	-	-	50	20	100
4	ME	25ME11I	Concepts of Mechanical Engineering-I	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	ME	25ME12T	Environmental Sustainability	2	0	0	2	2	50	20	-	-	-	-	50
6	Personality Development		NCC/NSS/YOGA/SPORTS...	Students are expected to engage in any one of these activities from 1 st semester to 6 th semester (No Credits)											
Total				17	0	16	33	25	250	-	100	-	100	-	450



**Government of Karnataka
Department of Technical Education**

C-25 Diploma Curriculum

Engineering Mathematics For Engineering Programmes

First Semester
(Effect from the AY 2025-26)



**Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION**

Curriculum Structure

I Semester Scheme of Studies- Diploma in _____Engineering

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours /week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	SC	25SC11I	Engineering Mathematics-I	4	0	4	8	6	50	20	50	20	-	-	100

L: Lecture: T: Tutorial: P: Practice: SC-Science: T-Theory (Whole Class)::P-Practical(Batch wise)::I-Integrated (Both theory & Practice-Batch wise)

- For Engineering Mathematics-I, Theory for whole class and Practice batch wise

Integrated Course Template (T+P)



Government of Karnataka
DEPARTMENT OF TECHNICAL
EDUCATION

Program	Engineering	Semester	I
Course Name	Engineering Mathematics-I	Type of Course	Integrated
Course Code	25SC11I	Contact Hours	8 hours/week (104 hours/semester)
Teaching Scheme	L:T:P - 4:0:4	Credits	6
CIE Marks	50	SEE Marks	50

1. Rationale

The course is designed to give a comprehensive coverage at an introductory level to the subject of Matrices and Determinants, Vectors, Trigonometry, Complex numbers and Limits.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Solve the system of linear equations using determinants and performs the same in MS Excel.
CO-02	Apply the knowledge extensively in finding product of two vectors and executes the same in GeoGebra graphing calculator tool..
CO-03	Able to solve physical problems using trigonometric ratios and visualize the graphs of trigonometric functions in GeoGebra graphing calculator.
CO-04	Able to solve problems on algebra of complex numbers and interpret the results graphically.
CO-05	Evaluate the limit of a single variable function and extract the limit values for discretized data of a one variable function in MS excel.

3. Course Content:

WEEK	CO	PO (L3- Highly mapped)	Theory (4 Hours per week)	Practice (4 Hours per week)
1	1	1,4,7	MATRICES: -Definition and order of matrices Types of matrices: Row matrix, Column matrix, Zero matrix (Null matrix), Square matrix, Diagonal matrix, Scalar matrix, Unit matrix (Identity matrix)	Practice-1: Introduction to MS Excel
	1	1,4,7	Algebra of matrices: Scalar multiplication and Transpose of a matrix	
	1	1,4,7	Addition and Subtraction of matrices (2x2 only)	Practice-2: Compute addition, subtraction, scalar multiplication of matrices in MS Excel.
	1	1,4,7	Product of two matrices (2x2 only) and Problems	
	1	1,4,7	Problems continued	

2	1	1,4,7	DETERMINANTS: Definition, Expansion of determinant of order 2 and Problems	Practice-3: Compute multiplication, transpose of matrices in MS Excel.
	1	1,4,7	Cramer's Rule (Determinant method): Solution of the system of linear equations with two unknowns and Problems	Practice-4: Compute determinant, and inverse of matrices in MS Excel.
	1	1,4,7	Minors, Co-factors, evaluating Adjoint of square matrices explicitly by finding minor and co-factors (2X2 only) and Problems	
3	1	1,4,7	Definition of Singular and non-singular matrices, Inverse of a matrix (2X2 only) and Problems	Practice-5: Solve the system of linear equations by Cramer's rule in MS Excel.
	1	1,4,7	Characteristic equation and characteristic roots of a matrix (2X2 only) and problems	
	2	1,4,7	VECTORS: Definition, notation and types of vectors [Null, Unit, Equal, Coplanar and Collinear vectors]	Practice-6: Installation and introduction to tools in GeoGebra.
	2	1,4,7	Position vector & its magnitude and problems	
4	2	1,4,7	Problems on equilateral, isosceles, right-angled triangle	Practice-7: Finding magnitude of a vector, sum and difference of two vector and visualize it in GeoGebra graph.
	2	1,4,7	Expression and formula for unit vector along the given vector and problems	
	2	1,4,7	Addition and Subtraction of two vectors (Algebraically) and problems	Practice-8: Verifying whether the given three position vectors are vertices of an equilateral triangle in MS excel.
	2	1,4,7	Scalar product (dot product) of two vectors and problems	
5	2	1,4,7	Applications of Scalar product: Cosine of an angle between two vectors and problems	Practice-9: Find the scalar product of two vectors also find the angle between two vectors degrees in GeoGebra. Visualize the dot product of two vectors and hence verify the property of orthogonality.
	2	1,4,7	Condition for two vectors to be orthogonal or perpendicular and problems	
	2	1,4,7	Projection of $\vec{a}$ on $\vec{b}$ and $\vec{b}$ on $\vec{a}$ and problems	Practice-10: Find the work done by the force applied at different angles on the body to move it from point A to B. Hence analyze the amount of work done and give the physical interpretation.
	2	1,4,7	Work done by the vector (force) and problems	
6	3	1,4,7	TRIGONOMETRY: Recapitulation of Trigonometric ratios and identities.	Practice-11: Plot the graphs of trigonometric functions for $\sin x$, $\cos x$ and $\tan x$ in the interval $[-\pi, \pi]$ in GeoGebra.
	3	1,4,7	Define radian of an angle. Conversion of angles (Degree to Radian and Radian to Degree) and Problems	
	3	1,4,7	Allied angles: Definition of allied angle, ASTC Rule	Practice-12: Verify the ASTC rule of quadrants in GeoGebra.

	3	1,4,7	Rules of allied angles ($-\theta, 90^\circ \pm \theta$ & $270^\circ \pm \theta$) and simple Problems.	
7	3	1,4,7	Rules of allied angles ($180^\circ \pm \theta$ & $360^\circ \pm \theta$) and simple Problems.	Practice-13: Construction of clinometer for measurement of sides and angles of a triangle.
	3	1,4,7	Problems continued on Allied angles	
	3	1,4,7	Problems continued on Allied angles	
	3	1,4,7	Compound Angles: Formulae for $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$ (without proof) and T-functions of 15° , 75° and 105°	Practice-14: Usage of clinometer (DEMONSTRATION)
8	3	1,4,7	Multiple Angles: $\sin 2A$, $\cos 2A$, $\tan 2A$ with proof	Practice 15: Using clinometer find the heights and distances of physical objects in the surroundings.
	3	1,4,7	Multiple Angles: $\sin 3A$ and $\cos 3A$ with proof	
	3	1,4,7	Applications of Trigonometry: Introduction to Heights and Distances	Practice-16: Using clinometer measure the heights and distances of objects in the surrounding.
	3	1,4,7	Problems based only on angle of inclination	
9	4	1,4,7	COMPLEX NUMBERS: - Definition, real and imaginary parts of a complex number $z = a + ib$. Examples	Practice-17: Plot the Cartesian complex numbers z_1, z_2, z_3, z_4 and z_5 . Also plot $z_1 + z_2, z_3 - z_4, 2z_1, z_3/z_4$ and $z_4 \times z_5$ in the graph sheets
	4	1,4,7	Modulus and amplitude of a complex number and Problems	
	4	1,4,7	Conjugate of a complex number and Problems	Practice-18: Plot the polar complex numbers z_1, z_2, z_3, z_4 and z_5 . Also plot $z_1 + z_2$ and $z_3 - z_4$ in the graph sheets
	4	1,4,7	Addition and subtraction of complex numbers and Problems	
10	4	1,4,7	Multiplication of complex numbers and Problems	Practice-19: Generate 50 random data, construct the frequency distribution table and plot Bar chart using MS Excel.
	4	1,4,7	Ratio of two complex numbers and Problems	
	4	1,4,7	Polar form of a complex number and Problems	Practice-20: Generate 50 random data, construct the frequency distribution table and plot Pie chart using MS Excel.
	4	1,4,7	Exponential form of a complex numbers and Problems	
11	4	1,4,7	Conversion of Cartesian form into polar and exponential forms and Problems	Practice-21: Generate 50 random data, construct the frequency distribution table and plot Line graph using MS Excel.
	4	1,4,7	Problems continued	
	5	1,4,7	LIMIT OF FUNCTIONS: Constants and variables, Definition of function. Concept of limits	Practice-22: Generate 50 random data, construct the frequency distribution table and scatter plot using MS Excel.
	5	1,4,7	Evaluation of limits by factorization method and problems	
12	5	1,4,7	Problems continued	Practice-23: Generate 50 random data, construct the frequency
	5	1,4,7	Evaluation of limits by rationalization method and problems	

				distribution table and plot Histogram using MS Excel.
	5	1,4,7	Problems continued	Practice-24: Plot the following functions in GeoGebra and visualize the graphs. i) Odd function ii) Even function iii) Algebraic function iv) Trigonometric functions v) Exponential functions vi) Logarithmic functions
	5	1,4,7	Evaluation of limit of a function of the type $\lim_{x \rightarrow \infty} \left(\frac{f(x)}{g(x)} \right)$ and Problems	
13	5	1,4,7	Problems continued	Practice-25: Using MS Excel, verify that, as x tends to zero the ratio $\frac{\sin x}{x}$ tend to 1, for 20 discrete data in the interval [0.5, 0.1]. (DEMONSTRATION)
	5	1,4,7	Standard Limits (without proof): a) $\lim_{x \rightarrow a} \left(\frac{x^n - a^n}{x - a} \right) = na^{n-1}$, where n is rational b) $\lim_{\theta \rightarrow 0} \left(\frac{\sin \theta}{\theta} \right) = 1$, where θ is in radians c) $\lim_{\theta \rightarrow 0} \left(\frac{\tan \theta}{\theta} \right) = 1$ where θ is in radians d) $\lim_{x \rightarrow 0} \left(\frac{e^x - 1}{x} \right) = 1$	
	5	1,4,7	Problems on Standard Limits	Practice-26: Evaluation of limits of standard type in <i>wolfram alpha</i> . (DEMONSTRATION)
	5	1,4,7	Problems continued	

4. References:

1. NCERT Mathematics Books for Class XI and XII.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
3. G.B.Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
4. V.Sundaram, R.Balasubramanian, K.A.Lakshminarayanan, Engineering Mathematics, 6/e., Vikas Publishing House.
5. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi.
6. Online resources (courtesy you tube)
 - i) <https://www.youtube.com/watch?v=wbJcJCKBcMg> – Excel for beginners
 - ii) <https://www.youtube.com/watch?v=RDFb--em5Kg> – construction of clinometer.
 - iii) <https://www.youtube.com/watch?v=tn6UoIz-1yM> – using clinometer.
 - iv) <https://www.geogebra.org/download?lang=en-> to download GeoGebra.
 - v) <https://www.youtube.com/watch?v=RYGBhRN9oHQ&list=PLqZ0eZtMcAlugmcomSSvjPBfewVbX35L7> - Basics of GeoGebra
 - vi) <https://www.youtube.com/@grantsander9529> – More videos on GeoGebra

5. CIE and SEE Assessment Methodologies:

Sl. No	Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1 Theory Test	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the activities through Rubrics	1-13		50	
Total Continuous Internal Evaluation (CIE)					50 Marks
Semester End Examination (SEE) -Theory			180	100	50 marks (100 marks Scaled down to 50 marks)
Total Marks					100 Marks
Minimum marks to pass in CIE & SEE is 40% individually					

6. CIE Theory Test Model question paper:

CIE 1(at the end of 4th week)

Program	_____ Engineering		Semester	I
CourseName	Engineering Mathematics-I		Marks	50
Course Code	25SC11I		Duration	90 min
Name of the Course Coordinator:				
Section A (Answer any six questions, each question carries 5 marks)				
Q. No.	Questions	CL	CO	PO
1			1	
2			1	
3			1	
4			1	
5			1	
6			1	
7			1	
8			1	
9			1	
Section B (Answer any four questions, each question carries 5 marks)				
10			2	
11			2	
12			2	
13			2	
14			2	
15			2	

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

CIE 3(at the end of 10th week)

Program	_____ Engineering	Semester	I		
CourseName	Engineering Mathematics-I	Marks	50		
Course Code	25SC11I	Duration	90 min		
Name of the Course Coordinator:					
Section A (Answer any one question, each question carries 5 marks)					
Q. No.	Questions	CL	CO	PO	
1			2		
2			2		
Section B (Answer any six questions, each question carries 5 marks)					
3			3		
4			3		
5			3		
6			3		
7			3		
8			3		
9			3		
10			3		
Section C (Answer any three questions, each question carries 5 marks)					
11			4		
12			4		
13			4		
14			4		
15			4		

7. CIE Practice Test:

Program	Engineering			Semester	I
CourseName	Engineering Mathematics-I			Test	II/IV
Course Code	25SC11I	Duration	3 Hrs	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
a.					50
OR					
b.					
Scheme of assessment					
a) Observation					10
b) Conduction					20
c) Result and Output					10
d) Viva					10
II--CIE (ANY ONE QUESTION FROM PRACTICE 1 TO 12(Except 1 and 6)					50
IV--CIE (ANY ONE QUESTION FROM PRACTICE 15 TO 24)					
Total Marks					

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

8. Suggestive Activities:

The List is only shared as an Example and not inclusive of all possible activities of the course. Student and Faculty are encouraged to choose activities that are relevant to the topic and on the availability of such resources at their institution.

Note: Minimum 3 suggested activities should be done.

Sl. No.	Suggestive Activities
01	Application of matrices in coding and decoding.
02	Applications of vectors in dynamics
03	Applications of trigonometry in respective programme domains
04	Plotting circles of different radii ($ z - z_0 = r$), discs ($ z - z_0 \leq r$) and annulus ($R_1 \leq z - z_0 \leq R_2$) in complex plane and record the same in a document.
05	Evaluation of limits using Wolfram alpha platform.

