



**Government of Karnataka
Department of Technical Education**

C-25 Diploma Electrical & Electronics Engineering Curriculum

Scheme of Studies
(Effect from the AY 2025-26)



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Curriculum Structure

I Semester Scheme of Studies

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	ME	25ME02I	Computer Aided Engineering. Graphics	3	0	4	7	5	50	20	-	-	50	20	100
3	EE	25EE01I	Fundamentals of Electrical & Electronics Engineering.	3	0	4	7	5	50	20	-	-	50	20	100
4	EE	25EE11I	Electrical Wiring Systems and Practice	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	EE	25EE12T	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				16	0	16	32	24	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 the 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 TECHNICAL EDUCATION

Program	Non Mechanical & Allied Programs	Semester	I/II
Course Name	Computer Aided Engineering Graphics (CAEG)	Type of Course	Integrated
Course Code	25ME02I	Contact Hours	7 Hrs/Week=91Hrs
Teaching Scheme	L: T:P 3:0:4	Credits	5
CIE Marks	50	SEE Marks	50

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	Create sketches with proper dimensions using drawing instruments.
CO-02	Develop and Interpret Principal Views of Points, Lines, Planes and Solids.
CO-03	Draw Orthographic views for the given pictorial Drawing.
CO-04	Create Solid model for the given pictorial Drawing in CAD.

3. Course Content

Note: Practice shall be done in A4 drawing book.

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 Dimensioning of common features: Line, Radius, Diameter, Arc, Chord, Angles, Sphere, Chamfer, Hole, through hole, Counter bore & Counter Sink.

			• System of dimensioning: Aligned system & Uni-direction system. • Methods of Dimensioning Chain, Parallel, Combined & Progressive Dimensioning	• Practice Problem on- Aligned and Uni-direction system of dimensioning. * • Practice Problems on - Chain Dimensioning, Parallel Dimensioning, Combined Dimensioning, Progressive Dimensioning
2	2	1,4,7	• Projection of Points: Problems on projection of points (All four quadrants). • 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.	• Practice Problems on projection of points (All four quadrants).* • Practice Problems on Projections of Lines
3	2	1,4,7	Projection of Planes: • Problems on projection of Planes (Triangular, Square, Pentagonal & Hexagonal laminas) 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.*
4	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.*
5	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.*

6	3,4	1,4,7	Orthographic Projections & Solid Modelling: Draw Orthographic Views for 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
7	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
8	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
9	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
10	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings	Create Solid model for Pictorial drawings in CAD & Extract Views.*
11	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
12	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*
13	3,4	1,4,7	Draw Orthographic Views for Pictorial drawings.	Create Solid model for Pictorial drawings in CAD & Extract Views.*

Note: * Refer Annexure for suggestive practice questions and 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 Publications Thornes

5. CIE Assessment Methodologies

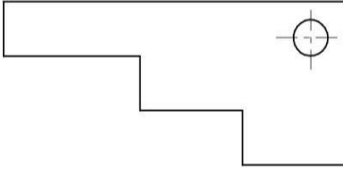
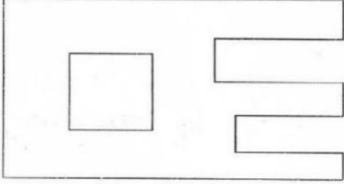
Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max Marks	Average of all CIE=50 Marks
1.	CIE-1 Practice Test	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Practice Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of A4 - Drawing book and activities through Rubrics	1-13	-	50	
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 Theory Test model question paper

Program	CS/EC/EE/IT/MT			Semester I/II	
Course Name	Computer Aided Engineering Graphics (CAEG)			Test	I
Course Code	25ME02I	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) Dimension the given sketch using aligned system with chain method. 			
2	b) Draw three principal views of a point P , 30mm Above HP, 50mm in front of VP & 40mm from Left Profile Plane.			
2	a) Dimension the given sketch using unidirectional system with parallel method. 	Apply	C01	10+15=25
	b) Draw three principal views of a point P , 30mm Below HP, 50mm behind VP & 40mm from Left Profile Plane.			
Section-2				
3	a) 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. b) 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.			
4	a) 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. b) 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.	Apply	C02	10+15= 25
<i>Note for the Course coordinator: Each question may have one, two or three sub divisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.</i>				

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

8. CIE Practice Test model question paper

Program	CS/EC/EE/IT/MT			Semester	I/II
Course Name	Computer Aided Engineering Drawing.			Test	II/IV
Course Code	25ME02I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
a) 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				C02	20

projections of the prism. (ANSWER SHEET)		CO3, CO4	30
b) Draw Orthographic views for a pictorial Drawing (ANSWER SHEET) & create solid model of the same pictorial drawing Extracting Views (CAD)			
Scheme of assessment for Q1 1. Drawing projections of a Solid - 15 Marks 2. Adopting Dimensioning & Drawing convention (types of lines) -5Marks	Scheme of assessment for Q2 1. Drawing orthographic Views in answer sheet-15 Marks 2. Creating solid model in CAD -10Marks 3. Extracting Views- 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 A4 -Drawing sheet and Activities (Qualitative Assessment)

Sl. No.	Dimension	Unsatisfactory	Need Improvement	Satisfactory	Good	Excellent	Students 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	45

				n.		standards.	
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

20ME02I Model Practice Question Paper				
Program	CS/EC/EE/IT/MT		Semester	I
Course Name	Computer Aided Engineering Graphics (CAEG)	Course Code: 20ME02I	Duration	180 min
			Max Marks	50
Questions			CO	Marks
1. Draw Orthographic views for a pictorial Drawing (ANSWER SHEET) & create solid model of the same pictorial drawing (CAD)			3,4	50
Scheme of assessment for Q1				
- Drawing orthographic Views in answer sheet -15 Marks - Creating solid model in CAD – 25 Marks - Extract Views – 5 Marks - Printout - 5 Marks				
Total Marks				50

1) Signature of the Examiner

2) Signature of the Examiner

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

Sl. No.	Particulars	Specification	Quantity
01	Drawing tables	As per standard size	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.

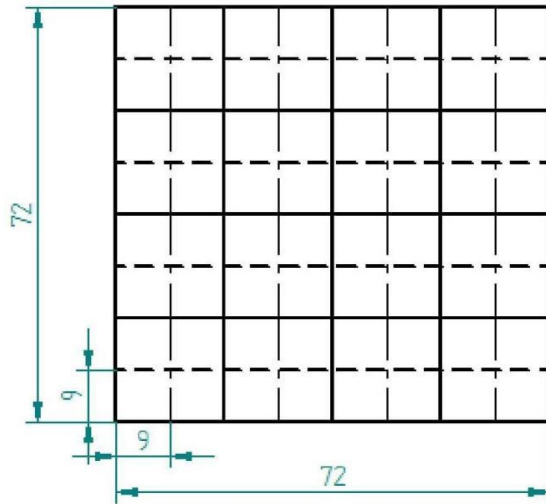


Fig.1

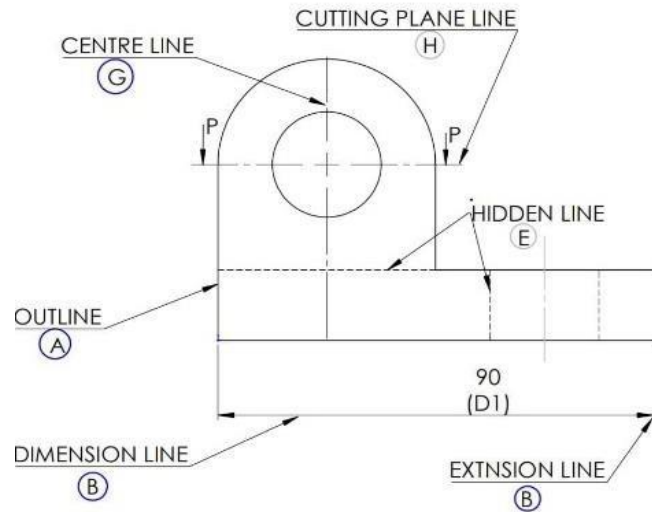


Fig.2

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.

