



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Curriculum Structure

II Semester Scheme of Studies - Diploma in Artificial Intelligence

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	25SC21I	Engineering Mathematics-II	4	0	4	8	6	50	20	50	20	-	-	100
2	CS	25CS01I	IT Skills	3	0	4	7	5	50	20	-	-	50	20	100
3	EE/EC	25EE01I	Fundamentals of Electrical and Electronics Engineering.	3	0	4	7	5	50	20	-	-	50	20	100
4	CS	25CS21I	Thinking Programming with Python	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	CS	25CS22T	Indian Constitution	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

Note: The course **25EE01I** shall be taught by faculty from the **Electrical & Electronics (E&E)** department. In the event that E&E faculty are **not available** in the institution, the course **25EE01I** shall be assigned to faculty from the **Electronics & Communication (E&C)** department. If **both E&E and E&C departments** exist in the institution, the course **25EE01I** shall be taught by the **E&C faculty**.



**Government of Karnataka
Department of Technical Education**

C-25 Diploma Curriculum

Engineering Mathematics for Engineering Programmes

Second semester
(Effect from the AY 2025-26)



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Curriculum Structure

II 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	24SC21I	Engineering Mathematics-II	4	0	4	8	6	50	20	50	20	-	-	100

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

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

Integrated Course Template (T+P)



Government of Karnataka
DEPARTMENT OF TECHNICAL
EDUCATION

Program	Engineering	Semester	II
Course Name	Engineering Mathematics-II	Type of Course	Integrated
Course Code	25SC21I	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:

This course is designed to give a comprehensive coverage at an introductory level to the subject of Straight Lines, Differential Calculus and Applications, Integration and Definite Integrals and Applications.

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

CO-01	Identify the various linear models and interpret the visualizations in MS excel and GeoGebra
CO-02	Apply the basic rules of differentiation.
CO-03	Apply the basic concepts of differentiation in one dimensional motion of a particle and compares the actual results with the results obtained at GeoGebra.
CO-04	Evaluate the integrals with basic integrands and compares results with the results obtained at GeoGebra.
CO-05	Evaluate definite integrals pertaining to area and volume. Also Compares the results with the result obtained at GeoGebra.

3. Course Content

WEEK	CO	PO (L3- highly mapped)	Theory (4 Hours per week)	Practice (4 Hours per week)
1	1	1,4,7	Straight Lines: - Introduction of Slope ($m = \tan \theta$) and Intercepts of a straight line, Problems	Practice-1: To find the slope of randomly drawn straight lines on a graph sheet manually for minimum 5 straight lines.
	1	1,4,7	Different forms of equation of straight lines (without proof), a) Slope – Intercept form b) Slope – Point form c) Two-point form d) Intercepts form Problems on Slope – Intercept form	

	1	1,4,7	Problems on Slope – Point form (one point form)	Practice-2: To visualize the sign convention of the slopes of the straight lines manually on a graph sheet.
	1	1,4,7	Problems on Two-point form	
2	1	1,4,7	Problems on Intercepts form	Practice-4: Collect two variable data (online or off line) and obtain the linear approximation for the same in MS Excel. Hence interpolate or extrapolate few data.
	1	1,4,7	Problems continued on above forms	
	1	1,4,7	General form of equation of straight line ($ax+by+c=0$). Finding slope, x-intercept and y-intercept of a line	Practice-5: Plot minimum 3 straight lines at GeoGebra graphing calculator and compare the results with theoretical inferences.
	1	1,4,7	Conditions for two straight lines to be parallel & perpendicular and Problems	
3	1	1,4,7	Equation of a straight line parallel to the given straight line and passing through a point and Problems	Practice-6: To visualize and record the data gathered by the straight lines plotted at GeoGebra graphing calculator. Hence conclude the conditions for parallelism and perpendicularity of lines($y=mx+c$).
	1	1,4,7	Problems continued	
	2	1,4,7	DIFFERENTIAL CALCULUS: - Definition of derivative. Derivative of Constant(K), x^n by the method of first principle.	Practice-7: Introduction to CAS (Computer Algebra System) tool in GeoGebra.
	2	1,4,7	Derivative of e^{ax} by the method of first principle.	
4	2	1,4,7	List of standard derivatives (Algebraic, trigonometric, exponential and logarithmic).	Practice-8: To verify the method of first principles in MS excel constraint to $f(x)=x^2$ and $f(x)=x^3$ at $x=1$.
	2	1,4,7	Derivative of a function with scalar multiple. Sum rule of differentiation. Difference rule of differentiation	
	2	1,4,7	Problems continued.	Practice-8: Find the derivatives of the standard functions in GeoGebra.
	2	1,4,7	Product rule of differentiation. (product of two functions)	
5	2	1,7	Product rule of differentiation. (product of three functions)	Practice-9: Find the derivatives of the sum and the difference in GeoGebra. Compare the result with the theoretical inference.
	2	1,7	Quotient rule of differentiation.	
	2	1,7	Composite rule (chain of two functions only) of differentiation.	Practice-10: Find the derivatives of product functions in GeoGebra. Compare the result with the theoretical inference.
	2	1,7	Problems on Composite rule.	
6	2	1,4,7	Successive differentiation up to second order and simple problems	Practice-11: Find the derivatives of quotient functions in GeoGebra. Compare the result with the theoretical inference.
	2	1,4,7	Problems continued	