9. Sample Rubrics for Assessment of Activity (Qualitative Assessment)

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

Sl. No.	Dimension	Beginner 2	Intermediate 4	Good 6	Advanced 8	Expert 10	Students Score
1	Knowledge	Poor knowledge About the subject	Normal knowledge about the subject	Good knowledge about the subject	Very good knowledge about the subject	Excellent knowledge about the subject	8
2	Problems solving ability	Solved minimum number of problems with maximum mistakes	Solved minimum number of Problems	Solved problems with few mistakes	Solved maximum number of problems	Solved all problems in neat manner	10
3	Strategies and Procedure	Hardly uses an effective strategy to solve problems.	Rarely uses an effective strategy to solve problems.	Sometimes uses an effective strategy to solve problems, but does not do it consistently.	Typically, uses an effective strategy to solve the problem(s).	Typically, uses an efficient and effective strategy to solve the problems	10
4	Completion	Several of the problem are not completed	Only 30% of the questions are answered correctly	Only 50% of the questions are answered correctly	Only 75% of the questions are answered correctly	All assignment questions are answered correctly	8
5	Neatness and Organization	The work appears sloppy and unorganized. It is hardly to know what information goes together.	The work appears sloppy and unorganized.	The work is presented in an organized fashion but may be hard to read at times.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in a neat, clear, organized fashion that is easy to read.	8
Total marks=8+10+10+8+8=44							44

Equipment/software list with Specification for a batch of 30 students

Sl. No.	Particulars	Specification	Quantity
01	Computers	12 th Generation, Intel Core i3, Graphic card, RAM 16GB, Storage:1TB	30
02	Operating System and software	Windows 10,MS Office, MS excel, GeoGebra	30
03	Internet	High Speed Internet	01
04	Printer	Wireless Multifunctioning printer	03
05	Projector	High resolution, Wi-fi enabled	02
06	UPS	As per standards	5KV

PROBLEMS FOR PRACTICE:

MATRICES AND DETERMINANTS

- If $A = \begin{bmatrix} 4 & 5 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 6 \\ 1 & 3 \end{bmatrix}$, find the matrix $3A + 2B$.
- If $A = \begin{bmatrix} 4 & 5 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \\ 4 & 1 \end{bmatrix}$, find the matrix $A - 2B$.
- If $A = \begin{bmatrix} 3 & 2 \\ 2 & 0 \end{bmatrix}$ then find $A + A^T$ matrix.
- If the matrix $A = \begin{bmatrix} x & 3 \\ 3 & x \end{bmatrix}$ is a singular matrix find the value of x .
- If $A = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 2 \\ 4 & 1 \end{bmatrix}$ find AB matrix.
- Solve the system of linear equations by applying Cramer's rule $3x + 2y = 8; 2x + 5y = 9$.
- Solve the equations $x + y = 3; 2x + 3y = 8$ by Cramer's rule.
- Solve the system equations $2x - y = 3; x + 2y = 4$ by determinant method.
- Solve the system equations $2x + 3y = 5; x + 4y = 5$ by applying Cramer's rule.
- If $A = \begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ verify that $A(\text{adj}A) = |A|I$ where $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
- If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, find AB matrix and also find $(AB)^T$ matrix.
- If $\begin{vmatrix} x & 2 \\ 3 & 4 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 0 & x \end{vmatrix}$ find the value of x .
- Find adjoint of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$
- If $A = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$ then find the inverse of the matrix A if it exists
- Find A^{-1} if $A = \begin{bmatrix} 5 & 5 \\ 1 & 2 \end{bmatrix}$
- Find characteristic equation and characteristic roots of the matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$.
- Find characteristic roots of the matrix $A = \begin{bmatrix} 3 & 4 \\ 2 & 1 \end{bmatrix}$.
- Find characteristic equation and characteristic roots of the matrix $A = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$.
- Find characteristic equation and characteristic roots of the matrix $A = \begin{bmatrix} 5 & 2 \\ 4 & 3 \end{bmatrix}$.

VECTORS

- Find the magnitude of vector $i + 2j + k$.
- If $\vec{a} = i + 2j - k, \vec{b} = 3i - 5j + 2k$ find the magnitude of $3\vec{a} - 2\vec{b}$.
- If $\vec{a} = i + 2j + k$ and $\vec{b} = 2i + 4j - k$ then find $|2\vec{b} - 3\vec{a}|$.
- If $\vec{a} = 2i + j + 2k, \vec{b} = i + 3j + k$ and $\vec{c} = 2i + 2j - k$, find $(\vec{a} + \vec{b}) \cdot \vec{c}$.
- Find the projection of $\vec{a} = i + 2j + k$ on $\vec{b} = 2i - 3j + k$.

6. If the vectors $\lambda i + 5j - 6k$ and $7i + 2j + 4k$ are orthogonal find λ .
7. Find the unit vector of $\vec{a} = 2i + 3j - k$.
8. If $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - 5j + 2k$, find $\vec{a} \cdot \vec{b}$.
9. If $A = (3, -4, 2)$, $B = (-6, 8, 4)$ then find the position vectors of A and B . Also find $\overrightarrow{AB}$ and $|\overrightarrow{AB}|$.
10. If $\vec{a} = i + 2j + 3k$ and $\vec{b} = 4i - j - 5k$, find $\vec{a} + \vec{b}$ and $|\vec{a} + \vec{b}|$.
11. If $\vec{a} = 2i - j + k$ and $\vec{b} = 3i + j - k$, find $\vec{a} \cdot \vec{b}$.
12. If $\vec{a} = i + j + 2k$ and $\vec{b} = 2i - j + k$, then show that $\vec{a} + \vec{b}$ is perpendicular to $\vec{a} - \vec{b}$.
13. Find the unit vector of $\vec{a}$ if $\vec{a} = 3i + 4j + k$.
14. If $\overrightarrow{OA} = 2i - 3j$ and $\overrightarrow{OB} = 8i + 5j$ then find $|\overrightarrow{AB}|$.
15. If $\vec{a} = 2i + 5j - 6k$, $\vec{b} = 5i - j + 2k$, find $\vec{a} \cdot \vec{b}$.
16. Find unit vector in the direction of $\vec{a} = 5i - j + 2k$.
17. If the vertices of a triangle have position vectors $4i + 5j + 6k$, $5i + 6j + 4k$ and $6i + 4j + 5k$, then prove that triangle is an equilateral triangle.
18. Show that the position vectors of the points $2i + 3j + 5k$, $3i + 5j + 2k$ and $5i + 2j + 3k$ form an equilateral triangle.
19. If $\vec{a} = 3i - j + \lambda k$, $\vec{b} = 3i + 3j - 4k$ are orthogonal, find the value of λ .
20. Find the cosine of the angle between the vectors $\vec{a} = 2i + 3j - k$ and $\vec{b} = i + 2j + 2k$.
21. Find the cosine of the angle between the vectors $4i - 2j - 3k$ and $2i - 3j + 4k$.
22. Find the cosine of the angle between the vectors $i + j - 3k$ and $2i + j - k$.
23. Find $\cos \theta$ if θ is the angle between the vectors $\vec{a} = 3i - 2j + 5k$ and $\vec{b} = 2i + 3j + k$.
24. Find the cosine of the angle between the two vectors $\vec{a} = 4i - 2j - 3k$ and $\vec{b} = 2i - 3j + 4k$.
25. Find the projection of the vector $\vec{b} = 3i + 5j + k$ on the vector $\vec{a} = 2i + j - 2k$.
26. Find the projection of the vector $\vec{a} = 2i + j - 2k$ on the vector $\vec{b} = 3i + 5j + k$.
27. A particle is acted by constant forces $3i - j + 2k$, $-i + 3j + k$, $i + j - 2k$ and is displaced from the point $(-1, 2, 3)$ to $(2, -1, 5)$. Calculate the total work done by the forces.
28. A force $\vec{F} = 2i + j - 2k$ acting on particle at $(3, 2, 2)$ displaces it to the point $(1, 3, -1)$, find the work done.
29. Find the work done by the force $\vec{F} = 5i + 3j + 7k$ in moving a particle from the point $A(1, 2, -1)$ to $B(3, 1, -4)$.

TRIGONOMETRY

1. Convert 120° into radian and $\frac{3\pi}{2}$ into degree.
2. Find the value of $i. \sin 300^\circ$ $ii. \cot 225^\circ$
3. Prove that $\tan(45^\circ + A) = \frac{1 + \tan A}{1 - \tan A}$
4. Write the formula of $\sin(A - B)$ then find the value of $\sin 15^\circ$
5. Find the value of $\sin 120^\circ \cos 330^\circ - \sin 240^\circ \cos 390^\circ$
6. Simplify $\frac{\cos(360^\circ - A) \tan(360^\circ + A)}{\cot(270^\circ - A) \sin(90^\circ + A)}$
7. Simplify $\frac{\sec(360^\circ - A) \cot(90^\circ - A)}{\tan(360^\circ + A) \csc(90^\circ + A)}$
8. Prove that $\sin 2A = 2 \sin A \cos A$
9. Prove that $\cos 2A = \cos^2 A - \sin^2 A$
10. Prove that $\cos 2A = 2 \cos^2 A - 1$

11. Prove that $\cos 2A = 1 - 2\sin^2 A$
12. Prove that $\sin 3A = 3\sin A - 4\sin^3 A$
13. Prove that $\cos 3A = 4\cos^3 A - 3\cos A$.
14. From a point on the ground, the angle of elevation of the top of a building is 30° . If the distance from the point to the base of the building is 50 meters, find the height of the building.
15. A tower is 30 meters high. The angle of elevation from a point on the ground to the top of the tower is 30° . Find the distance of the point from the base of the tower.
16. A tower casts a shadow 20 meters long when the angle of elevation of the sun is 60° . Find the height of the tower.

COMPLEX NUMBERS:

1. Find the value of $1 + i^{10} + i^{20} + i^{30}$
2. Express $\sqrt{3} - i$ in polar form.
3. Express $-1 - i$ in polar form.
4. Find the modulus and amplitude of $\sqrt{3} + i$.
5. Find the modulus and amplitude of $1 - i$.
6. Find the modulus and amplitude of $1 + i$.
7. Express $\frac{(1+3i)}{(1+i)}$ in $a + ib$ form.
8. Express $\frac{(1+3i)}{(1+i)}$ in $a + ib$ form.
9. Express $(1+2i)(3+i)$ in $a + ib$ form.
10. Express $\frac{(2-i)}{(1-i)(3+i)}$ in $a + ib$ form.
11. Find the conjugate of $\frac{(1+i)(1-2i)}{(3+i)}$.
12. Find the modulus and amplitude of $1 + \sqrt{3}i$.
13. Find the real and imaginary parts of $(5+3i)(1-2i)$
14. Find the real and imaginary parts of $(5+3i)(1-2i)$

LIMITS

1. Find $\lim_{x \rightarrow 2} \left(\frac{x^4 - 16}{x - 2} \right)$.
2. Find the value of $\lim_{x \rightarrow -2} \left[\frac{x^3 + 8}{x + 2} \right]$.
3. Find $\lim_{x \rightarrow 0} \left(\frac{3x + \tan 2x}{\sin 3x - 5x^2} \right)$.
4. Evaluate $\lim_{x \rightarrow \infty} \left(\frac{x^2 + x + 1}{2x^2 - 3x - 4} \right)$.
5. Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin 2\theta}{\sin 3\theta}$.
6. Evaluate $\lim_{\theta \rightarrow 0} \left[\frac{\theta}{\tan 5\theta} \right]$.
7. Evaluate $\lim_{x \rightarrow 0} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{x} \right)$.
8. Evaluate $\lim_{n \rightarrow \infty} \left[\frac{(5-n^2)(n-2)}{(2n-3)(n+3)(5-n)} \right]$.
9. Evaluate $\lim_{x \rightarrow 1} \frac{x^2 - 2x + 3}{x^2 + x + 1}$.
10. Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 4x + 3}{x^2 + 5x + 6}$.
11. Evaluate $\lim_{\theta \rightarrow 0} \left(\frac{1 - \cos 2\theta}{\theta^2} \right)$.

12. Evaluate $\lim_{x \rightarrow \infty} \left(\frac{5x^2+3x}{7x^2+2x} \right)$.
13. Evaluate $\lim_{x \rightarrow 1} \frac{x^2+5x-6}{x^2-3x+2}$.
14. Evaluate $\lim_{\theta \rightarrow 0} \frac{\tan m\theta}{\tan n\theta}$.
15. Evaluate $\lim_{x \rightarrow 2} \frac{x^2-9x+14}{x^2-4}$.
16. Find $\lim_{\theta \rightarrow 0} \frac{\sin 4\theta}{\tan 5\theta}$.
17. Find $\lim_{x \rightarrow 2} \frac{x^2+5x-14}{x^2+x-6}$.
18. Find $\lim_{x \rightarrow 0} \frac{\sqrt{2+x}-\sqrt{2-x}}{x}$.
19. Evaluate $\lim_{x \rightarrow \infty} \frac{2x^2+3x+5}{6x^2-5x+2}$.
20. Evaluate $\lim_{\theta \rightarrow 0} \frac{\tan 2\theta}{\theta}$.
21. Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{1+3x}-\sqrt{1-3x}}{x}$.
22. Evaluate $\lim_{x \rightarrow \infty} \left(\frac{x^2+x+1}{2x^2-3x-4} \right)$.
23. Evaluate $\lim_{x \rightarrow 1} \left(\frac{2x-2}{x^2-1} \right)$.
24. Evaluate $\lim_{x \rightarrow 2} \left[\frac{x^2-4}{\sqrt{x+2}-\sqrt{3x+2}} \right]$.
25. Find the value of $\lim_{x \rightarrow -2} \left[\frac{x^3+8}{x+2} \right]$.
26. Evaluate $\lim_{x \rightarrow 1} \frac{x^2-2x+3}{x^2+x+1}$.
27. Evaluate $\lim_{x \rightarrow 0} \frac{\sin px}{\tan qx}$.
28. Evaluate $\lim_{x \rightarrow -3} \frac{x^2+4x+3}{x^2+5x+6}$.
29. Evaluate $\lim_{x \rightarrow \infty} \left(\frac{5x^2+3x}{7x^2+2x} \right)$.
30. Evaluate $\lim_{x \rightarrow 1} \frac{x^2+5x-6}{x^2-3x+2}$.
31. Evaluate $\lim_{x \rightarrow 3} \frac{x^3-27}{x-3}$.
32. Evaluate $\lim_{x \rightarrow 2} \frac{x^2-9x+14}{x^2-4}$.