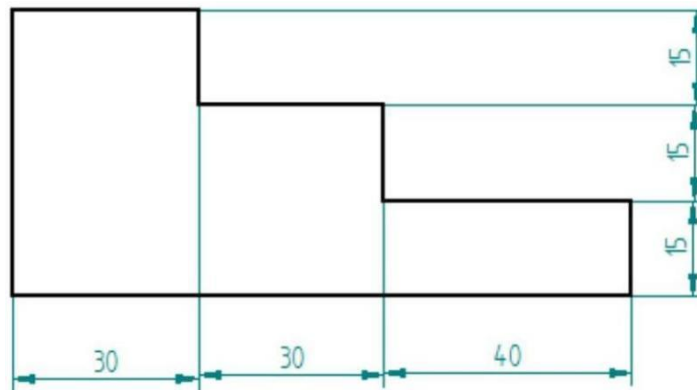


Fig.3

- 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.

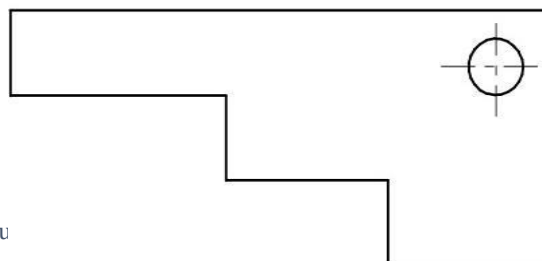


Fig.4

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

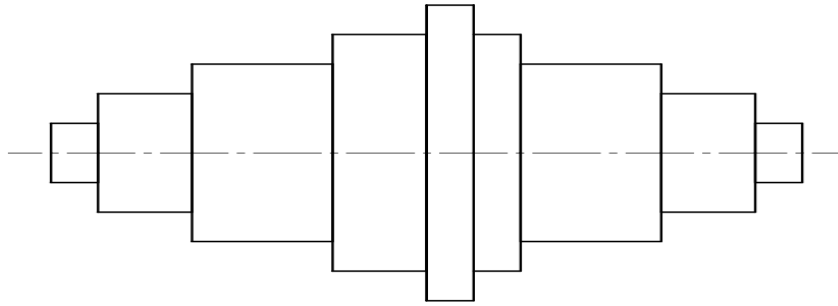


Fig.5

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

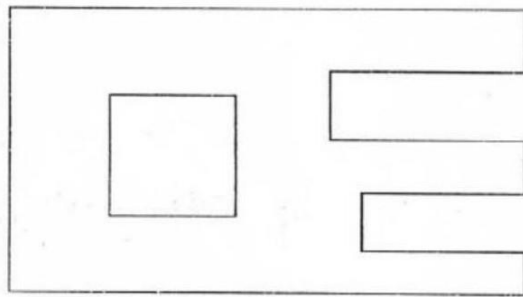


Fig.6

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

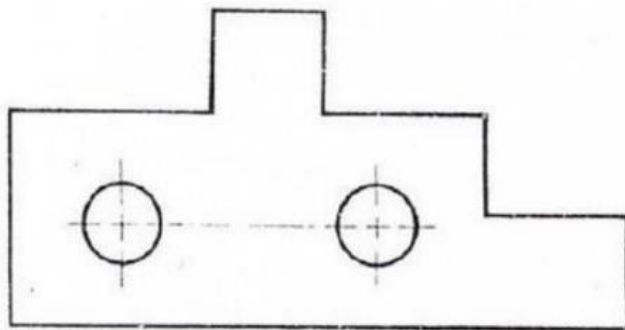
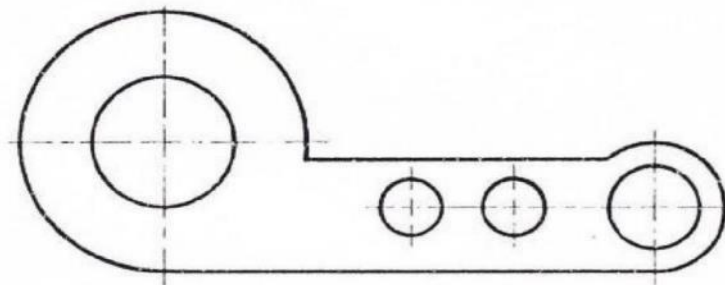


Fig.7

- 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.

2. 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.

3. 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.

4. 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

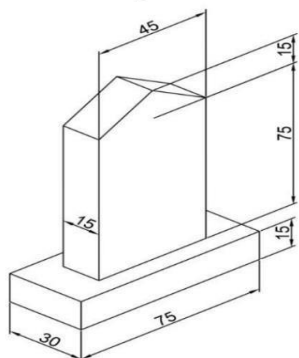
the prism is inclined at 30° to HP. Draw the projections of the prism.

- 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.

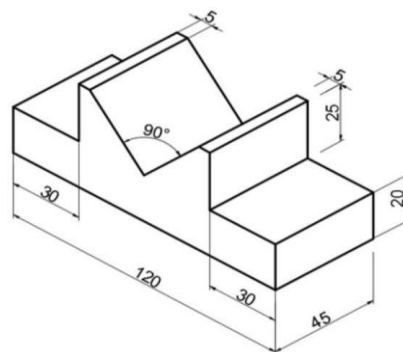
5. Pictorial Drawings.

Drawing Sheet No.8,9& 10 - (Student has to submit Minimum two standard size drawing sheets(A2) in this unit for portfolio evaluation).

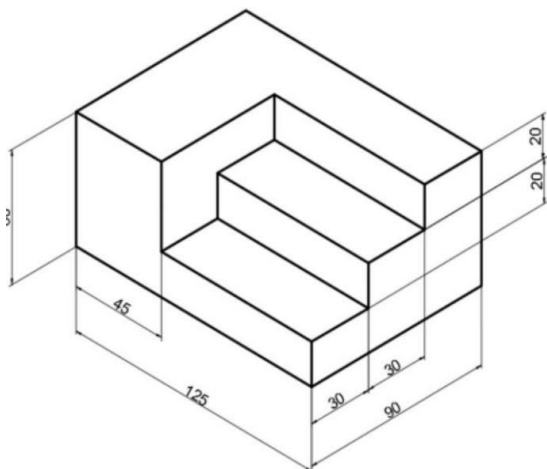
Q1. Draw the three principal views of the given component. & Create Solid Model.