	3	1,4,7	Applications of Derivatives: Tangent: Finding the slope of tangent to the curve.	Practice-12: To derive the equations of tangent at three distinct points from the plots obtained in GeoGebra.
	3	1,4,7	Equation of the tangent to the curve at a point and problems.	
7	3	1,4,7	Normal: Finding the slope of Normal to the curve.	Practice-13: To derive the equations of normal at three distinct points from the plots obtained in GeoGebra.
	3	1,4,7	Equation of the Normal to the curve at a point and problems.	
	3	1,4,7	Derivative as a rate measure: Velocity of a particle or a body and problems	Practice-14: To determine the velocity and acceleration for well-defined distance function and tabulate the velocity and acceleration in an interval in GeoGebra.
	3	1,4,7	Problems continued on velocity of a particle or a body	
8	3	1,4,7	Acceleration of a particle or a body and problems	
	3	1,2,4,7	Problems continued on acceleration of a particle or a body	
	4	1,2,4,7	Integral calculus:- Definition of Integration and list of formulae (Algebraic, trigonometric and exponential)	Practice-15: Evaluate the standard integrals in GeoGebra.
	4	1,2,4,7	Rules of integration (without proof) with examples	
9	4	1,4,7	Problems on Rules of integration for algebraic functions	Practice-16: Evaluate the integrals with the integrands as sum and difference of all functions in GeoGebra.
	4	1,4,7	Problems continued	
	4	1,4,7	Problems involving trigonometric functions	
	4	1,4,7	Problems continued	
10	4	1,4,7	Integration by substitution method of the forms $\int f(x)^n f'(x) dx$, $\int \frac{f'(x)}{f(x)} dx$ simple problems	Practice-17: Evaluate the integrals with the integrands as product of algebraic and trigonometric (ILATE) in GeoGebra. Compare the result with the theoretical inference.
	4	1,4,7	Problems on integration by substitution method	
	4	1,4,7	Problems on integration by substitution method continued	
	4	1,4,7	Integration by parts:(ILATE RULE) $\int x \sin x dx$, $\int x \cos x dx$	
11	4	1,4,7	Integration by parts: $\int x \sec^2 x dx$, $\int x \operatorname{cosec}^2 x dx$, $\int x e^x dx$	Practice-19: Evaluate the integrals with the integrands as product of algebraic and exponential functions (ILATE) in GeoGebra. Compare the result with the theoretical inference.
	4	1,4,7	Integration by parts: $\int \log x dx$, $\int x \log x dx$, $\int x^2 \log x dx$	

	5	1,2,4,7	Definite Integrals and Applications:- Definition and simple problems on definite integrals	Practice-20: Evaluate the integrals with the integrands as product of algebraic and logarithmic functions (ILATE) in GeoGebra. Compare the result with the theoretical inference.
	5	1,2,4,7	Problems on definite integrals of algebraic functions	
12	5	1,2,7	Problems on definite integrals of trigonometric functions	Practice-21: To evaluate the area under the given curve and the volume generated by rotating the curve $y=f(x)$ about x-axis in GeoGebra.
	5	1,2,7	Problems on definite integrals using substitution method	
	5	1,2,7	Problems continued	
	5	1,2,7	Problems continued	
13	6	1,2,4,7	Applications of Integration: Simple problems on finding the area bounded by the curve and x – axis. Problems.	Practice-22: Visualization Solids generated by rotating the curves about fixed axes in GeoGebra. (DEMONSTRATION)
	6	1,2,4,7	Problems continued.	
	6	1,2,4,7	Finding the volume of solid generated by revolving the curve about x – axis. Problems	
	6	1,2,4,7	Problems continued.	