**Government of Karnataka
Department of Collegiate and Technical Education**

**C-25
Diploma Curriculum
COMMON TO ALL ENGINEERING AND NON-ENGINEERING PROGRAMMES
EXCEPT COMMERCIAL PRACTICE
(Effective from the AY 2025-26)**

ESSENTIAL ENGLISH COMMUNICATION: 25EG01I



Government of Karnataka
DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION
Curriculum Structure

I/II Semester Scheme of Studies - Common to all Engineering and Non Engineering Programmes except Commercial Practice

Sl. No	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours /week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	ENGLISH	25EG01I	Essential English Communication	4	0	4	8	6	50	20	-	-	50	20	100

L: Lecture: T: Tutorial: P: Practice: I-Integrated (Theory, Tutorial & Practice-Batch wise classes mandatory)



Government of Karnataka
DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Program	Common to all Engineering and Non Engineering Programmes Except Commercial Practice	Semester	I/II
Course Name	Essential English Communication	Type of Course	Integrated
Course Code	25EG01I	Contact Hours	8 hours/week (104 hours/semester)
Teaching Scheme	L:T:P - 4:0:4	Credits	6
CIE Marks	50 (Practice + Theory Test)	SEE Marks (Practice)	50

1. Rationale:

Effective Communication is an important life skill. The process of exchange of information happens vocally (verbal exchanges), through written media (books, websites, and magazines), visually (using graphs, charts, videos and maps), non-verbally (body language, gestures, pitch of voice, and tone) or even electronically (mails, messages, posts). Awareness of, and expertise in basic communication tools, as well as the ability to make use of it in English, is a quality that is bound to open a plethora of doors for a serious learner looking to craft a successful career.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Effectively read from a printed text, internet and other sources; understand and explain it in different written formats and contexts, adhering to the general rules of grammar and syntax
CO-02	Confidently listen to, perceive and comprehend audio-visual information and use verbal and nonverbal attributes to speak about them
CO-03	Persuasively present cogent, relevant and independent thought and analysis, using latest technological tools

VERY IMPORTANT

CO 1 is attained through learning and assessment of textual questions, composition and comprehension exercises.
CO 2 is accomplished through learning and assessment of listening and speaking skills. Use of audiovisual media is compulsory to fulfil this.
CO 3 is achieved through learning and assessment of presentation skills using modern technological tools. Use of computers, office tools and internet is mandatory.

3. Course Content (Based on the textbook **ESSENTIAL ENGLISH COMMUNICATION FOR POLYTECHNICS** prescribed by DTE; available on the department website)

WEEK	CO	PO	Lecture (Theory)	Methodology for Practice	Content for Practice
1	1, 3	6, 7	THE INSPIRATIONAL STORY OF ELON MUSK	Students will share their experiences on and expectations from their community leaders and model personalities	Use of Computers, Internet and Software as tools of Communication Online Newspaper Reading Individual Profile Creation and Resume Preparation using Word tools
2	1, 3	6, 7	THE INSPIRATIONAL STORY OF ELON MUSK Composition (Narrative Writing)	Students will sit in groups of five and discuss the difference between leaders and bosses. Each group shall note down ten points of difference based on the discussion	Building Social Media Profile (LinkedIn, X, Facebook/Instagram)
3	1, 2, 3	6, 7	AN EXCERPT FROM OORU KERI	ACTIVITY No. 1 for Portfolio Evaluation Shall be a group activity on topics related to basic English grammar: viz Parts of Speech,	Listening Skills (I Have a Dream - Martin Luther King Jr (https://www.youtube.com/wa

			Composition (Expository Writing) Composition (Descriptive Writing)	Auxiliary verbs and Tenses. Should involve Practical demonstration/ along with a written/printed report/portfolio.	tch?v=qHc3FY9il1s Sachin Tendulkar's Retirement Speech https://www.youtube.com/watch?v=joZZyUXU7Bg Shashi Tharoor's words on anti-colonialism https://www.youtube.com/watch?v=f7CW7S0zxv4&t=274s The Great Dictator - Speech https://www.youtube.com/watch?v=w8HdOHrc3OQ&t=98s Dananjaya Hettiaracchi - I see something https://www.youtube.com/watch?v=bbz2boNSeL0&t=169s Srikanth Bolla https://www.youtube.com/watch?v=hxS5He3KVEM Tryst with Destiny https://youtu.be/lrEkYscgbqE?s=i=U4M_uOH3SXR_8Rf- Ted talk Shah Rukh Khan https://youtu.be/ONV1KdWRHck?si=WOCw6_aX_rvYLSGS Winston Churchill "We shall fight on the beaches." https://youtu.be/skrdyoabmgA?si=zIzVI-ZMTfnFAYw1 Greta Thunberg's speech made at UN Climate summit https://youtu.be/u9KxE4Kv9A8?si=NSBAL6z7DX_eTWiF Gururaj Karjagi's Motivational speech https://youtu.be/Dzj6TGwwNhg?si=ClbQsDOIEqGisynq
4	1, 2, 3	6, 7	AN EXCERPT FROM OORU KERI	Students in groups of five will talk to the class about any three local festivities, fairs or traditional practices	Speaking Skills Story Narration, Self Introduction, Asking questions based on a given text or a demo video, Self Justification, Theme based arguments, group discussions, extempore speech, elocution.
5	1, 2	6, 7	THE SECRET OF THE MACHINES	Students will debate the pros and cons of mechanisation in the rural areas of India	Technical Jargon – Engineering and Non-Engineering based-subject specific product labels, user manuals, technical/product brochures, sales pamphlets Agile Non Engineering: CAFM, CMMS, Compliance, Hot Dealing, ITSM, Hybrid Office, SaaS, Invoice, Indent, Challan, USP, CMS, CMR, TOFU, MOFU, BOFU, Cash cow, Appraisal, Attrition, Sabbatical, Benchmark

6	1, 3	6, 7	THE SECRET OF THE MACHINES Concept Development Note making, Circulars, Announcements, Notifications, Minutes of Meeting etc	Students will bring a few sales brochures to the class and evaluate their effectiveness in communicating the intended message. They will discuss the pros and cons and suggest required changes.	Branch specific product/service pitches/campaigns using PPT tools. Online communication tools - etiquettes of online communication - Do's and Don't s. Use of google forms for data collection and analysis
7	1, 3	6, 7	CYBERCRIME	Students will go through the following links: <u>XMost Common Mistakes Spoken English Connection by Kanchan Ma'am - YouTube Kids</u> Identify and discuss common mistakes in English usage. They will highlight funny and embarrassing situations that might arise due to such errors.	Use of Artificial Intelligence tools in imbibing communication skills, Identification of spam, phishing and Trojan mails Introduction to deep fakes
8	1, 3	6, 7	CYBERCRIME Concept Development using AI tools : Official Communication - Notices, Memo etc, Vocabulary Building	ACTIVITY No. 2 for Portfolio Evaluation Shall be a group activity based on topics related to basic English grammar viz: Subject-Verb Agreement, Voices, Homophones, Homonyms and Homographs. Should involve Practical demonstration/ along with a written/printed report/portfolio.	Technical/Professional Writing through Word and PowerPoint using AI Tools
9	1, 3	6, 7	CLIMATE CHANGE – A CONVERSATION	Students will watch the <i>Shovel scene</i> from <i>The Gold Rush</i> (https://www.youtube.com/watch?v=cMZY1rB8naw) and relate it to the climate variation being experienced in the last few years	Interview Skills (May use Wadhvani Co-Pilot or similar platforms) Role play
10	1, 3	6, 7	CLIMATE CHANGE – A CONVERSATION Comprehension - Unknown Passage/Story	After going through the trailer of <i>Gandhada Gudi</i> available at https://www.youtube.com/watch?v=cScfvBT6LGU and write a summary of the same. This shall also include their experiences of such naturally beautiful places in their vicinity.	Non Verbal Communication – Body Language, Gesture, Posture, Image, Tone, Pitch, Voice Modulation, Eye Contact, Space
11	1, 3	6, 7	A PAGE FROM THE DIARY OF A YOUNG GIRL	Students will search for information about the books <i>War and Peace</i> and <i>Train to Pakistan</i> and based on that, will debate the pros and cons of international wars	Professional Correspondence – CV Covering letter, Letters to the editor, higher officers, letters of complaint, business letters
12			A PAGE FROM THE DIARY OF A YOUNG GIRL	Students will start maintaining a journal of daily activities. They will record events and	Email Writing Personal and Official Correspondence

	1, 2	6, 7	Punctuation Comprehension - Unknown Passage	happenings around them and note down their own opinions about the same	Journal Keeping, Note Taking, Notices, Circulars, Announcements, Notifications, Government Orders, Office Memos, Minutes of Meeting, Offer/Appointment & Termination/Resolution Letters, DO Letters, UO Notes
13	1, 2, 3	6, 7	Seminars on the textual topics covered from Week 1 to 12	A set of students shall present a chosen topic from the text and the rest shall interact with them in turns and vice versa	Preparation of a comprehensive report on the topics covered till date, with student inputs and feedback recorded in writing. Content, Style, Format and Syntax of Report Writing to be made aware to and followed by students

EXAMPLES OF TUTORIAL QUESTIONS/LEADS:

The students shall be asked to mull over and articulate their thoughts about the following. These questions must be broad based and analytical, suitable for developing a deeper understanding of the subject through research, group-discussion, opinion sharing, critical analysis and synthesis.

1. Describe the leadership style of a chosen figure. How have their leadership qualities contributed to their successes and failures? Include examples of how their management approach has evolved over time.
2. How has a chosen figure addressed ethical considerations within their businesses and innovations? Discuss any notable instances where their decisions have led to ethical debates.
3. How has a chosen figure's personal life and public persona influenced their professional image? Discuss how they have managed public relations and personal challenges.
4. To what extent do you think luck played a role in the success of a chosen figure? Assess the balance between luck, skill, and determination in their career.

4. References:

Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press, 1956. 2. James Hartman et al. Ed. English Pronouncing Dictionary. Cambridge: Cambridge University Press, 2006. 3. Rajesh Kumar et al. English Language Communication Skills: Lab Manual cum Workbook. Cengage: Cengage Learning India Pvt. Ltd, 2019. 4. Kandula Nirupa Rani et al. Speak Well. Orient BlackSwan: Orient BlackSwan Private Limited, 2012. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980. 5. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan: Orient BlackSwan Private

5. Suggested Activities: *The Course coordinator shall facilitate the learning of various attributes and attainment of course outcomes through active involvement in and proper stimulation of students' learning processes. Lecture, Tutorial and Practice as well as all assessment activities shall be carried out in batches, inside a well-equipped Language Laboratory. A word a day concept should be introduced and students encouraged to bolster their vocabulary. Grammar exercises may be referenced from [Advanced English Lessons](https://www.englishpage.com), available at <https://www.englishpage.com>.*

The following is just an indicative and not a comprehensive set of activities for the course. Students and Faculty are encouraged to choose activities that are relevant to the topics being discussed and based on the availability of resources/availability of implementation at their institutes.

Speaking Skills

1. **Role-plays:** Create role-playing scenarios that simulate real-life situations students may encounter in their future careers. For example, role-play scenarios could include job interviews, client consultations, or group project meetings. This activity allows students to practise speaking in different contexts and develop their communication skills
2. **Mock Interviews:** Conduct mock job interviews or admission interviews where students take turns playing the role of interviewer and interviewee. Provide feedback on communication skills, professionalism, and interview performance, helping students improve their speaking skills in professional settings.
3. **Storytelling.** Students can briefly summarise a tale or story they have listened to. They may create their own stories to tell to the class.
4. **Debates.** Holding **debates** is a great way for students to speak a lot in class, as you only act as the facilitator or judge during the activity.
5. **Instructions and Directions:** The student is asked to give directions or instructions, for example to the school library.

Listening Skills

1. **Listen and Summarise:** Provide students with recordings of academic lectures or TED Talks relevant to their field of study. After listening, ask them to summarise the main points, key ideas, and arguments presented in the talk. This activity not only hones listening skills but also reinforces comprehension and critical thinking.

2. **Dictations** - Vocabulary, syntax based
3. **Interactive Listening Games/Activities:** Introduce interactive listening games or activities such as "listen and draw" (where students listen to instructions and draw what they hear) or "listen and sequence" (where students listen to a series of events and arrange them in order). These activities make listening practise enjoyable and reinforce comprehension skills.
4. **Pairings/Group Listening Activities:** Organise pair or group listening exercises where students listen to audio clips or short speeches together. Afterward, encourage them to discuss and share their interpretations, ensuring active engagement and collaboration.
5. **Telephone.** In this activity, students are responsible for listening carefully to their peers in order to successfully relay a message.

Browsing and Presentation Skills

1. Browse KPSC website for the post of Assistant Civil Engineer, extract the details and create 5-6 slides using MS Powerpoint.
2. Browse through scholarship databases and funding opportunities available for you, extract the details and create a presentation using MS Powerpoint.
3. Browse any online collaboration tools and platforms to work on group projects with your classmates, extract the details and create a presentation using any MS Tools.
4. Browse websites and blogs offering professional development resources such as resume tips, interview advice, and career guidance, extract the information and create a presentation using any MS Tools.
5. Browse websites and resources offering skill development exercises, quizzes, and challenges related to your diploma program, extract the information and create a presentation using any MS Tools.

Unit	Concepts	Laboratory Activity
1	Composition, Documentation Elucidation, Presentation and Research	Use of Microsoft Word/Google Docs/Microsoft Powerpoint/Google Slides/WordUp, Memrise, Quizlet, Visuwords, Anki similar open source tools, use of internet to access various news portals and e-papers and magazines and LinkedIn, Facebook, Reddit profiles
2	Listening, Speaking, Verbal and Nonverbal skills	LingQ, FluentU, Speechling, YouTube, Spotify, Elsa Speak, Speechify, Speechnotes, Mozilla DeepSpeech, Descript etc for training students to practice simple conversational exercises.
3	Note taking, Official Communiques and presentation	Notepad, Microsoft OneNote, GoogleKeep, EverNote, Noteful, Obsidian, Gemini AI, Meta AI and ChatGPT for synthesis of various official communiques through input of bare points and Microsoft Powerpoint/Google Slides/similar open source presentation tools for effectively presenting official communication documents
4	Tools and etiquettes of Online Communication, Cyber crime	Google Meet, Microsoft Teams, WhatsApp, Telegram, YouTube
5	Interview Preparations, Body language	Wadhvani CoPilot, ChatGPT, Doulingo, Replika, YouTube,
6	Professional communication and correspondence	Emails, covering letters and notes of introduction, blogs, vlogs, podcasts using offline and online tools

6. Model Rubrics for Assessment of Activity (Qualitative Assessment)/ Portfolio Evaluation CIE-5

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Score
		2	4	6	8	10	
1	CONTENT/ ORGANISATION	Does not collect any information relating to the topic	Collects very limited information	Collects some information	Collects much information	Collects a great deal of information	8
2	DURATION/ PACE	Does not keep up time	Not up to the mark	Adequate	Above Average	Extremely good	6
3	PRESENTATION	Poor presentation	Scope for improvement	Average presentation skills	Presentation effective	Excellent Presentation	2
4	LANGUAGE/ DELIVERY	Poor Language skills	Scope for improvement	Average Language skills	Effective	Excellent Language	4
5	WORD CHOICE	Limited Vocabulary	Generally correct words	Experiments with figurative language	Effective and creative verbs	Powerful and engaging words. Accurate and precise	2
Average Marks= (8+6+2+4+2)/5=4.4							5

Note: Descriptors can be redefined by course coordinators as per classroom requirements.

7. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Week	Duration	Max marks	Average of all 5 CIE=50 Marks Min Passing Marks: 40% in total (20/50)
1.	CIE-1 Theory Test	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio Evaluation <i>(Students are expected to submit a comprehensive report on at least 2 activities executed/performed during the 3rd and 8th weeks of the semester. The same shall be submitted to the course coordinator in the form of a bound folio, with proper indexing and certificate. A maximum of 50 marks shall be awarded for each activity. The final score shall be the average of the marks scored in the three activities)</i>	1-13	NA	50	
Total Continuous Internal Evaluation (CIE)					50 Marks
Semester End Examination (SEE) -Theory					NA
Semester End Examination (SEE)-Practice			180	50	50 Marks
Total Marks: CIE+SEE (50+50)					100 Marks

CIE Theory Test 1 (Test No. 1)

Program	Common to all Engineering and Non Engineering Programmes			Semester I/II	
Course Name	ESSENTIAL ENGLISH COMMUNICATION			Test	I/III
Course Code	25EG011	Duration	90 min	Marks	50
Name of the Course Coordinator:					
Note to Course coordinators: This test shall assess learnings from the topics and exercises covered during the first four weeks of the semester, i.e from the texts: THE INSPIRATIONAL STORY OF ELON MUSK & An excerpt from OORU KERI. This shall include Question-Answer and Composition exercises. Each question may have one, two or three subdivisions. Optional questions (1:1 choice) in each section carry the same weightage of marks, cognitive level and course outcomes. Answer any one full question from each section. Each full question carries equal marks.					
Q. No	Questions	CL	Course Outcome	Marks	
1	a) List any five of Elon Musk's achievements. Provide details about any one of them. b) Based on your reading of the excerpt from OORU KERI, elaborate the statement: "Nature is an integral part of life in the villages". OR c) Briefly define the working of any two of the following: <i>Tesla Cybertruck/The Boring Company/Tesla Superchargers/Tesla AutoPilot/NeuraLink.</i> d) Is the writer angry or amused about the societal practices in his village? Explain with examples.	L1 L3 L1 L3	1	10X2=20	
2	a) Write a paragraph of not more than 200 words about your favourite personality? OR b) What are the qualities of a good leader? Explain with the help of an example?	L2 L2	1	10	
3	a) Describe how Coronavirus affected your family. OR b) Write a short note about your recent visit to a tourist destination.	L1 L1	1	10	
5	a) Draft a fresher Resume to apply for a suitable job? OR b) Create a Profile suitable for use in LinkedIn?	L5 L5	1	10	

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

CIE Theory Test 2 (Test No. 3)

Program	Common to all Engineering and Non Engineering Programmes			Semester I/II	
Course Name	ESSENTIAL ENGLISH COMMUNICATION			Test	I/III
Course Code	25EG01I	Duration	90 min	Marks	50
Name of the Course Coordinator:					
Answer any one full question from each section. Each full question carries equal marks. Note to Course coordinators: This test shall assess the learnings from the topics and exercises covered between weeks 5-10 of the semester, i.e from the texts: THE SECRET OF MACHINES, CYBERCRIME, CLIMATE CHANGE – A CONVERSATION and A PAGE FROM THE DIARY OF A YOUNG GIRL. This shall include Question- Answer, Concept Development, Comprehension and Grammar. Each question may have one, two or three subdivisions. Optional questions (1:1 choice) in each section carry the same weightage of marks, cognitive level and course outcomes.					
Q. No	Questions		CL	CO	Marks
1	a) Though the poem <i>The Secret of Machines</i> refrains from naming them explicitly, it is understood that there are clear references to many machines. Name any five such and explain their functions in simple words. b) From the reading of the text and your experience of using the internet on computers and phones, list ten good practices that will help you stay away and safe from the threats of cybercrimes. or c) What events/circumstances inspired Ms. Kangujam to take up climate activism? d) Jacques's matter of fact statement "I don't dare do anything anymore, 'cause I'm afraid it's not allowed" is a testament to the life of Jews during the II World war. Justify in light of your reading of Anne Frank's diary.		L1 L4 L1 L4	1	10X2=20
2	a) Write a letter to the Deputy Commissioner of your district requesting him to arrange for regular supply of potable water in your locality. Highlight the difficulties being faced by the residents in light of severe summer heat. OR b) The annual day function of your college is slated to be held on a certain date this month. Imagine the necessary details and prepare a detailed notice to be displayed for public information.		L3 L3	1	10
3	a) Develop a narrative using the following hints: Lion - sleeping in a forest - mouse - playing on it - angry lion - threatened to kill the mouse - mouse asked to forgive - promised to save him one day - lion laughed - let him off - another day - lion caught by hunter - in net - mouse heard the lion roar - mouse cut the net with his teeth - lion escaped - thanked the mouse. OR b) A poor woodcutter's axe slipped and fell into a river—a God heard him cry and wanted to help him—he dived brought a gold axe for him—the honest woodcutter did not take this axe—the god again went down into the river and brought up a silver axe, woodcutter refused to accept—the god was very pleased and gave him his own axe as well as the gold and silver axes		L5 L5	1	20

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

9. CIE Practical Test 1 (Test No. 2)

Program	Common to all Engineering and Non Engineering Programmes			Semester	I/II
Course Name	ESSENTIAL ENGLISH COMMUNICATION			Test	IV
Course Code	25EG01I	Duration	3 Hrs	Marks	50
Name of the Course Coordinator:					
Questions				Course Outcome	Marks
Note to Course coordinators: The questions shall concentrate on assessing students' listening and speaking skills, based mainly on audiovisual inputs provided in the classroom from week 1-7. The coordinator may choose one of the videos listed in the curriculum or may even use other audio clips/videos, based on viability.					
Answer any one full question. 1a. Listen to the audio clip being played. Based on your understanding of the audio, answer the following questions. i. ii. iii. iv. v. OR 1b. Sit with a friend of your choice. Talk to him/her and find out about his personal life, achievements, goals and aspirations. Prepare a short writeup of not more than 200 words about the same.				2	50
Scheme of Valuation 1a & 1b: Ten marks for each question. Grammatical and syntactical mistakes shall be penalised. The idea is to assess the listening skills of the student and his/her ability to transform the gleaned information into coherent, purpose-built answers.					
Total Marks					50

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

CIE Practical Test 2 (Test No. 4)

Program	Common to all Engineering and Non Engineering Programmes			Semester	I/II
Course Name	ESSENTIAL ENGLISH COMMUNICATION			Test	IV
Course Code	25EG01I	Duration	3 Hrs	Marks	50
Name of the Course Coordinator:					
Note to Course coordinators: The questions shall concentrate on assessing students' presentation skills using modern tools of communication, based on the topics covered in the class between week 8-13.				Course Outcome	Marks
Answer any one full question. Grammatical and syntactical mistakes shall be penalised. 1. a) You are Raghavan. Prepare a resume using <i>relevant details</i> from the information given below. Use your imagination to fill in details that are not provided. The resume is for seeking an internship at Cognizant/MI India/KPTCL. b) Type the same Resume in MS Age: 18, Height: 5.2, SSLC: 88%, Face resembles Salman Khan, Hobbies: playing PUBG, National Level Tennis Player, Favourite dessert: Ice-cream, Body Builder, Disco dancer, School Leader in 10 th Std, Working part time in father's office, Zodiac sign: Libra. OR 2. a) List any five technical terms related to your branch. Explain their meanings in simple words. b) Prepare a PPT highlighting the meaning and importance of the above words.				3	25+25
Scheme of Valuation 1a. Five marks for including all the essential components of resume; five marks for using only the relevant details; five marks for building up and using the missing details; five marks for relevance of purpose; five marks for presentation 1b. Ten marks for error free recreation of the written resume in MS Word. Fifteen marks for proper use of formatting and stylistic tools. OR 2a. Five marks for including all the essential components of resume; five marks for using only the relevant details; five marks for building up and using the missing details; five marks for relevance of purpose; five marks for presentation 2b. Ten marks for error free recreation of the written resume in MS Word. Fifteen marks for proper use of formatting and stylistic tools.					
Total Marks					50

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

10. SEE - Model Practical Question Paper

Program	Common to all Engineering and Non Engineering Programmes		Semester	II
Course Name	ESSENTIAL ENGLISH COMMUNICATION	Course Code: 25EG01I	Duration	3 Hrs
Note to paper setters: 15 marks for written answers - BTE answer script; 15 marks for demonstration using computers; 10 marks for activity based assessment (class notes and assignments); 10 marks for viva-voce questions Questions on Email Writing, Personal and Official Correspondence, Notices, Circulars, Announcements, Journal Keeping, Note Taking, Notifications, Government Orders, Office Memos, Minutes of Meeting, Offer/Appointment & Termination/Resolution Letters, DO Letters, UO Notes, ,CV Covering letter, Letters to the editor, higher officers, letters of complaint, business letters, interview skills, Technical/Professional Writing, Individual Profile Creation and Resume Preparation, Non Verbal Communication – Body Language, Gesture, Posture, Image, Tone, Pitch, Voice Modulation, Eye Contact, Space can be included in this section.			50 marks	
1. Question based on audiovisual inputs (Listening and Speaking skills) 2. Question based on presentation skills using technological tools (using computers) 3. Question based on Portfolio Evaluation/Activities 4. Viva-voce questions based on listening and speaking skills.			3 hours	15 15 10 10
Total Marks				50

1) Signature of Examiner 1

2) Signature of Examiner 2

11. Equipment/Software list with Specification for a batch of 30 students

Sl. No.	Particulars	Specification	Quantity
1	Desktop Computers (All in ones preferred)	Core i7 and above 16GB RAM 1TB ROM Windows 11+	31
2	Headphones with mic	Sony MDR ZX110AP Wired Headset with In-line remote and mic for hands-free calls	31
3	Multimedia Speakers	Sony SA-D40 4.1 Channel Speaker, 80 Watts	1 Set
4	Ink Tank Colour Printer	HP 790 Ink Tank Multifunction Colour Wi-Fi Printer	1
5	UPS	As per the power needs for the above setup (10KV)	1
6	Digital Projector Ceiling-mounted with brackets and installation	Epson EB695Wi	1
7	LAN/WiFi with High Speed Internet connection		31
8	Language Lab Modules/Softwares Robotel/ SPEARS Language Lab/ iTell Digi Language Lab/ Digital Teacher OR similar		
9	Books for Reference 1. Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press,1956. 2. James Hartman et al. Ed. English Pronouncing Dictionary. Cambridge: Cambridge University Press, 2006. 3. Rajesh Kumar et al. English Language Communication Skills: Lab Manual cum Workbook. Cengage: Cengage Learning India Pvt. Ltd, 2019. 4. Kandula Nirupa Rani et al. Speak Well. Orient BlackSwan: Orient BlackSwan Private Limited, 2012. 5. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980. 6. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan: Orient BlackSwan Private		

CO-PO CORRELATION

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7
1	0	0	0	0	0	3	3
2	0	0	0	0	0	3	3
3	0	0	0	0	0	3	3
LEVEL 3- Highly Mapped, LEVEL 2-Moderately Mapped, LEVEL 1- Low Mapped, Level 0- Not Mapped							

CO	UNIT	PO	CL	HOURS	MARKS
1	1, 2, 3, 4, 5, 6	6, 7	L1, L2, L3, L4 L5	36	35
2	2, 5	6, 7	L2, L3, L5	32	30
3	1, 3, 4, 6	6, 7	L1, L2, L3, L4 L5	36	35
TOTAL HOURS/MARKS				104	100

x x x



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	ME & Allied Programs	Semester	I
Course Name	Computer Aided Engineering Drawing (CAED)	Type of Course	Integrated
Course Code	25ME01I	Contact Hours	7 Hrs/Week= 1Hrs
Teaching Scheme	L: T:P 3:0:4	Credits	5
CIE Marks	50	SEE Marks	50 (Practice)

1. Rationale: Engineering Drawing is universal & effective language of engineers that strengthens the technological structure. It helps in communicating design ideas and technical information to engineers and other professionals throughout the design process. The objective of Engineering drawing & CAD is to introduce the students, the techniques of drawing, visualize and represent 3D objects in 2D & create solid model.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Use drawing instruments and dimension the drawing as per the standards.
CO-02	Draw the principal views of points, lines, planes and solids.
CO-03	Convert Orthographic views of a given drawing to pictorial Drawing.
CO-04	Create Solid model of the pictorial Drawing in CAD.