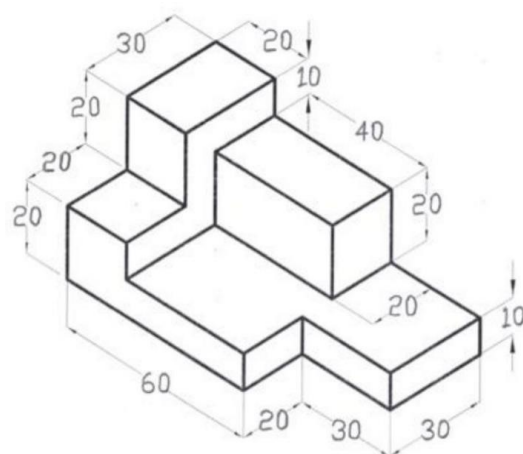
Q2. Draw the three principal views of the given component. & Create Solid Model.



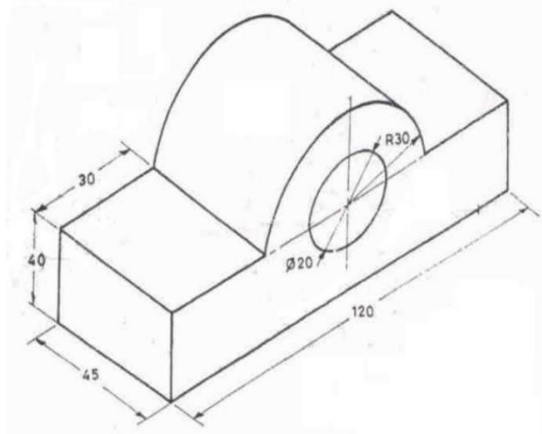
3. Draw the three principal views of the given component. & Create Solid Model.



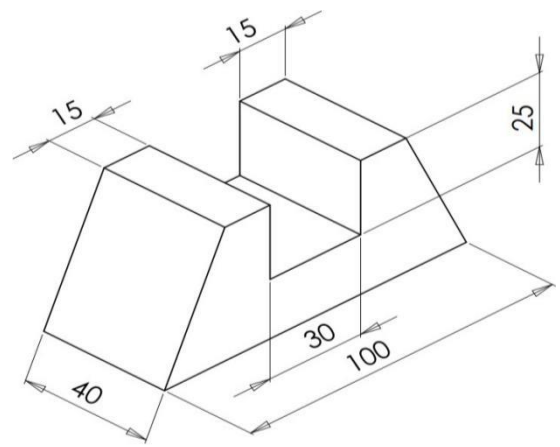
4. Draw the three principal views of the given component. & Create Solid Model.



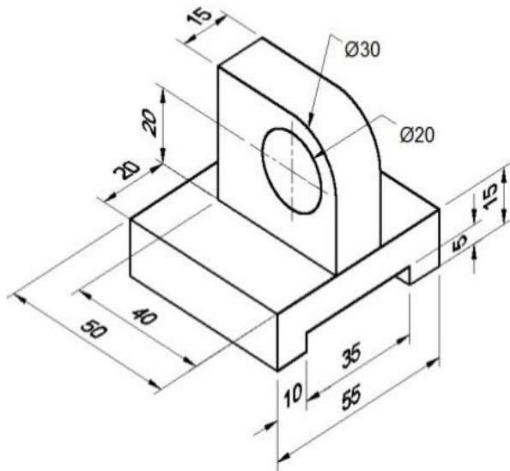
Q5. Draw the three principal views of the given component. & Create Solid Model.



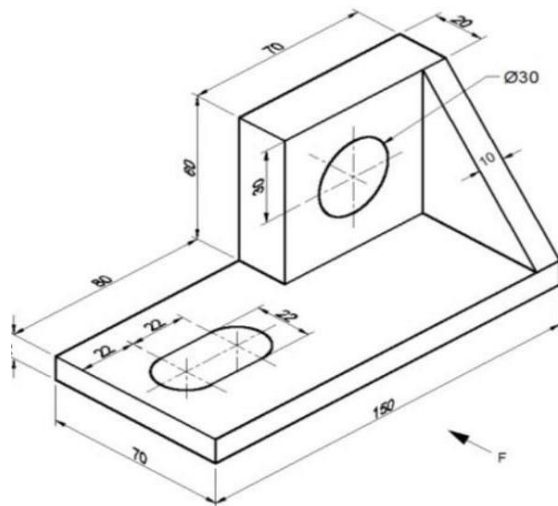
Q6 Draw the three principal views of the given component. & Create Solid Model.



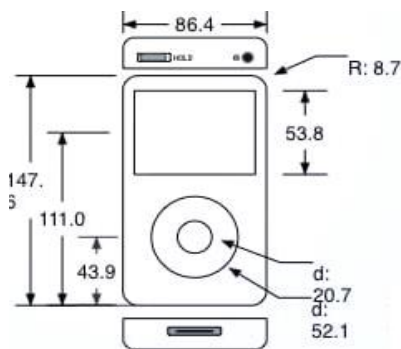
7. Draw the three principal views of the given component. & Create Solid Model.



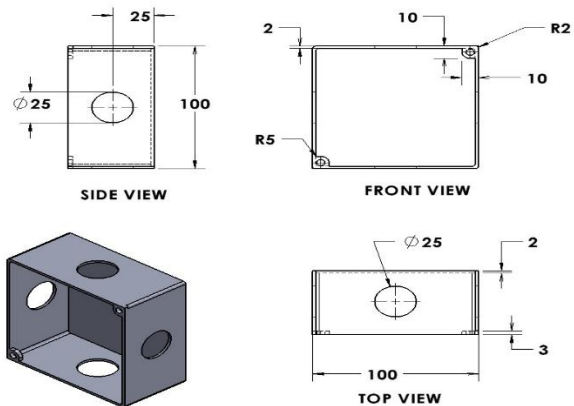
8 Draw the three principal views of the given component. & Create Solid Model.



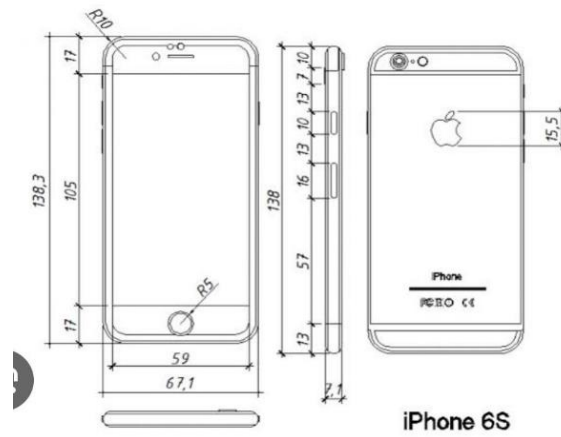
9 Create 3D model using CAD for the component whose orthographic views are given below



10 Create 3D model using CAD for the component whose orthographic views are given below



11 Create 3D model using CAD for the component whose orthographic views are given below





Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Electrical & Electronics Engineering	Semester	I / II
Course Name	Fundamentals of Electrical and Electronics Engineering	Type of Course	Integrated
Course Code	25EE01I	Contact Hours	7 hours/week 91 hours/semester
Teaching Scheme	3:0:4	Credits	5
CIE Marks	50	SEE Marks	50 (Practice)

1. Rationale:

Fundamentals of Electrical and Electronics Engineering is essential for all streams of diploma engineering.

At the end of this Course the student is able to gain knowledge about electrical safety, DC and AC circuits,

Electrical wiring circuits, protective devices, electrical machines, and working of electronics devices

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

CO-01	Comply with the Electrical safety procedures
CO-02	Analyze simple electrical circuits and Wire up simple domestic electrical wiring systems with proper protective device
CO-03	Identify different types of electrical machines and interpret Name plate details of given electrical machines
CO-04	Test and report condition of given Battery and connect UPS to AC Mains.
CO-05	Identify and select the Electronic components for given application

3. Course Content

WEEK	CO	PO	Theory	Practice
1	1	1,4	Electrical safety Procedures: - Meaning of Electrical Safety - Safety precautions in electrical working place - Electrocution (Electric shock) and How to free a person from electrocution.	- Demonstrate use of Personal Protective Equipment (PPE) and types - Electrocution (Electric shock) Use Videos to demonstrate how to free a person from electrocution
	1	1,4	First aid in Electrical injury and methods Electrical fire, causes and preventions Fire extinguishers and types	Demonstration of Pipe and plate Earthing methods Know your Electrical lab. Identify power supply, various components with symbols, Check earthing by measuring the voltage between neutral and earth points.
	1	1,4	- Types of Electrician Tools and their functions - Earthing Definition, necessity and types Advantages of Earthing	
2	2	1,4	Sources of Electricity - Sources of Electricity- Conventional and Non-conventional sources - Advantages of electrical energy - Effects of electric current and its applications	Video demonstration on identification and observation of different ranges and types of meters Verification of Ohm's Law using simple circuit
	2	1,4	Definition, units and meters; Electric Current, Voltage, Resistance, Potential Difference, EMF Ohm's Law; Statement, explanation, Applications and limitations.	Demonstrate experimentally Open circuit, closed circuit and short circuit conditions in Simple series circuit.
	2	1,4	Circuit conditions- open, close, and short circuit	
3	2	1,4	Features of Series and Parallel circuits	Determine the equivalent Resistance in series resistive circuit
	2	1,4	Simple problems on Series circuit	
	2	1,4	Simple problems Parallel circuit.	Determine the equivalent Resistance in parallel resistive circuit

4	2	1,4	Definitions, units and meters; - Electrical work, power and energy, - Simple problems on Electrical energy consumption (Unit/ KWh)	1. Measure the AC voltage, current, power , using relevant measuring instruments in a Single phase AC circuit 2. Measurement of energy in a Single phase AC circuit
	2	1,4	AC Fundamentals - Sinusoidal voltage,current, - definitions of amplitude, cycle, time-period, frequency	Demonstrate the measurement of Amplitude, peak-peak value, time period and frequency of AC quantity using CRO and function generator.
	2	1,4	- Single phase and Three phase electrical power supplies - Applications of single-phase and three-phase power - Merits of three phase system over single phase system.	
5	2	1,4	Protective Devices - Meaning - Necessity of protective devices - Functions and Applications of ✓ Rewireable Fuse ✓ Glass cartridge fuse ✓ HRC fuse	Wire up and test PVC Conduit wiring to control two lamps and one socket independently by providing suitable protective devices.
	2	1,4	✓ Kit-kat fuse ✓ MCB ✓ ELCB	Wire up and test to control one lamp from two places using suitable protective devices (Two- way control/ Staircase wiring)
	2 2	1,4	Types of wiring systems and accessories	
6	3	1,4	Electromagnetic Induction: - Definition, Faraday's laws, Statically and dynamically induced EMF generation. - Self and mutual induced EMF.	Control a lamp using Electromagnetic Relay

	3 3	1,4	Transformers: Function, working, video demonstration on construction of transformer	Determine experimentally the transformation ratio of a given Transformer
	3	1,4	Classification and applications, Transformation ratio.	
7	3	1,4	Generators: DC and AC Generators- definition, types and applications	Study the Name plate details of a given Electrical machine
	3	1,4	DC Motors: - Definition, types and applications. - BLDC motor applications	Video demonstration of construction of three phase Induction Motor.
	3	1,4	AC Motors: - Definition ,Types & Applications - Necessity of starters for AC motors. - Types and applications.	Wire up a starter to start and reverse the 1 Phase/3 phase AC motor.
8	4	1,4	Cells and Batteries: Definition, symbol, types, comparison and applications	Construct a simple battery using primary cells for the required voltage and to light an LED through a resistor in series.
	4	1,4	Lead Acid battery and its maintenance	Video demonstration on construction of Lithium-Ion battery
	4	1,4	Lithium-Ion battery and its applications	
9	4	1,4	Ampere-Hour Capacity, Selection criteria of batteries	Test and report the condition of given Lead Acid battery /Lithium-Ion battery
	4	1,4	UPS Meaning, types and applications	
	4	1,4	Block diagram of online UPS system.	Connect UPS in an electrical lighting system and observe continuity of supply. Measure the AC voltage.
10	4	1,4	Introduction of Alternate Energy Sources and Applications	Video Demonstration on working of a Simple Electric Vehicle
	4	1,4	Evolution of Electric Vehicles, Batteries used for EVs	
	4	1,4	- Electric Motors used in EVs - Battery and UPS ratings for Solar powered Street lighting	Video demonstration on solar powered street lighting

11	5	1,4	Electronic Components Resistors, Capacitors and Inductors - Definition, Unit, Types, and Applications.	Identify and determine the value of resistance, inductance and capacitance using LCR meter Compute the value of a given carbon resistor using colour coding.
	5	1,4	- Definitions of conductors, insulators and semiconductors with examples - comparison and applications	Identify the terminals of Diode.
	5	1,4	Semiconductor Diode; - Definitions of P and N type semiconductors, - Diode and its Symbol - Working of Diode in forward and reverse bias - Types of diodes and ratings - Applications	Connect the diode in forward and reverse bias modes and observe the status of the LED connected in the circuit.
12	5	1,4	Rectifier Definition, types, working of Bridge rectifier	Trace the input and output waveforms of an IC Bridge rectifier.
	5	1,4	Transistor - Definition and Types - Symbol - Applications	
	5	1,4	Digital fundamentals - Integrated Circuits (IC) - Definition, advantages and applications - Logic Gates- Symbol, Boolean expression and truth table of AND, OR, NOT, NAND, NOR, EX- OR gates	Verify the truth tables of AND, OR, NOT, NAND, NOR, EX-OR gates
13	5	1,4	Sensors and Actuators; Definition, Types and Applications of sensors	1. Construct Photo-diode circuit and Test for its working
	5	1,4	LDR, Photodiode, and Photo transistor (opto-isolator), Solar cell- Symbol and Applications	2. Detect an object using IR proximity sensor
	5	1,4	- Definition of Actuator, Types and applications. - PLC- Block diagram and PLC applications.	Video demonstration on working of any simple Mechanical/ Electrical Actuator. List commercially available PLCs.