3. Course Content -

***Note: Practice of Drawings should be done in Drawing Sheet (A2) only.**

WEEK	CO	PO	Lecture (3 Hours per Week)	Practical (CAD) (4 Hours per Week)
1	1	1, 4, 7	Fundamentals of Engineering Drawing: • Introduction to Engineering Drawing - Need for Engineering Drawing, Instruments Used in Engineering Drawing • Layout of Drawing sheet, Title Block, Types of Lines and its Applications. Dimensioning: Introduction to dimensioning, Need for dimensioning & Elements of dimensioning.	• Practice different types of Lines using drawing instruments. • Conventional representation of Materials. • Practice Dimensioning of common features: Line, Radius, Diameter, Arc, Chord, Angles, Sphere, Chamfer, Hole, through hole, Counter bore & Counter Sink.
2	1	1,4,7	• Concept of Scale: Representative fraction (RF), Full scale, reduced scale & enlarged scale. Conversion of Linear measurements of an object in mm, cm & Meter • System of dimensioning: Aligned system & Uni-direction system. • Methods of Dimensioning Chain, Parallel, Combined & Progressive Dimensioning	• Practice Problems on Scaling • Practice Problem on - Aligned and Uni-direction system of dimensioning. * • Practice Problems on - Chain Dimensioning, Parallel Dimensioning, Combined Dimensioning, Progressive Dimensioning
3	2	1,4,7	Projection of Points: • Planes of Projections and Views –Principal planes & Views. • First angle & Third angle projection with symbolic representation. • Problems on projection of points.	Practice Problems on projection of points.*

4	2	1,4,7	Projection of Lines (Only First angle projection) for following conditions • Line parallel to both HP & VP • Line parallel to HP & Perpendicular to VP • Line parallel to VP & Perpendicular to HP. • Line inclined to HP & Parallel to VP • Line inclined to VP & Parallel to HP.	Practice Problems on Projection of Lines.*
5	2	1,4,7	Projection of Planes: • Problems on projection of Planes (Triangular, Square, Pentagonal & Hexagonal laminae) With conditions: ○ Base edge resting on HP ○ Corner resting on HP ○ Inclination only to HP • Problems on projection Circular lamina with Inclination only to HP.	Practice Problems on Projection of Planes.*
6	2	1,4,7	Projection of Solids: • Problems on projections of Solids (Triangular and Square prism & pyramid) with conditions: ○ Base edge resting on HP ○ Corner resting on HP ○ Base Inclination only to HP. • Problems on projections of Cone with base Inclination only to HP	Practice Problems on Projection of Solids.*
7	2	1,4,7	• Problems on projections of Solids (Pentagonal, Hexagonal prism & pyramid) with conditions: ○ Base edge resting on HP ○ Corner resting on HP ○ Base Inclination only to HP. • Problems on projections of Cylinder with base Inclination only to HP	Practice Problems on Projection of Solids.*

8	3,4	1,4,7	Orthographic Projections & Solid Modelling: Draw Orthographic Views for given Pictorial drawings.	• Familiarization of CAD window Commands like New file, saving the file, opening an existing drawing file, Undo, Redo, move commands, Menu bar, Tool bar, Task bar & Ribbon bar. • Practice CAD commands like arc, circle, square, rectangle, chamfer, Trim, inclined lines, Extend, Extend to Next, Shell, • Fillet, Group, Array and Mirror commands
9	3,4	1,4,7	Draw Orthographic Views for given Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
10	3,4	1,4,7	Draw Orthographic Views for given Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
11	3,4	1,4,7	Draw Orthographic Views for given Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Sectional Views with an arbitrary Sectional Plane.*
12	3,4	1,4,7	Draw Orthographic Views for given Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Sectional Views with an arbitrary Sectional Plane.*
13	3,4	1,4,7	Draw Orthographic Views for given Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Sectional Views with an arbitrary Sectional Plane.*

Note - * Refer annexure for Practice Questions & portfolio evaluation

4. References:

Sl. No.	Author	Title of Book	Publication/Year
01	Basant Agrawal/C N Agrawal	Engineering Drawing	3rd Edition, McGraw-Hill, 2019
02	K Venkata Reddy	Textbook of Engineering Drawing	2nd Edition, B S Publication
03	Venugopal K	Engineering Drawing and Graphics with Auto CAD	2009
04	N D Bhatt	Engineering Drawing	Charotar Publication
05	Imtiaz Hashmi	Fundamentals of Engineering Drawing	Lambert Academic Publishing ,2010
06	M B Shah	Engineering Drawing	Pearson Education India, 2013
07	Frederick E Giesecke and Ivan L Hill	Technical Drawing with Engineering Graphics	Pearson Education Limited, 2013
08	K R Gopala Krishna	Engineering Graphics	Subhash Publications
09	R K Dhawan	Text book of Engineering Drawing	S Chand Publications
10	Maurice Arthur Parker	Engineering Drawing with Worked Examples, Volume 1	Stanley Thornes Publications

5. CIE Assessment Methodologies

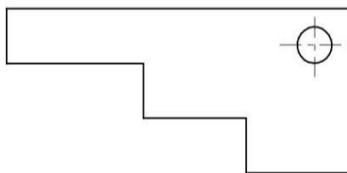
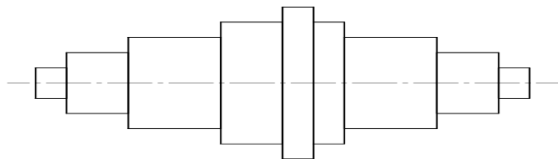
***Note:** Drawings should be practiced in Drawing Sheet (A2) only, Except Orthographic drawings which shall be practiced in A4 sheet.

Sl.No.	CIE Assessment	Test Week	Duration (minutes)	Max Marks	Average of all CIE=50 Marks
1.	CIE-1 Theory Test	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the Drawing sheets and activities through Rubrics	1-13	-	50	Average of all CIE=50 Marks
Total					50 Marks

6. SEE – Practice Assessment Methodologies

Sl. No	SEE – Practice Assessment	Duration (minutes)	Max. Marks	Min. Marks to Pass
1.	Semester End Examination-Practice	180	50	20

7. CIE-1 Theory Test Model Question Paper

Program	Mechanical Engineering			Semester - I	
Course Name	Computer Aided Engineering Drawing (CAED)			Test	I
Course Code	25ME01I	Duration	90min	Marks	50
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					
Q. No	Questions		Cognitive Level	Course Outcome	Marks
Section-1					
1	a) Draw layout of drawing sheet & List different sizes of Drawing sheet. b) Dimension the given sketch using aligned system with chain method. 		Apply	CO1	10+15=25
2	a) Draw Title block b) Dimension the given sketch using unidirectional system with parallel method. 		Apply	CO1	
Section-2					
3	a) Draw three principal views of a point P , 30mm below HP, 50mm behind VP & 40mm from Left Profile Plane. b) Draw the three principal views of a line 40 mm long when it is placed parallel to VP and perpendicular to HP. The line is 30mm above HP, 40mm in front of VP and 30mm from right Profile plane.		Apply	CO2	10+15=25

4	a) Draw three principal views of a point P , 30mm Above HP, 50mm behind VP & 40mm from Left Profile Plane b) Draw the three principal views of a line 40mm long which it is inclined at 30° to VP and parallel to HP. The line is 30mm above HP, 40mm in front of VP and 30mm from right profile plane.	Apply	CO2	
<i>Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.</i>				

Signature of the Course Coordinator
Chairman

Signature of the HOD

Signature of the IQAC

8. CIE-2 Practice Test model question paper

Program	Mechanical Engineering			Semester	I
Course Name	Computer Aided Engineering Drawing. (CAED)			Test	II
Course Code	25ME01I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
1. Draw the three principal views of a line 40 mm long when it is placed parallel to both HP & VP. The line is 30 mm above HP,40 mm in front of VP and 30mmfromright Profile plane.				CO2	15
2. A triangular lamina of base edge 40mm rests with one its base edge on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.				CO2	15
3. A square Prism of base edge 40mm and height 60mm rests with one its base edge on HP so that the axis of the prism is inclined at 30° to HP. Draw the projections of the prism.				CO2	20
Scheme of assessment Q1 Front View = 5 Marks Top View = 5 Marks Side View = 5 Marks		Scheme of assessment Q2 Initial position= 5 Marks In Inclined Position: Front View=5 Marks Top view= 5 Marks		Scheme of assessment Q3 In Initial Position: Front View=5 Marks Top view= 5 Marks In Inclined Position: Front View=5 Marks Top view= 5 Marks	
Total Marks					50

Signature of the Course Coordinator

Signature of the HOD

Signature of the
IQAC Chairman

9. Suggestive Activities for Tutorials:

- The students shall do minimum of one suggested activities
- List is an Example and not inclusive of all possible activities of the course.
- Student and Faculty are encouraged to choose activities that are relevant to the topic.

Sl.No.	Suggestive Activities for Tutorials
01	Prepare Nut and Bolt by 3D Printing
02	Prepare V block/ Patterns by 3D Printing
03	Prepare solid models of Inter-disciplinary components by 3D Printing

10. Rubrics for Assessment of Graded Exercises and Activities (Qualitative Assessment)

Sl. No.	Dimension	Unsatisfactory	Need Improvement	Satisfactory	Good	Excellent	Student Score
		(0-10)	(11-20)	(21-30)	(31-40)	(41-50)	
1	Technical Accuracy	Significant errors make the drawing unusable.	Multiple inaccuracies	Some errors affecting understanding but correctable.	Minor errors in interpretation or calculations	All details are accurate	40
2	Line Quality	Lines are messy and confusing.	Lines are uneven	Inconsistent line quality	Clear lines with minor inconsistencies.	Clean and consistent lines	40
3	Dimension	Dimensions are missing or incorrect.	Many errors; hard to interpret	Some dimension errors affecting interpretation.	Mostly accurate; minor issues	Dimensions are precise, clear, and correctly positioned, following standards.	45
4	Presentation & Neatness	Very untidy; Very poor presentation	Messy; Presentation hinders clarity	Somewhat neat; Some layout issues	Generally neat with minimal flaws; minor improvement in Presentation	Extremely neat and organized; all details easy to read	40
5	Adherence to Standards	Does not follow any drawing standards.	Limited adherence to standards	Lacks consistency.	Minor deviations from standards.	Adheres to relevant drawing standards (ISO, ANSI, etc.).	35
Average Marks = $(40+40+45+40+35)/5 = 40$ Marks							40

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

11. SEE- Model Practice Question Paper

Program	Mechanical Engineering		Semester	I
Course Name	Computer Aided Engineering Drawing	Course Code: 25ME01I	Duration	180 min
			Maximum Marks	50
Questions			CO	Marks
1. A pentagonal Prism of base edge 40mm and height 60mm rests with one its corner on HP so that the base of the prism is inclined at 30° to HP. Draw the projections of the prism. (ANSWER SHEET)			CO2	20
2. Draw Orthographic views for the given pictorial Drawing (ANSWER SHEET) & create solid model (CAD) for the same and Extract Views.			CO3,CO4	30
Scheme of assessment for Q1		Scheme of assessment for Q2		
1. Draw projections of a Solid -15 Marks		1. Drawing orthographic Views in answer sheet-15 Marks		
2. Adopting Dimension& Drawing convention (types of lines) -5Marks		2. Creating solid model in CAD & print out - 10Marks		
		3. Extracting Views- 5 Marks		
Total Marks				50

1) Signature of the Examiner
Examiner

2) Signature of the

12. Equipment/software list with Specification for a batch of 30 students

Sl.No.	Particulars	Specification	Quantity
01	Drawing tables	As per IS	30
02	CAD software	-	30 users
03	Computers	Latest configuration	30

***Annexure**

Students shall practice these or similar questions for portfolio evaluation

1. Fundamentals of Engineering Drawing

Drawing Sheet No. 1 - (Student has to submit Minimum one standard size drawing sheets (A2) in this unit for portfolio evaluation).

- Draw Fig.1 & Fig.2 as per the drawing and identify types of lines.

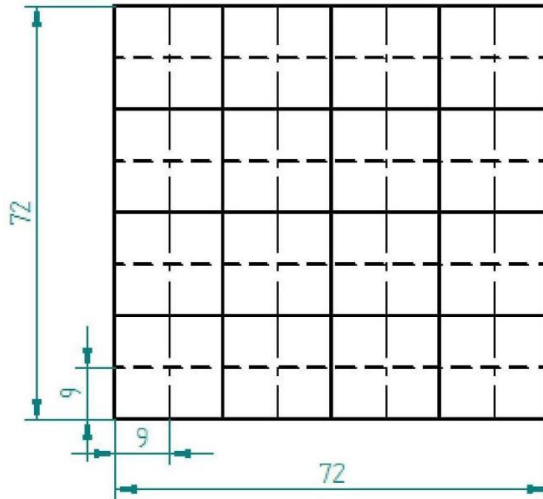


Fig.1

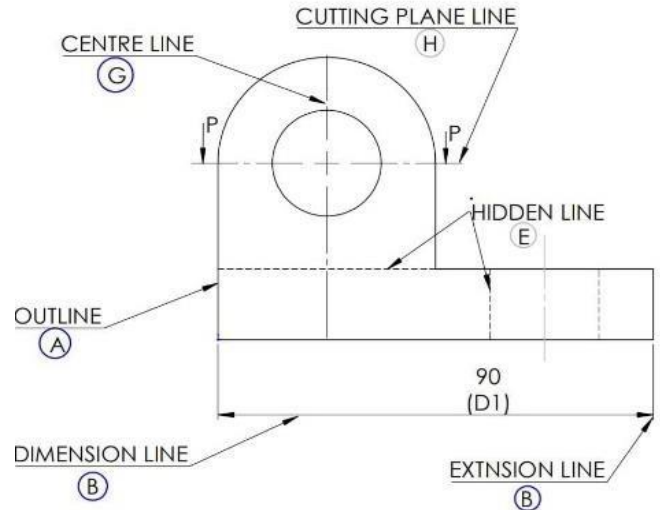


Fig.2

2. Dimensioning

Drawing Sheet No.2 & 3 - (Student has to submit Minimum two standard size drawing sheets (A2) in this unit for portfolio evaluation)

Draw Fig.3 to 1:1 scale, 1:2 scale & 2:1 scale.

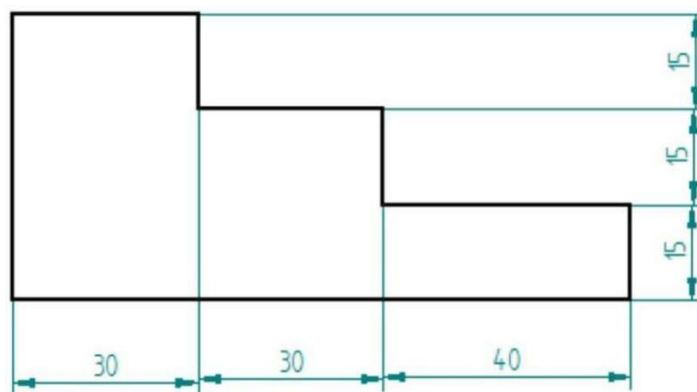


Fig.3

- Copy Fig. 3 to 1:1 scale and dimension it using both Aligned system & Uni-directional system.
- Copy Fig.4 to 2:1 Scale and dimension it using Aligned system with Chain dimensioning.