4.References:

1. ABC of Electrical Engineering by B. L. Theraja and A. K. Theraja, S Chand Pu
2. Basic Electrical and Electronics Engineering by S. K. Bhattacharya, Pearson Education India, 2012 Edition
3. Electronic Devices and Circuits by I. J. Nagrath, PHI Learning Pvt. Ltd., 2007 Edition.
4. Basic Electrical Engineering by V. Mittle and Arvind Mittle, McGrawHill Companies, 2005 Edition
5. The 8051 Microcontroller & Embedded systems usinkbnnnjbbh bb vvvvg assembly and C (2nd Edition) – M.A. Mazidi, J.C. Mazidi & R.D. McKinlay ISBN: 81-317-1026-2

6. Programmable Logic controllers, W BOLTON
7. <https://www.youtube.com/watch?v=mc979OhitAg&list=PLWv9VM947MKi7yJ0FCfzTBXpQUQd3K>
8. <https://www.youtube.com/watch?v=CWulQ1ZSE3c>
9. en.wikipedia.org/wiki/Transformer
10. <http://www.animations.physics.unsw.edu.au/jw/AC.html>
11. <http://www.alpharubicon.com/altenergy/understandingAC.htm>
12. <http://www.electronics-tutorials/>
13. <http://www.pitt.edu/~qi4/Academic/ME2082/Transistor%20Basics.pdf>
14. <http://www.technologystudent.com/elec1/transis1.htm>
15. <http://www.learningaboutelectronics.com/>
16. <http://www.electrical4u.com/>
17. <https://www.youtube.com/watch?v=zLW>
18. <https://www.youtube.com/watch?v=8PTNjw-hQIM>

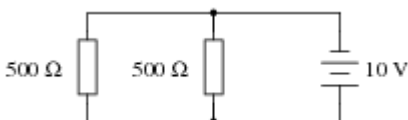
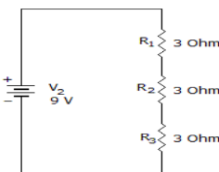
5. CIE Assessment Methodologies

Sl. No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3TheoryTest	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					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 Theory Test model question paper

Program		Electrical & Electronics Engineering			Semester -I/II	
Course Name		Fundamentals of Electrical and Electronics Engineering			Test	I/II I
Course Code		25EE01I	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			Cognitive Level	Course Outcome	Marks
Section - 1						
1	a) List any 5 electrician tools. Mention their function.			1	1	5
	b)State and explain Ohm’s Law. List the limitations of Ohm’s Law.			2	2	8
	c)Compare single-phase and three-phase power.			3	2	6
	d)Calculate the total current drawn by the below circuit.			4	2	6
						
2	a)Define earthing. List the different types of earthing.			1	1	5
	b)With simple diagrams explain open circuit, short circuit and closed circuit			2	2	8
	c)What are the Advantages of three phase power over single phase power.			3	2	6
	d) Find the equivalent resistance and the current flowing through 3-ohm resistance in the circuit below.			4	2	6
						
Section - 2						
3	a)List any 5 sources of electrical energy			1	1	5
	b) Draw a sinusoidal waveform and name amplitude, instantaneous value, time period, frequency and cycle.			2	2	8
	c)How to free a person from electrocution?			3	2	6
	d)An electric fan draws a current of 0.9 Amps when connected to a single-phase, 230 volts, 50 HZ AC supply through an electric regulator. Determine the resistance of the regulator.			4	2	6

4	a)List the safety precautions to be taken in an electrical working place	1	1	5
		2	2	8
	b)Define Current, Voltage and Resistance. Mention their symbol and Units.	3	2	6
	c)List the different types of fire extinguishers. Which type of fire extinguisher do you use to extinguish fire caused by wood and cooking oil?	4	2	6
	d)A 9 Volt cell when used in an electrical circuit turns on a LED. State the effect of electric current. Justify			
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.				

Signature of the Course Coordinator

Signature of the HOD

**Signature of the
IQAC Chairman**

8. CIE Practice Test model question paper

Program	Electrical & Electronics Engineering			Semester	I/II
Course Name	Fundamentals of Electrical and Electronics Engineering			Test	II/IV
Course Code	25EE01I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
NOTE : Any ONE of the following questions may be allotted to each student					50
1. Verify Ohm's Law using a simple circuit.				1	
2. Demonstrate experimentally Open circuit, closed circuit and short circuit conditions in Simple series circuit.				2	
3. Determine the equivalent Resistance in series circuit				2	
4. Determine the equivalent Resistance in parallel circuit				2	
5. Measure the AC voltage, current, power using relevant measuring instruments in a Single phase AC circuit				2	
6. Measurement of energy in a Single phase AC circuit				2	
7. Measure Amplitude, peak-peak value, time period and frequency of AC quantity using CRO and function generator.				2	
8. Wire up and test PVC Conduit wiring to control two lamps and one socket independently by providing suitable protective devices.				2	
9. Wire up and test to control one lamp from two places using suitable				2	
10. protective devices (Two- way control/ Staircase wiring)				2	
11. Wire up Panel board wiring with protective devices (fuse, MCB, load, Neutral link)				2	
12. Control a lamp using Electromagnetic Relay				2	
13. Demonstrate the concept of Electromagnetic induction using coil, magnet and galvanometer				3	
14. Determine experimentally the transformation ratio of a given Transformer				3	
15. Wire up a starter to start and reverse the 1 Phase/3 phase AC motor.				3	
Scheme of assessment					
a) Identification of meters/ equipment/wires/tools etc					5
b) Writing Circuit/writing diagram and Procedure					12
c) Conduction					18
d) Results					5
e) Viva-voce					10
Total Marks					50

Signature of the Course Coordinator

Signature of the HOD

9. Suggestive Activities:

The List is an Example and not inclusive of all possible activities of the course. Student and Faculty are encouraged to choose **any two** activities that are relevant to the topic

Sl.No.	Suggestive Activities
01	Given the practical working circuits, measure Resistance, Current, Voltage, Power and Energy in DC and AC (Single phase) Circuits Using suitable meters/ instruments.
02	List out the different types of wiring systems used in your laboratories or house with their representation
03	Mini-Projects: Like preparing extension box, switch box and wiring models
04	List out the different protective devices used in your laboratories or house with their ratings.
05	Applications of Electromagnetic Induction, statically induced and dynamically induced emf, self and mutual induced emfs
06	Prepare a report on types of starters and enclosures used for various industrial applications of AC motors.
07	Types of Cells and Battery maintenance
08	Visit a nearby Battery charging shop or showroom and prepare a report of the visit.
09	Prepare a report on various types of diodes used for various industrial applications.
10	Prepare a report on various types of sensors and actuators used for various industrial applications.
11	Mini-Projects: Connect and test a sensor (domain application) to a Digital circuit
12	Prepare a report stating HP rating, types and applications of FHP motors.

10. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Student Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
	Average Marks=(8+6+2+2)/4=4.5						5

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

11. SEE- Model Practice Question Paper

Program	Electrical & Electronics Engineering		Semester	I/II	
Course Name	Fundamentals of Electrical and Electronics Engineering	Course Code	25EE01I	Duration	180 min
Questions				CO	Marks
NOTE : Any ONE of the following questions may be allotted to each student					50
1. Verify Ohm’s Law using a simple circuit.				1	
2. Demonstrate experimentally Open circuit, closed circuit and short circuit conditions in Simple series circuit.				2	
3. Determine the equivalent Resistance in series circuit				2	
4. Determine the equivalent Resistance in parallel circuit				2	
5. Measure the AC voltage, current, power using relevant measuring instruments in a Single phase AC circuit				2	
6. Measurement of energy in a Single phase AC circuit				2	
7. Measure Amplitude, peak-peak value, time period and frequency of AC quantity using CRO and function generator.				2	
8. Wire up and test PVC Conduit wiring to control two lamps and one socket independently by providing suitable protective devices.				2	
9. Wire up and test to control one lamp from two places using suitable protective devices (Two- way control/ Staircase wiring)				2	
11. Wire up Panel board wiring with protective devices (fuse, MCB, load, Neutral link)				2	
12. Control a lamp using Electromagnetic Relay				2	
13. Demonstrate the concept of Electromagnetic induction using coil, magnet and galvanometer				2	
14. Determine experimentally the transformation ratio of a given Transformer				3	
15. Wire up a starter to start and reverse the 1 Phase/3 phase AC motor.				3	
16. Construct a simple battery using primary cells for the required voltage and to lit an LED through a resistor in series.				3	
17. Identify and determine the value of resistance, inductance and capacitance using digital multi meter/LCR meter				4	
18. Compute the value of a given carbon resistor using colour coding.				5	
19. Connect the diode in forward and reverse bias modes and observe the status of LED connected in the circuit.				5	
20. Trace the input and output waveforms of an IC Bridge rectifier.				5	
21. Verify the truth tables of AND, OR, NOT, NAND, NOR, EX-OR gates (ANY 3)				5	
22. Construct Photo-diode circuit and Test for its working					
23. Detect an object using IR proximity sensor					
Scheme of assessment					
a) Identification of meters/ equipment/wires/tools etc					5
b) Writing Circuit/writing diagram and Procedure					12
c) Conduction					18
d) Results					5
e) Viva-voce					10
Total Marks					50

1) Signature of the Examiner

2) Signature of the Examiner

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

	Particulars	Specification	Quantity
01	Dual Channel ,continuously variable DC Regulated Power Supply with Current and Overload Protection	30 V, 2 A	05
02	Fixed DC Regulated Power Supply	+/- 15 V, 2 A	05
03	Portable Moving Coil DC Voltmeters	a) 0 - 1 V b) 0 - 10 V c) 0 - 30 V	Each 05 No.
04	Portable Moving Iron AC Voltmeters	a) 0 - 300 V b) 0 - 600 V	Each 05 No.
05	Portable Moving Coil DC Ammeters	a) 0 - 100 mA b) 0 - 1 A c) 0 - 2 A	Each 05 No.
06	Portable Moving Iron AC Ammeters	a) 0 - 2 A b) 0 - 5 A c) 0 - 10 A	Each 05 No.
07	Watt-meters	a) 150/ 300V, 2 A, UPF b) 300/ 600 V, 5/ 10 A, LPF	Each 02 No.
08	Rheostats	25 Ohms, 50 Ohms, 150 Ohms, 220 Ohms (all rated at 3 A)	Each 05 No.
09	Rheostat Loads	1 KW, 230 V	02
10	Wire wound Resistors	-5 Ohms 2 Watts, 25 Ohms 5 Watts, 330 Ohms 2 Watts, 560 Ohms 2 Watts, etc.	Each 05 No.
11	Soldering Iron	60 W	05
12	Single Phase Energy meter	10 A, 230 V, 50 Hz, Digital type	05
13	Multimeter Digital	$\frac{3}{4}$ "	06
14	Dual Trace Oscilloscope	30 MHz	02
15	Three Phase Induction Motor	1 HP – 440 V 50 Hz, 2 HP – 440 V 50 Hz.	Each 02 No.
16	Three phase DOL, Star-Delta, Auto transformer starter		Each 02 No.
17	UPS	1 KVA	01
18	Battery and Hydrometers	Battery Lead-Acid type, 140 A-hr	02
19	I C Trainer kit		05
20	Digital IC's	7400, 7402, 7404, 7408, 7486 etc	Each 10 No
21	Wooden Wiring board	(2x3) ft	10

22	Wiring accessories a) PVC conduit - $\frac{3}{4}$ " - 10 lengths b) Cap and casing - $\frac{3}{4}$ " - 10 lengths c) Switches Single Pole- 5A, 230 V d) Switches two way – 5 A, 230 V e) 3 Pin Sockets 5A, 230 V f) Bulb Holders – 5 A, 230 V g) 3 Pin Plug 5A, 230 V h) 60 Watts Lamps i) 100 Watts Lamps j) 15 W CFL lamps k) Copper Wires of sizes 1.5 mm ² , 2.5 mm ² , 4 mm ² – 1 coil each l) Gang boxes (1+1, 2+1, 2+2) m) Kit –Kat fuses 5A, 15 A n) MCB 16 A & 32 A/ 230 V, Single and Double Pole o) ELCB 16 A & 32 A/ 230 V, Double Pole p) Neutral link- 16 A, 230 V q) Screws of assorted sizes r) Testers		Each 10 No
22	Electronic Components a) Diodes - BY 127 and IN 4001 b) Zener Diodes – 6.2 V, 5.6 V, 7.8 V c) Relays – solid state Sugar cube type, SPST, Coil 6V, Power circuit 230 V, 5 A. d) Spring Boards e) Bread Boards f) Tag Boards.		Each 10 No
23	Simple PANEL BOARD/ CUBICAL consisting of bus-bars, CB/MCB/ELCB, meters, HRC fuses, magnetic contactors, cables, earthing points.		01



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Electrical & Electronics Engineering	Semester	I
Course Name	Electrical Wiring Systems and Practice	Type of Course	Integrated
Course Code	25EE11I	Contact Hours	8 hours/week 104 hours/semester
Teaching Scheme	L: T:P 4:0:4	Credits	6
CIE Marks	50	SEE Marks	50 (Theory)

1. Rationale:

The inclusion of these topics in a Basic Electrical Technology course provides a comprehensive foundation for understanding and working with electrical systems. This curriculum is designed to equip students with essential theoretical knowledge and practical skills, ensuring they can safely and effectively design, install, maintain, and troubleshoot electrical systems. By covering both fundamental concepts and hands-on practices, students gain the expertise needed for a variety of electrical technology applications.