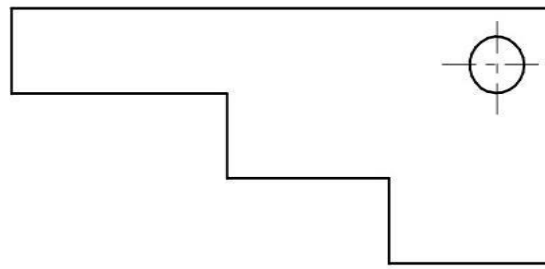


Fig.4

- Copy Fig. 5 to 1:1 Scale and dimension it using Unidirectional system with Parallel dimensioning

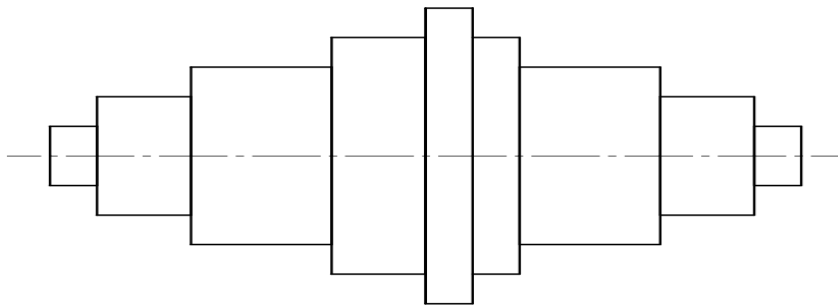


Fig.5

- Copy Fig. 6 to 1:1 scale and dimension it using unidirectional system with Combined dimensioning method

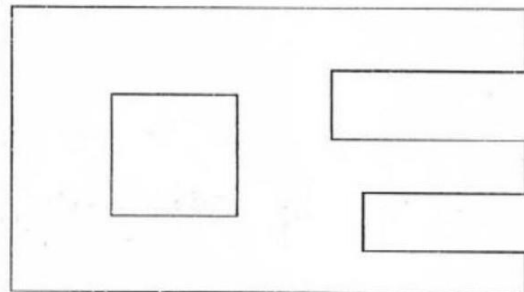


Fig.6

- Copy Fig. 7 to 1:1 scale and dimension it using Aligned system with Progressive dimensioning method

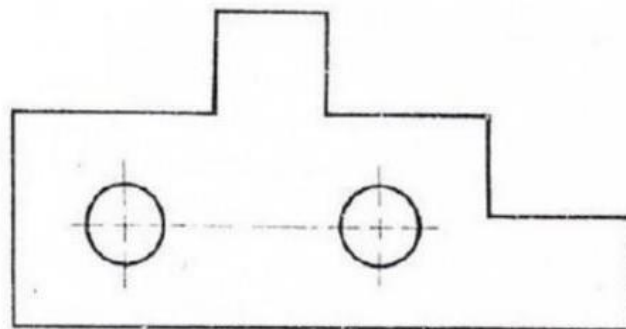
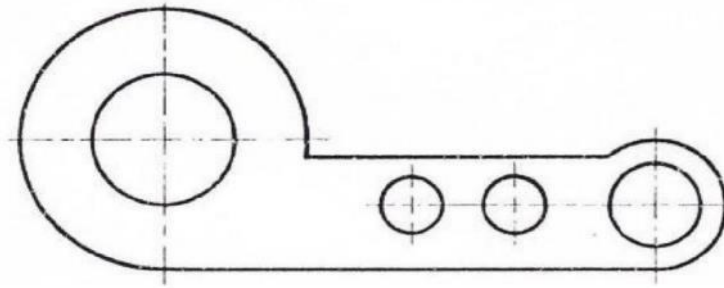


Fig.7

- Copy Fig. 8 to 1:1 scale and dimension it using Aligned system with chain dimensioning method



• Fig.8

2. Projection of Points

Drawing Sheet No.4- (Student has to submit Minimum one standard size drawing sheet (A2) in this unit for portfolio evaluation).

- Q1.** Draw three principal views of a point P, 30mm Above HP, 50mm in front of VP & 40mm from Left Profile Plane.
- Q2.** Draw three principal views of a point P, 30mm Above HP, 50mm behind VP & 40mm from Left Profile Plane.
- Q3.** Draw three principal views of a point P, 30mm Below HP, 50mm behind VP & 40mm from Left Profile Plane.
- Q4.** Draw three principal views of a point P, 30mm Below HP, 50mm in front VP & 40mm from Left Profile Plane.

1. Projection of Lines

Drawing Sheet No.5- (Student has to submit Minimum one standard size drawing sheet in this unit for portfolio evaluation).

- Q1.** Draw the three principal views of a line 40 mm long when it is placed parallel to both HP & VP. The line is 30 mm above HP, 40 mm in front of VP and 30mm from right Profile plane.
- Q2.** Draw the three principal views of a line 40 mm long when it is placed parallel to HP and perpendicular to VP. The line is 30mm above HP, 40mm in front of VP and 30mm from right Profile plane.
- Q3.** Draw the three principal views of a line 40 mm long when it is placed parallel to VP and perpendicular to HP. The line is 30mm above HP, 40mm in front of VP and 30mm from right Profile plane.
- Q4.** Draw the three principal views of a line 40mm long which it is inclined at 30° to HP and parallel to VP. The line is 30mm above HP, 40mm in front of VP and 30mm from right profile plane.
- Q5.** Draw the three principal views of a line 40mm long which it is inclined at 30° to VP and parallel to HP. The line is 30mm above HP, 40mm in front of VP and 30mm from right profile plane.

2. Projections of Planes

Drawing Sheet No.6 - (Student has to submit Minimum one standard size drawing sheet (A2) in this unit for portfolio evaluation).

- Q1.** A triangular lamina of base edge 40mm rests with one its base edge on HP so that the

surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.

- Q2.** A triangular lamina of base edge 40mm rests with one its Corner on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q3.** A square lamina of base edge 40mm rests with one its base edge on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q4.** A square lamina of base edge 40mm rests with one its corner on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q5.** A pentagonal lamina of base edge 40mm rests with one its base edge on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q6.** A pentagonal lamina of base edge 40mm rests with one its corner on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q7.** A hexagonal lamina of base edge 40mm rests with one its base edge on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q8.** A hexagonal lamina of base edge 40mm rests with one its corner on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
- Q9.** A circular lamina of 30mm diameter rests on HP such that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.

3. Projections of Solids

Drawing Sheet No.7- (Student has to submit Minimum one standard size drawing sheet (A2) in this unit for portfolio evaluation).

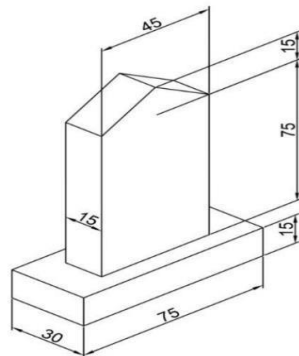
- Q1.** A triangular Prism of base edge 40mm and height 60mm rests with one its base edge on HP so that the base of the prism is inclined at 30° to HP. Draw the projections of the prism.
- Q2.** A square Prism of base edge 40mm and height 60mm rests with one its base edge on HP so that the axis of the prism is inclined at 30° to HP. Draw the projections of the prism.
- Q3.** A pentagonal Prism of base edge 40mm and height 60mm rests with one its corner on HP so that the base of the prism is inclined at 30° to HP. Draw the projections of the prism.
- Q4.** A hexagonal Prism of base edge 40mm and height 60mm rests with one its corner on HP so that the base of the prism is inclined at 30° to HP. Draw the projections of the prism.
- Q5.** A triangular pyramid of base edge 40mm and height 60mm is resting with one of its corner on HP so that axis of the pyramid is inclined at 30° to HP. Draw the projections of the pyramid.
- Q6.** A square pyramid of base edge 40mm and height 60mm is resting with one of its corner on HP so that base of the pyramid is inclined at 30° to HP. Draw the projections of the pyramid.
- Q7.** A pentagonal pyramid of base edge 40mm and height 60mm is resting with one of its base edge on HP so that base of the pyramid is inclined at 30° to HP. Draw the projections of the pyramid.
- Q8.** A hexagonal pyramid of base edge 40mm and height 60mm is resting with one of its base edge on HP so that base of the pyramid is inclined at 30° to HP. Draw the projections of the pyramid.
- Q9.** A cylinder of 40mm diameter and axis height 65mm rests with its base on HP so that the base diameter inclined at 45° to the HP. Draw the projections.
- Q10.** A cone of 40mm diameter and axis height 65mm is resting with its base on HP. Draw the projections if base diameter is inclined at 45° to HP.

4. Pictorial Drawings.

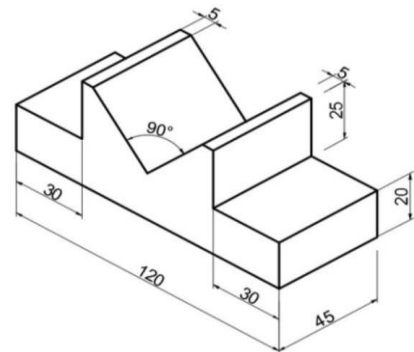
Drawing Sheet No.8,9 & 10 - (Student has to submit Minimum two standard size

drawing sheets(A2) in this unit for portfolio evaluation).

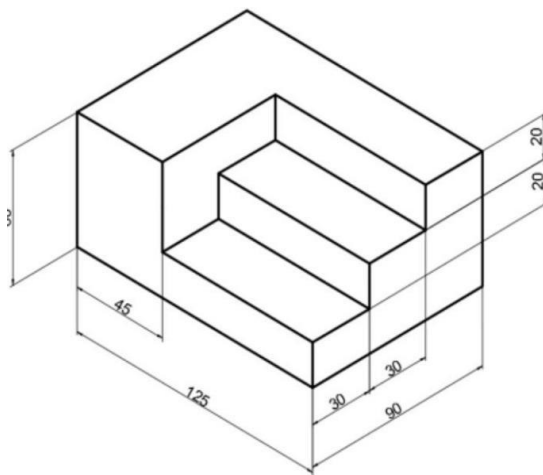
Q1. Draw the three principal views of the given component. & Create Solid Model.



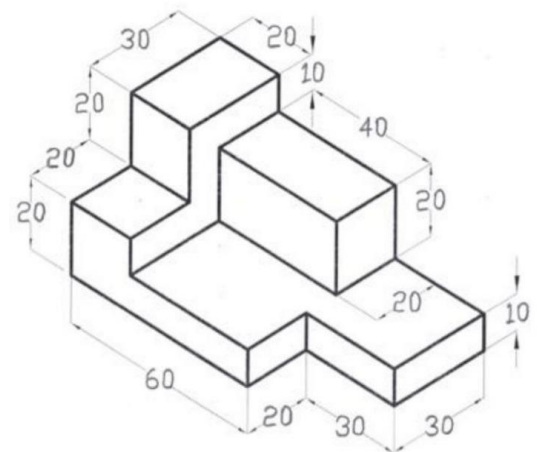
Q2. Draw the three principal views of the given component. & Create Solid Model.



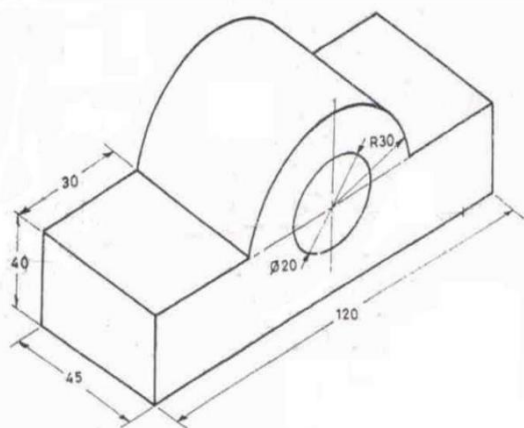
3. Draw the three principal views of the given component. & Create Solid Model.



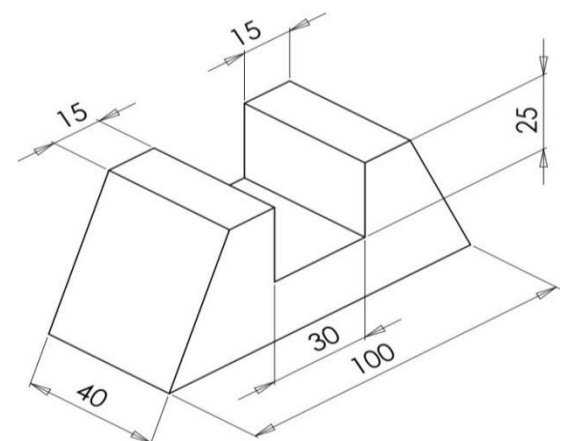
4. Draw the three principal views of the given component. & Create Solid Model.



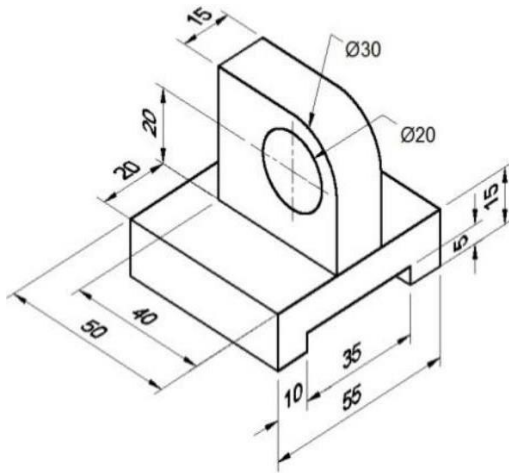
Q5. Draw the three principal views of the given component. & Create Solid Model.



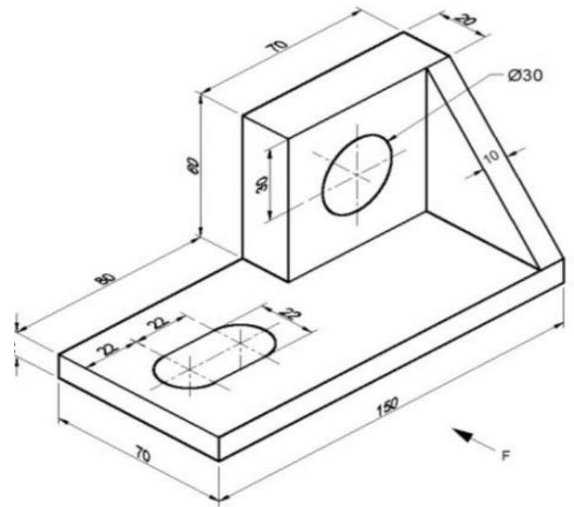
Q6 Draw the three principal views of the given component. & Create Solid Model.



7. Draw the three principal views of the given component. & Create Solid Model.



8 Draw the three principal views of the given component. & Create Solid Model.





Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Mechanical Engineering	Semester	I
Course Name	Concepts of Mechanical Engineering - I	Type of Course	Integrated
Course Code	25ME11I	Contact Hours	104 hrs/Sem
Teaching Scheme	L: T:P – 4-0-4	Credits	6
CIE Marks	50	SEE Marks	50 (Theory)

1. Rationale:

Engineering Materials play an important role through conventional and advanced materials leading to technological advances. Over a period of time, a lot of research has been done to develop materials that transformed civil society. Understanding the structure-property relationship and selecting the right material for a given application is vital in the modern customer-driven market. Therefore, a Diploma engineering student must be conversant with the properties, composition and behavior of materials from the point of view of the product's reliability, sustainability and performance. The study of engineering materials will help the students to understand engineering subjects where the emphasis is laid on the application of these materials. Understanding the basics of **Theory of Machines** is essential for mechanical engineers to design, develop, and optimize mechanical systems, mechanisms, and machines.

Diploma Engineers are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is essential. This requires training the students with a focus on **Fitting and Welding**, operations provides essential skills, knowledge, and experience about the various manufacturing processes. Hence this integrated course is introduced to provide strong foundation in practical skills, safety awareness, and problem-solving abilities essential for success in mechanical engineering and related fields.

2. Course Outcomes: At the end of the Course, the students will be able to:

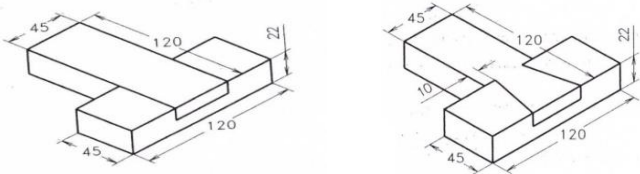
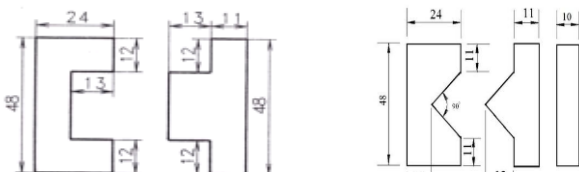
CO-01	Identify the Measuring instruments required for measuring the given component and Record the dimensions.
CO-02	Select suitable material for the real-world components and analyze their mechanical, thermal, and electrical properties.
CO-03	Assemble and test kinematic mechanisms, gear trains, and transmission systems to study

	their functionality and performance in mechanical applications.
CO-04	Perform fitting, welding, and carpentry operations by following safety guidelines with accuracy.

3. Details of Course Content

WEEK	CO	PO	Theory	Practice
1	1	-	• Introduction to Mechanical Engineering, scope of Mechanical Engineering and Career's opportunities for Mechanical Engineers • Fundamental Units – Definition and units of Length, Mass, Time & Temperature in CGS, FPS, MKS & SI Units with conversions. • Derived Units – units of Area, Volume, Density, Velocity, Acceleration, Force, Work, Energy Power in CGS, FPS, MKS & SI Units with conversions. (Formulae & Simple numerical examples)	• Measurement of linear dimensions using Vernier calipers. • Measurement of height using Height gauge. • Measurement of outside diameter by using screw gauge. • Measurement of inside diameter using inside caliper. • Measurement of angle by using bevel protractor and sine Bar.
2	2	1,2,4	Classification of Engineering Materials Ferrous Materials • Cast Iron- Types of cast iron- Grey, White, Malleable. Properties, composition and applications of cast iron. • Steel –Types, Designation of steel, Types -Plain Carbon Steel- Low (0.15-0.25%C), Mild (0.25%C), Medium (0.25-0.65%C), High Carbon (0.65-1.5%C), Properties, composition and applications of steel. • Alloy Steel- Tool Steel, Tungsten steel, Stainless-Steel, High-Speed Steel, Properties, composition and applications of alloy steel. <i>This concept shall be thought by Using the components made of cast iron, steel and alloy steel as teaching aids, Examples: Rails in Railways, Machine tool beds, Flywheels, Man-hole Cover, Sewage pipes. Pump Casing, Ball Mills, Wear Plate, Marine Pump Impeller, Gear Housing, Clamps Fixtures, Wrench and Pliers, Welding Electrodes, Chassis, car body, gears, axels, Shafts, Fasteners, exhaust, springs, axles, laminated springs, Cutting Tools, Sheet metals etc</i>	• Display different components made of cast iron, steel and alloy steel. • Students shall identify minimum 10 components and prepare the chart showing the components pictures, properties and applications.

3	2	1,2	Non-Ferrous Materials Properties, composition and applications of • Aluminum and Aluminum Alloys – Duralumin, Y-Alloy, Magnesium, Hindalium. • Copper and Copper Alloys - Brass, Bronze, Gun Metal, lead, Tin. Bearing Metals. • Zinc Based Alloys – Solder, German silver; • Nickel Based Alloys – Inconel, Monel metals. <i>This concept shall be thought by Using the components made up of Aluminum & Aluminium Alloys, Copper & Copper Alloys, Zinc Based Alloys, Nickel Based Alloys as teaching aids, Example: Food Wrapping, Rivets, Connecting Rods, Aircraft engine Parts, utensils, Electrical Connectors, tubes used in refrigerators, Water Pump parts, Bearings, bushes, Gun Parts, bells, Solders, propellers., Gun Parts, bells, Solders, propellers. Heat Exchangers, Cutting Tool Inserts.</i>	• Display different components made of Aluminum & Aluminum Alloys, Copper & Copper Alloys, Zinc Based Alloys, Nickel Based Alloys. • Students shall identify minimum 10 components and prepare the chart showing the components pictures, properties and applications.
4	2	1,2,4	Properties of Engineering Materials • Mechanical Properties - Elasticity, Plasticity, Malleability, Ductility, Brittleness, Strength, Toughness, Hardness, Stiffness, Resilience, Creep, Endurance, Fatigue & Machinability. • Thermal Properties - Thermal conductivity, Specific Heat, Thermal Expansion. • Electrical Properties – Resistivity, Conductivity, Dielectric Strength, Temperature Coefficient. • Chemical Properties – Reaction with Oxygen and Water. • Magnetic Properties- Magnetic permeability, Magnetic Flux Density.	Students shall prepare the chart showing Mechanical, Thermal, Electrical, Chemical and Magnetic Properties of Engineering Materials.

5	2	1,2,4	Non- Metals Properties, composition and applications of • Polymers: Thermoplastics (PE, PLA, PVC, Nylon, ABS), thermosetting polymers (Bakelite, Epoxy) and Biodegradable Polymers. • Ceramics- Types - Oxides, Carbides, properties and applications. • Composites- Types, Properties and Applications. <i>This concepts shall be thought by Using the components made of Polymers, Ceramics, Composites as teaching aids, Example: Plastic bags, Water bottles, Water mugs & buckets, Plumbing pipes, Spectacle frame, Tires, Ropes, Electric switch board, Fan, Shoes, Rain coats, Biodegradable polymers, Spark plug, Wash Basin, Artificial teeth, Electric Resistors and Fuse Holder, video of Wind turbine blades, Aircraft wings, Bicycle Frame etc.</i>	• Display different components made of Polymers, Ceramics, Composites. • Students shall identify minimum 10 components and prepare the chart showing the components pictures, properties and applications.
6	1,4	4	Carpentry Practice • Explain and show the different Types of wood, their Properties and applications. • Demonstrate the Safety precautions to be followed in Carpentry shop. • Demonstrate the tools and equipment's used in Carpentry shop. • Prepare the model as per give drawing (Given models are only suggestive). • Check the dimensions using measuring instruments as per the given drawing.	
7	1,4	4	Fitting Practice • Demonstrate the Safety precautions to be followed in Fitting shop. • Demonstrate the tools and equipment's used in Fitting shop. • Demonstrate the different operations like chipping, filing, drilling, tapping, sawing, cutting etc. • Prepare Fitting job as per given drawing (Given models are only suggestive). • Check the dimension using measuring instruments as per the given drawing.	

8	3	1,2,3	Basics of Kinematics of Machines • Kinematic link or Element- Types of links Kinematic pair-Types. • Types of constrained Motions, Kinematic chain- Definition of Machine, Structure and Mechanism. • Inversions-Types of Kinematic Chains, Four Bar Chain, Beam Engine. <i>This concepts shall be thought by Using the models of different applications of kinematics such as Piston and cylinder, drawer slides, hinged joints, robotic arm joints, Ball-and-socket joints (hip, shoulder), Nut and bolt, lead screw in a machine tool etc as teaching aids</i>	Practice Students shall build simple models and demonstrate the mechanisms.
9	3	1,2,4	Inversions and Kinematic Chains • Single Slider Crank Chain, Crank and Slotted Lever. • Quick Return Motion Mechanism • Double Slider Crank Chain, Scotch yoke mechanism, • Pantograph <i>This concepts shall be thought by showing the different inversions of kinematic chain used in shaping, cutting machines, slotting machines, rotary internal combustion engines, Reciprocating engines and control valve actuators as teaching aids</i>	Practice Students shall build simple models and demonstrate the mechanisms.
10	3	1,2,4	Transmission System Classification of Transmission system – Belt drives, Rope Drives, Chain drives. • Types of Belt Drives. • Length of belt drive in open and cross belt drive. • Concept of Velocity Ratio, Slip and Creep. • Material used for Belts. • Applications of Rope drives. • Applications of chain drives. • Simple problems <i>This concept shall be thought by showing the different applications of belt drives in Flour Mills, Lathe Machines, Compressors, Vehicle Engines, Blowers, washing machines, Rope drives in cranes, elevators etc. as teaching aids.</i>	• Simple Problems on Velocity Ratio, and Power Transmitted by Belt (Flat & V-Belt) in Machine Shop. • Simple Problems on calculating number of Ropes required to transmit power.

11	3	1,2,4	Gears and Gear Trains • Gears Drives– Introduction, Classification, Gear Terminology. • Gear Trains – Introduction, Types, Simple & Compound Gear Trains. • Reverted and Epicyclic Gear trains • Simple Problems. <i>Use different applications of gear trains in Lathe Machines, Milling Machines, Gear boxes, etc. as teaching aids</i>	• Simple Problems on Gear Trains. • Determine the velocity ratios of belt drives/gear drives used in Lathe/Drilling/Shaper/Planer/Grinding machines in the workshop.
12	4	1,4	Metal Joining processes Classification of Joining Process - Temporary and Permanent joining processes. Fasteners - Rivets, Bolts and Nuts and types. Welding - Classification of welding process, Arc welding process - Arc welding electrodes, Arc welding equipment's. TIG (GTAW) and MIG (GMAW) welding, Defects in arc welding process.	Practice - • Demonstrate the Safety precautions to be followed in arc welding. • Demonstrate the tools and equipment's used for arc welding. • Demonstrate the arc welding process. • Practice the arc welding process as per given drawing. • Check for the defects in welding process. Prepare Joints- Fillet Corner joint, Fillet Butt joint, Fillet T-Joint and Fillet Lap Joint on MS plate 10 mm thick in flat position.
13	4	4	Gas welding Process • CO₂ and Oxy-Acetylene gas welding process • Different types of gas welding flames. • Welding Positions – 1G, 2G, 3G, 5G. Soldering and Brazing • Principles of Soldering and Brazing Processes, • Fillers, heating methods Applications	Practice • Demonstrate the Safety precautions to be followed in gas welding process. • Demonstrate the tools and equipment's used for gas welding. • Demonstrate the gas welding process with different flames. • Practice the gas welding process as per given drawing. • Check for the defects in welding process Prepare Joints- Straight line beads and multi-layer practice on M.S. Plate 10 mm thick in Horizontal position, Structural pipe welding butt joint on MS pipe Ø 50 and 3mm WT in 1G position.

4. References:

Sl. No.	Author	Title of Books	Publication/Year
1.	J. W. Martin	Materials for Engineering	Woodhead Publishing Limited, 3 rd Edition, 2006
2.	William D. Callister Jr.	Material Science and Engineering	Wiley Publications, 10 th Edition, 2020
3.	V K Manchanda, GBS Narang, J S Narang	Materials science and Metallurgy	Khanna Publishers, 1 st Edition, 2021
4.	R.K. Rajput	Materials science and Engineering	S.K. Kataria & Sons, 5th Edition 2016, Reprint 2024
5.	Rangwala	Engineering Materials	Charotar Publishing house, 43 rd Edition, 2019
6.	C P Sharma	Engineering Materials	PHI Learning, 2004
7.	S S Rattan	Theory of Machines	Mc Graw Hill Publications, 4 th Edition, 2019
8.	R S Khurmi	Theory of Machines	S Chand Publication, 2005
9.	J S Brar, R K Bansal	Theory of machines	Firewall Media, 2004
10.	K R Gopalakrishna	Elements of Mechanical Engineering	2019
11	S. K. Hajra Choudhury, A. K. Hajra Choudhury, Nirijhar Roy	Elements of Workshop Technology Vol-I Manufacturing Processes	Media Promoters & Publishers Private Limited - 2008
12	S. K. Hajra Choudhury, Nirijhar Roy	Elements of Workshop Technology Vol-II Machine Tools	Media Promoters & Publishers Private Limited - 2010
13	R. B. Gupta	Workshop Practice	Stay Prakashan - 2024
14	G. S. Sethi	Welder Trade Tutorial	Computech Publications Limited - 2022
15	G. S. Sethi Balbir Singh	Fitter	Computech Publications Limited - 2021

5. CIE Assessment Methodologies

Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max Marks	
1.	CIE-1 Theory Test	4	90	50	Average of all CIE=50 Marks
2.	CIE-2 Practice Test	7	180	50	
3.	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all practices and activities through Rubrics	1-13	-	50	
Total					50 Marks

6. SEE - Theory Assessment Methodologies

Sl. No	SEE - Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

7. CIE Theory Test model question paper

Program		Mechanical Engineering			Semester- 1	
Course Name		Concepts of Mechanical Engineering - I			Test	I
Course Code		25ME11I	Duration- 90 min		Marks-50	
Name of the Course Coordinator:						
Note: Answer any one full question from each section. Each question carries equal marks.						
Q. No	Questions			CL	CO	Marks
Section - 1						
1	a) A cylinder tank has a volume of 2 m ³ . How many liters of liquid can it hold? b) Identify the key properties required for materials used in Bearings . c) Suggest essential properties used for Shafts in machinery. d) Identify the properties required for the materials used in manufacturing of Springs . e) Recognize properties should materials for Bolts and fasteners possesses.			Apply	CO1, CO2	5X5 = 25
2	a) The density of a metal is 7800 kg/m3. Convert this density to gm/cm3 b) Suggest the key properties considered when selecting cast iron for sewage pipelines and fittings . Recommend a suitable type of cast iron. c) Identify the desired properties for laminated springs in automobile suspension systems and recommend the appropriate type of carbon steel d) Identify the significant properties required for Kitchen utensils made from Stainless Steel. Suggest suitable Stainless steel. e) Suggest the critical engineering properties needed for the manufacturing of machine beds and recommend a suitable metal.			Apply	CO1, CO2	5X5 = 25
Section - 2						
3	a) Propose the appropriate non -ferrous metals for tubes used in refrigerators and justify your choice based on the required properties. b) Aluminum alloys are preferable choice in Aerospace industries. Highlight its Advantages and Disadvantages. c) Propose the appropriate non -ferrous metals for food packing and justify your choice based on the required properties. d) Which non -ferrous metal is suitable for making bearings and bushes and why is it chosen based on its properties. e) Which non -ferrous metal is suitable for making cutting tool inserts and why is it chosen based on its properties.			Apply	CO2	5X5 = 25
4	a) Which polymer is suitable for water bottles and why are they preferred over metal bottles? b) A wash basin can be made of a metal as well as a ceramic . Appreciate the use of ceramics over metals. Suggest a suitable ceramic material. c) Appreciate the suitability of composite material for aircraft wing application and suggest suitable composite material.			Apply	CO2	5X5 = 25

d) Which nonmetal is used the production of Spark plugs . Highlight its properties.			
e) Which nonmetal is used the production of Gun parts . Discuss its properties.			