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

CO-01	Identify the basic electrical & electronic components and measuring instruments.
CO-02	Understand the fundamentals of earthing, circuit protection, and electrical wiring systems to ensure electrical safety.
CO-03	Install and wire basic electrical circuits in residential buildings ensuring safety.
CO-04	Perform electrical testing to ensure safe and reliable wiring in circuits.
CO-05	Install electrical service mains for residential buildings and learn about alternative energy sources

3. Course Content

WEEK	CO	PO	Theory	Practice
1	1	1,4	Basic Electrical Concepts - Resistors: Types, symbols, and applications - Laws of Resistance	Using wires of different materials, lengths, and cross-sectional areas, find the resistivity.
			Specific Resistance and its unit, Simple problems	
			Effect of temperature on resistance and temperature coefficient	Conduct an experiment to study the nonlinear relationship between voltage, current, and resistance in a filament bulb. (Use bulbs of different ratings)
			Resistance in Electrical Circuits - Derivation of effective resistance in series and parallel circuits - Features of series and parallel circuits	
2	1	1,4	Solve simple problems on effective resistance: Series connection.	Connect two carbon resistors in series, measure individually and effective values using multimeters and compare with theoretical values
			Solve simple problems on effective resistance Parallel connection	
			Solve simple problems on effective resistance Series-Parallel combination	Connect a test lamp in series with an appliance to identify connection of appliance whether good or bad
			Identify the type of connection in the following applications: - Serial set connection - House wiring with 2 lamps in separate rooms - Heating circuit with rotary switch	
3	1	1,4	Measuring Instruments: Basic Electrical Measuring Instruments Types in AC,DC and their symbols . - Ammeters - Voltmeters - Ohmmeters - Wattmeters - Energy Meters - TriVector Meter	Measure current using an ammeter in both AC and DC circuits using meters of different ranges. Measure voltage using a voltmeter in both AC and DC circuits using meters of different ranges.
			- Classification of Measuring Instruments Analog Instruments: list different Analog Instruments - Draw and explain construction of PMMC Ammeters	
			Digital Instruments: list different digital Instruments - Advantages of Digital Instruments	Connect and configure an oscilloscope to measure and display AC and DC waveforms. Connect oscilloscope and signal generator for observing display of different types of waveforms.(sine, square, pulse, ramp etc)
			Errors in measuring instruments	

4	2	1,4	Principles of Earthing • Basic concept of fault current • Demerits of isolated neutral • How earthing protects humans, animals, equipment, and installations	Measure earth resistance by earth tester.
			Earthing Components Types of earthing systems: • Pipe earthing (Draw and explain) • Plate earthing (Draw and explain)	Install an earthing system for your laboratory and test.
			Factors Affecting Earthing • Earthing in Different Applications	
5	2	1,4	Circuit Protection: Rewireable fuses • Working principle • Selection criteria for fuses based on current ratings • Applications and limitations of fuses	Perform an experiment for studying inverse current characteristics of a fuse.
			Miniature circuit breakers • Working principle • Trip mechanisms: Thermal mechanisms with simple circuit using bimetallic strip,	
			Overload Protection • Definition and causes of overload • Types of overload protection: ○ Thermal overload relays, ○ Electronic overload relays	Connect a suitable circuit to study the operation of MCB.
			Selection of Insulating Materials • Electrical Properties • Thermal Properties • Mechanical Properties	Collect different insulating materials and list their properties. Identify their usage.
6	2	1,4	Wiring Systems & Standards • Systems of Electrical Wiring and their application: ○ Surface wiring, concealed wiring, ○ Conduit wiring, tray wiring, etc. ○ Comparison of various wiring systems. • Types of wires and cables and application, • Components and accessories of electrical wiring systems.	Study of different current carrying capacities for different wire gauges from standard chart
				Basic Wiring Techniques • Wire Stripping and Preparation: ○ Tools and techniques for stripping insulation from cables. • Crimping and Soldering: ○ Making reliable wire connections using crimping tools or soldering. • 1 sq mm Cable Terminations and lugging: ○ Correct techniques for terminating wires with connectors or terminal blocks. • Using Hand Tools: ○ Proper use of wire cutters, pliers, screwdrivers, tape measures, etc.
			Standard wire gauge and its usage to measure gauge of a wire.	
				Carry out proper techniques for stripping insulation and terminate one sq mm cable.

7	3	1,4	Wiring Installations - Code of Practice for Lighting Installations - Point out the factors to be considered while selecting the type of wiring system	Design and install a functional lighting circuit for a single room to meet a practical load requirement (e.g., controlling two LED lights and one ceiling fan).
			- List the materials required for Interior wiring. Write their specifications. - Specify the method of deciding the number of sub-circuits	
			- Solve one simple example on Interior wiring with a single circuit- calculate the load-for a residential building. - Determine the size of conductors	Practice Cable laying, Cable joints (terminations), proper size lugs, crimping of joints towards a house wiring installation with Wire joints
8	3	1,4	Prepare the schedule of materials for providing lighting circuit wiring for the above	Wire up a simple circuit consisting of a Electrical Wiring types (godown)
			Wire up basic lighting circuits with switches and fixtures. (Draw wiring plan for the above residential building)	
			Different types of switches commercially available in the market with their rating and specification.	Wire up for a calling bell and troubleshoot if any.
9	3	1,2,4	One lamp, one fan and one three pin socket controlled from one switchboard - Circuit diagram - Wiring diagram - Lighting fixtures required - Tools used	One lamp controlled from three different places. (Intermediate switch) with protective devices.
			Ground Fault Circuit Interrupter (GFCI) - Working. - Components - Applications	
			Symbolic representation of the following - SPDT - DPST - DPDT - TPST - TPDT	Construct the main distribution board with SP, DP switches, protective devices and a lamp load.
			Operation and applications of the following switches - rotary switch - intermediate switch - toggle switch - Push button switch	Prepare a chart showing the images of different types of switches.
			Relays - Meaning, types, working of Electromagnetic Relay, reed relay	Connect a relay to turn on a lamp on its actuation.

10	4	1,2,4	Meaning of electrical contactors- working and applications	
			Timers- Meaning, types, working of ON timer with example	Connect a timer with a contactor to run a small water pump for a fixed time(ten minutes).
			Working of OFF timer and Delay timer with example	
11	4	1,2,4	Testing of electrical wiring	Testing domestic wiring installation: - Continuity test (OC & SC Test) - Polarity test - Earth and ground test - Insulation and leakage test
			Continuity Testing	
			Insulation Resistance Testing	
			- Grounding Resistance Testing - polarity of control and protective devices	
12	5	1,2,4	- Service mains - Meaning of service mains, code of Practice for service mains, types of service mains	Design a 2BHK residential installation scheme and estimate the materials required. Draw the layout diagram; installation plan and wiring diagram according to National electrical code for the following wiring installations. Also prepare the bill of materials.
			- Overhead Service Mains -materials and specifications - prepare a schedule of material for providing overhead service mains to a residential building with 1.2 KW lighting, 2.5 KW heating .The supplier pole is 10 meters away.	
			UG Service Mains -materials and specifications	Consumer main board with Energy meter, Double pole iron Clad Switch and Distribution Board
			schedules of materials for single phase OH service connection,	
13	5	1,2,4	Alternate Energy Sources	Run a miniature solar powered fan.
			- List different types of alternative energy sources. - Components used in Solar Power Plants. - Discuss generation of electrical energy using solar energy with a block diagram.	
			- Components used in Wind Power Plants - Discuss generation of electrical energy using wind energy with a block diagram.	Provide a solar light to the lawn of your institution.
			- Generation of electricity using hydrogen energy - Concept of fuel cells and applications.	

4. References:

1. Electrical Engineering Drawing-Bhattacharya S. K.- New Age International, New Delhi, ISBN: 978-81-224-0855-3.
2. Electrical Wiring, Estimating and Costing - Uppal S.L; Garg G.C. - Khanna Publishers, New Delhi,
3. Electrical Workshop: Safety, commissioning, maintenance and testing of electrical equipment - I.K. International Publishing House , Pvt. Ltd. New Delhi, ISBN:978- 9389447057
4. Electrical Estimating and Costing - Gupta J. B. - S. K. Kataria & Sons, New Delhi,
5. An introduction to electrical engineering - materials Indulkar C.S. & Thiruvengadam S. -S Chand & Co., ISBN :978-812190666

5. CIE Assessment Methodologies

Sl. No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3TheoryTest	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					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

CIE Theory Test model question paper

Program	ELECTRICAL AND ELECTRONICS ENGINEERING			Semester - I	
Course Name	Electrical Wiring Systems and Practice			Test	I/III
Course Code	25EE11I	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		Cognitive Level	Course Outcome	Marks
Section - 1					
1	1. list Types of resistors and their applications 2. state the Effect of temperature on resistance 3. Calculate the equivalent resistance of two resistors, one of 10 Ω and another of 20 Ω, connected in series 4. Draw and Explain plate earthing with a neat diagram and advantages.		L1 L1 L3 L3	1	5+5+5+1 0 =25
2	1. List different types of digital voltmeters 2. list the advantages of earthed neutral . 3. Calculate the equivalent resistance of two resistors, one of 10 Ω and another of 20 Ω, connected in Parallel 4. Draw and Explain pipe earthing with a neat diagram and advantages.		L1 L1 L3 L3	1	5+5+5+1 0 =25
Section - 2					
3	1. Define specific resistance and state its unit. Explain one application where specific resistance is critical 2. Derive the formula for the effective Resistance when 2 Resistances are connected in parallel. 3. Differentiate between analog and digital measuring instruments with examples. 4. list differents Errors in measuring instruments and explain		L1 L3 L3 L2	1	5+5+5+1 0=25
4	a) State and explain the laws of resistance b) Three resistors of 5 Ω, 10 Ω, connected in parallel and 15 Ω are connected in series. Calculate the equivalent c) Compare series and parallel circuits with diagrams and applications d) Draw and explain construction of PMMC Ammeters		L1 L3 L3 L2	1	5+5+5+1 0=25
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.					

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

8. CIE Practice Test model question paper

Program	ELECTRICAL AND ELECTRONICS ENGINEERING			Semester	
Course Name	Electrical Wiring Systems and Practice			Test	II/IV
Course Code	25EE11I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
NOTE : Any ONE of the following questions may be allotted to each students					50
1) Using wires of different materials, lengths, and cross-sectional areas, find the resistivity.				1,2 1,2 1,2 1,2	
2) Conduct an experiment to study the nonlinear relationship between voltage, current, and resistance in a filament bulb.				1,2 1,2 1,2	
3) Measure current using an ammeter in both AC and DC circuits using meters of different ranges.				1,2	
4) Measure voltage using a voltmeter in both AC and DC circuits using meters of different ranges.				1,2	
5) Connect and configure an oscilloscope to measure and display AC and DC waveforms.				1,2	
6) Connect oscilloscope and signal generator for observing display of different types of waveforms.(sine, square, pulse, ramp etc)				1,2	
7) Measure earth resistance by earth tester.				3	
8) Install an earthing system for your laboratory and test.				3	
9) Perform an experiment for studying inverse current characteristics of a fuse.				3	
10) Connect a suitable circuit to study the operation of MCB.				3	
11) Collect different insulating materials and list their properties. Identify their usage.				3	
12) Design and install a functional lighting circuit for a single room to meet a practical load requirement (e.g., controlling two LED lights and one ceiling fan).				4	
13) Practice Cable laying, Cable joints (terminations), proper size lugs, crimping of joints towards a house wiring installation with Wire joints				4 4	
Scheme of assessment					
a) Circuit/Setup Design (10 Marks)					
b) Practical Execution (10 Marks)					
c) Correct Connections (10 Marks)					
d) Functionality Testing (10 Marks)					
e) Safety and vivo (10 Marks)					
Total Marks					50

**Signature of the Course Coordinator
HOD**

Signature of the

9. Suggestive Activities for Tutorials:

The List is an Example and not inclusive of all possible activities of the course. Student and Faculty are encouraged to choose **any two** activities that are relevant to the topic

Sl.No.	Suggestive Activities for Tutorials
01	Troubleshoot a given wiring system and make a report on procedures followed to locate faults.
02	Estimate the materials required for wiring a domestic 3BHK house, and prepare a cost estimate.
03	Interact with an electrical contractor and involve in a physical wiring work and make a report of all activities.
04	Preparing extension box, switch box and wiring models, simple panel board, and distribution board, building wiring of a lab/ room, etc

10. Rubrics for Assessment of Activity(Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
	Average Marks=(8+6+2+2)/4=4.5						5

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

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

Sl.No.	Particulars	Specification	Quantity
01	Power Supply Unit:	AC/DC adjustable power supply, 0-30V, 5A.	6
02	Digital Multimeter	3 ½ or 4 ½ digit display	10
03	Resistors (Various Ratings)	Values: 10Ω to 1MΩ, 1/4W, 1/2W	-
04	Capacitors (Various Ratings)	Electrolytic, ceramic, 10μF to 1000μF	-
05	Inductors:	Inductors with ratings 10mH to 100mH.	
06	Breadboards	Full-size, with 830 tie-points for circuit assembly	15
07	Connecting Wires	Flexible wires with banana plugs, assorted colors.	
08	Oscilloscope:	100 MHz Digital Storage Oscilloscope (DSO)	5
09	Function Generator	1 Hz to 2 MHz, sine, square, triangle wave outputs.	
10	Ammeter and Voltmeter:	Analog and digital, ranges 0-10A and 0-300V.	5 each
11	Fuses:	Glass and ceramic, 1A to 30A ratings.	
12	Circuit Breakers	Miniature Circuit Breakers (MCB) 1P, 2P, 6A to 32A	6
13	Relay Module	5V/12V SPDT relays.	6
14	Fire Extinguisher	ABC dry chemical type, 2kg.	3
15	Wire Strippers	Adjustable wire gauge compatibility (0.5mm ² to 6mm ²).	-
16	Crimping Tools	Ratchet crimping tool, 0.5mm ² to 6mm ² .	-
17	Soldering Kit:	25W soldering iron, solder wire, flux, and stand.	-
18	Hand Tools	Insulated pliers, cutters, screwdrivers.	-
19	Lugs and Terminals	Copper lugs, 1 sq mm to 16 sq mm.	-
20	Lighting Fixtures		-
21	Switches and Boards		-
22	Distribution Board:		-
23	Timer and Contactor		-
24	Solar Kit		6



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
6. Solid Waste Management and Environmental Acts	Solid waste generation, Sources, Characteristics of solid waste Solid Waste Management rules 2016	22
	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.					