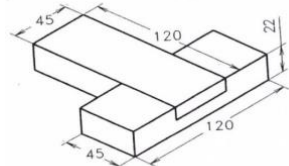
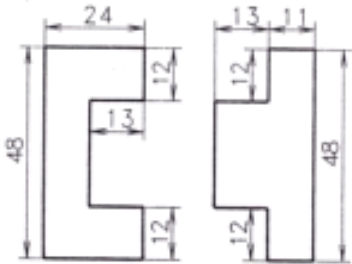
Note for the Course coordinator: Each question may have two, three, four and five subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

8. CIE Practice Test model question paper

Program	Mechanical Engineering		Semester	I	
Course Name	Concepts of Mechanical Engineering - I		Test	II	
Course Code	25ME11I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Note: Answer any one full question from the following					
Questions			CO	Marks	
1. a. Explain the Safety precautions used in Carpentry shop. b. Prepare the model as per the dimensions given below. 			1,4	10+40 = 50 Marks	
2. a. Explain the Safety precautions used in Fitting shop. b. Prepare the model as per the dimensions given below. 					
Scheme of Assessment -Q No.1 & 2 -					
a) Identify safety outfits, usage of appropriate safety method			- 10 Marks		
b)					
• Listing of tools & operations required for performing job • Marking of job • Operations performed • Finishing and Dimensional accuracy of the job			- 10 Marks - 05 Marks - 20 Marks - 05 Marks		
			50 Marks		

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

9. Suggestive Activities for Tutorials:

- The students shall do minimum of one suggested activities
- List is an Example and not inclusive of all possible activities of the course.
- Student and Faculty are encouraged to choose activities that are relevant to the topic.

Sl.No.	Suggestive Activities for Tutorials
01	Develop the working model of Single Slider crank mechanisms.
02	Develop the working model of Double slider crank lever mechanisms
03	Develop the working model of Quick return mechanisms

04	Develop the working model of Crank and slotted lever mechanisms
05	Develop the working model of Four bar chain mechanism

10. Rubrics for Assessment of Graded Exercises and Activities (Qualitative Assessment)

Sl. No.	Dimension	Unsatisfactory	Need Improvement	Satisfactory	Good	Excellent	Student Score
		(0-10)	(11-20)	(21-30)	(31-40)	(41-50)	
1	Preparation	Not prepared at all	Lacks several important materials or tools	Adequately prepared but missing key items	Mostly prepared with minor omissions	Fully prepared with all necessary materials and tools	40
2	Execution/Implementation	Task not executed	Major errors affecting results or functionality	Some inconsistencies or inaccuracies present	Minor errors in execution, but overall effective	Test or task performed flawlessly with precision and accuracy	40
3	Quality of Work	No quality demonstrated	Poor quality, major flaws impacting functionality	Acceptable quality with noticeable defects	Good quality with minor flaws	High-quality output, meets or exceeds standards	30
4	Use of Tools/Techniques	No proper tool use demonstrated	Weak use of tools, significant risks noted	Basic use of tools, some inefficiencies	Good use of tools, minor issues with technique	Mastery of tools and techniques demonstrated safely and effectively	40
5	Practical Record submission	Major sections are not addressed.	Major sections are missing or poorly addressed.	Some sections are included, but lack detail.	Most sections are complete with minor omissions.	All required sections are included and thoroughly detailed.	50
Average Marks=(40+40+30+40+50)/5=40							40

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

11. Equipment/software list with Specification for a batch of 30 students

Sl. No.	Particulars	Specification	Quantity
Fitting shop			
01	Flat file	14" rough bastard file	30
02	Try square	6"	30
03	Triangular file	10" rough	30
04	Hack saw frame	12"	30
05	Center punch	Standard size	30
06	Ball peen hammer	11/2 lbs	30
07	Flat chisel	6"	30
08	Smooth file	10" flat	30

09	Bench vice	8"	30
10	Leg vice	6"	10
11	Power hack saw	Standard size	01
12	Bench grinding	Standard size	01
13	Tap set and die set	Upto1"	01
14	Vernier caliper	0-300 mm	10
15	Spring divider	Standard size	20
16	Steel scale	0-300 mm	30
17	Vernier height gauge	0-300 mm	01
18	Surface plate	2 x 3 feet	01
19	Number punch	Standard size	01
20	Anvil	Standard size	10
21	V block	Standard size	02
Welding shop			
01	Arc welding transformer	Upto 300 Amps	03
02	Welding shield	Standard size	20
03	Ball peen Hammer	11/2 Lbs	10
04	Chipping Hammer	Standard size	10
05	Wire brush	Standard size	10
06	Anvil	Standard size	01
07	Hand Gloves	Standard size	05
08	Flat tongs	Standard size	10
09	Steel scales	0-300mm	10
10	Flat file	14" rough bastard file	10
11	Oxygen cylinder	Standard capacity	01
12	Acetylene cylinder	Standard capacity	01
13	C0 ₂ Gas Cylinder	Standard capacity	01
14	Gas welding torch	Standard size	05
15	Spark lighter	Standard size	05
16	Gas welding goggles	Standard size	10
17	Gas cutting torch	Standard size	02
18	Try square	6"	10
Carpentry shop			
01	Carpenter Benchvice	Standard size	20
02	G or C clamp	6"	20
03	Marking gauge	Standard size	20
04	Try square	19mmx4"	20
05	Wooden mallet	Standard size	20

06	Firmer chisel	2"	20
07	Firmer chisel	3/4"	20
08	Mortise chisel	1/2"	20
09	Metal jack plane	9"	20
10	Beveled square	6"	20
11	Hand saw or cross cut saw	Standard size	20
12	Steel scale	12"	20



Government of Karnataka
Department of Technical Education

Course Code	Programme Specific	Semester	I
Course Title	ENVIRONMENTAL SUSTAINABILITY	Course Group	Audit
No. of Credits	2	Type of Course	Lecture
Course Category	AU	Total Contact Hours	2Hrs Per Week
			26Hrs Per Semester
Prerequisites	Basic Environmental Science	Teaching Scheme	(L: T:P) = 2:0:0
CIE Marks	50	SEE Marks	-

COURSE OBJECTIVES:

Technicians working in industries or elsewhere essentially require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.

1. Solve various engineering problems applying ecosystem to produce eco – friendly products.
2. Use relevant air and noise control methods to solve domestic and industrial problems.
3. Use relevant water and soil control methods to solve domestic and industrial problems.
4. To recognize relevant energy sources required for domestic and industrial applications.
5. Solve local solid and e-waste problems.

COURSE OUTCOMES:

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

C01	Importance of ecosystem and terminology.
C02	The extent of air pollution, effects, control measures and acts.
C03	The extent of noise pollution, effects, control measures and acts.
C04	The water and soil pollution, effects, control measures and acts
C05	Different renewable energy resources and efficient process of harvesting.
C06	Solid Waste Management and Environmental acts.

COURSE CONTENT:

Unit-1 Ecosystem	<i>Allotted Hrs: 03</i>
Structure of ecosystem, Biotic & Abiotic components, Aquatic (Lentic and Lotic) and terrestrial ecosystem. Global warming - Causes, effects, Green House Effect, Ozone depletion.	
Unit-2 Air Pollution	<i>Allotted Hrs: 03</i>
Air pollution, Natural and manmade sources of air pollution, Effects of air pollution. Air Pollutants and Types. Control of air pollutants by Cyclone separator and Electrostatic Precipitator, Air (prevention and control of pollution) act 1981	
Unit-3 Noise Pollution:	<i>Allotted Hrs: 02</i>
Noise pollution: sources of pollution, measurement of pollution level, Effects and Control of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000	
Unit- 4 Water and Soil Pollution:	<i>Allotted Hrs: 06</i>
Water pollution and Sources of water pollution, Types of water pollutants, Characteristics of water pollutants, control measures of water pollution. Definition and list unit operations in water and Wastewater Treatment process, Water (prevention and control of pollution) act 1974, Water conservation – Importance of Rainwater Harvesting. Soil pollution, Causes, Effects and Preventive measures of Soil Pollution due to Excessive use of Fertilizers, Pesticides and Insecticides	
Unit-5 Renewable sources of Energy	<i>Allotted Hrs: 07</i>
<i>Solar Energy:</i> Basics of Solar energy. Definition and advantages of advanced solar collectors. Solar water heater and Solar stills and their uses. <i>Biomass:</i> Overview of biomass as energy source. Thermal characteristics of biomass as fuel. <i>Wind energy:</i> Current status and future prospects of wind energy. Wind energy in India. Need of new Energy sources, Different type's new energy sources. Environmental benefits of New Energy Sources-Hydrogen energy, Ocean energy resources, Tidal energy conversion.	

Unit-6 Solid Waste Management and Environmental Acts	<i>Allotted Hrs: 05</i>
Solid waste generation, Sources and characteristics of Municipal solid waste, Solid Waste Management rules 2016- 3R in SWM. E- Waste generation, Sources and characteristics, E waste management rules 2016 Plastic Waste generation, Sources and characteristics, Recycled plastic rules 2016 Importance of Environment (protection) act 1986 Occupational health and safety measures.	

Unit No & Name	Detailed Course Content	Contact Hrs
1. Ecosystem	Structure of ecosystem, Biotic & Abiotic components, Aquatic (Lentic and Lotic) and terrestrial ecosystem.	1
	Global warming - Causes, effects.	2
	Green House Effect, Ozone depletion - Causes, effects	3
2. Air and Pollution	Air pollution, Natural sources of air pollution, Man Made sources of air pollution	4
	Air pollutants and Types, Effects of Particulate Pollutants and control by Cyclone separator	5
	Effects of Particulate Pollutants and control by Electrostatic Precipitator, Air (prevention and control of pollution) act 1981.	6
3. Noise Pollution	Noise pollution: sources of pollution, Measurement of Noise pollution level.	7
	Effects and Control of Noise pollution.	8
	Noise pollution (Regulation and Control) Rules, 2000	
4. Water and Soil Pollution:	Sources of water pollution. Types of water pollutants, Characteristics of water pollutants.	9
	Control measures of water pollution.	10
	Definition and list unit operations in water and Wastewater Treatment process, Water (prevention and control of pollution) act 1974.	11
	Water conservation – Importance of Rainwater Harvesting	12
	Soil pollution, Causes and Effects due to Fertilizers, Pesticides and Insecticides	13
	Preventive measures of Soil Pollution due to Excessive use of Fertilizers, Pesticides and Insecticides.	14
5. Renewable sources of Energy	Solar Energy: Basics of Solar energy.	15
	Solar collectors and advantages of Advanced solar collectors.	
	Solar water heater, Solar stills and their uses.	16
	Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel.	17
	Wind energy: Current status and future prospects of wind	18

	energy. Wind energy in India.	
	Need of new Energy sources, Different type's new energy sources. Environmental benefits of New Energy Sources-Hydrogen energy	19
	Environmental benefits of New Energy Sources- Ocean energy resources	20
	Environmental benefits of New Energy Sources-Tidal energy conversion.	21
	Solid waste generation, Sources, Characteristics of solid waste Solid Waste Management rules 2016	22
6. Solid Waste Management and Environmental Acts	E- Waste generation Sources and characteristics, E waste management rules 2016	23
	Plastic Waste generation Sources and characteristics, Plastic Waste Sources and characteristics	24
	Recycled plastic rules 2016, Importance of Environment (protection) act 1986,	25
	Occupational health and safety measures.	26

References:

(a) Suggested Learning Resources:

Books:

1. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, New Delhi
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
3. Arceivala, Soli Asolekar, Shyam, Wastewater Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099.
4. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
5. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi
6. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
1. Rao, M. N. Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New Delhi, 1988, ISBN: 0-07- 451871-8.
2. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.
7. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.
3. Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6
4. Metcalf & Eddy, Wastewater Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.
5. Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)

(b) Open source software and website address:

- 1) www.eco-prayer.org
- 2) www.teriin.org
- 3) www.cpcp.nic.in
- 4) www.cpcp.gov.in
- 5) www.indiaenvironmentportal.org.in
- 6) www.whatis.techtarget.com
- 7) www.sustainabledevelopment.un.org
- 8) www.conserve-energy-future.com

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/subtopics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences
- Encouraging students to visit sites such as Railway station and research establishment around the institution.

Course Assessment and Evaluation Chart

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test (Theory)	7	90	50	Average of three tests 50
2.	CIE-2 Written Test (Theory)	10	90	50	
3	CIE-3 Written Test (Theory)	13	90	50	
Total CIE Marks					50
Total Marks					50

CIE Theory Test model question paper

Programme Name				Semester -1	
Course Name	Environmental Sustainability			Test	I/II/III
Course Code	Programme Specific	Duration	90 min	Marks	50
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					
Q.No	Questions				Marks
Section - 1					
1					25
2					
Section - 2					
3					25
4					
Note for the Course coordinator: Each question may have one, two, three, four or five sub divisions. Optional questions in each section carry the same weightage of marks.					