4. References:

1. Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2. Engineering Mathematics by Reena Garg, Khanna Publishing House, New Delhi.
3. Calculus and Analytical Geometry by G. B. Thomas and R. L. Finney, Addison and Wesley Publisher.
4. NCERT Mathematics Books of Class XI and XII.
5. Deepak Singh, Mathematics-I, Khanna Book Publishing Co. (P) Ltd.
6. Garima Singh, Mathematics-II, Khanna Book Publishing Co. (P) Ltd.

Web-based/Online Resources:

- i) <https://www.youtube.com/watch?v=Yp-RERSe8Yk> – To find derivatives using CAS in GeoGebra
- ii) <https://www.youtube.com/watch?v=1Cu4iw6jv6Y> –To plot tangent to the curve in GeoGebra
- iii) <https://www.youtube.com/watch?v=sh5KutnKo9Q> – To evaluate indefinite and definite integrals
- iv) <https://www.youtube.com/shorts/ZNCBgVjgPDY> - To demonstrate the solid of revolution.

5. CIE and SEE Assessment Methodologies

Sl.No	Assessment	Test Week	Duration (minutes)	Max marks	
1.	CIE-1 Theory Test	4	90	50	Average of all CIE=50 Marks
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the activities through Rubrics	1-13		50	
Total Continuous Internal Evaluation (CIE)					50 Marks
Semester End Examination (SEE) -Theory			180	100	50 (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:

CIE 1(at the end of 4th week)

Program	_____ Engineering		Semester	II
CourseName	Engineering Mathematics-II		Marks	50
Course Code	25SC21I		Duration	90 min
Section A (Answer any seven 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	
10			1	
Section B (Answer any three questions, each question carries 5 marks)				
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	<u> </u> Engineering	Semester	II
CourseName	Engineering Mathematics-II	Marks	50
Course Code	25SC21I	Duration	90 min

Section A (Answer any two questions, each question carries 5 marks)				
Q. No.	Questions	CL	CO	PO
1			2	
2			2	
3			2	
Section B (Answer any three questions, each question carries 5 marks)				
4			3	
5			3	
6			3	
7			3	
8			3	
Section C (Answer any five questions, each question carries 5 marks)				
9			4	
10			4	
11			4	
12			4	
13			4	
14			4	
15			4	
16			4	

Signature of the Course Coordinator Signature of the HOD Signature of the IQAC Chairman

7. CIE Practice Test

Program	Engineering			Semester	II
CourseName	Engineering Mathematics-II			Test	II/IV
Course Code	25SC21I	Duration	180 min	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
Total Marks					50

Note: For CIE-II Practice Test : 01 to 12 : For CIE – IV Practice Test : 13 to 22

Signature of the Course Coordinator Signature of the HOD Signature of the IQAC Chairman
 Department of Technical Education, Government of Karnataka

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	Write the application of system of linear equations in real life with neat diagrams and printed pictures.
02	Plot both standard functions and their derivatives in GeoGebra and document the plots obtained.
03	Plot the graphs for different $f(x)$ in any GeoGebra graphing tool and record the maxima and minima at different interval and submit in the document with neat pictures.
04	Apply the concept of derivatives to study the rate measure like velocity, acceleration and retardation etc.
05	Apply CAS tool in Geogebra to find the area between any two arbitrary curves and present the graphical inferences obtained.

9. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
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	10
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 use 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	8
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.	6
Total Marks= 10+10+8+8+6 =42							42

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

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

Sl. No.	Particulars	Specification	Quantity
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	For all PC
03	Internet	High speed Internet	For all PC
04	Printer	Wireless Multifunctioning printer	05
05	Projector	High resolution, wifi enabled	01
06	UPS	As per standards	6KV

Practice Problems:

Straight Lines:

- Find the equation of line passing through the point (3, 4) having slope 5.
- Find the equation to the straight line cutting off y – intercept 5 units and making an inclination 135° .
- Find the slope of straight line whose inclination with x – axis is 45° .
- Find the slope of line passing through the points (2, 4) and (8, 7).
- Find equation of straight line whose slope is 3 units and y - intercept is 4.
- Find the equation of straight line passing through the point (–3, 9) and having the slope –1.
- Find the equation of the straight line passing through (2, 3) and having slope 5.
- Find the equation of line passing through the point (6, 8) and having slope 2.
- Write the standard form of equation of straight line with
 - One point (x_1, y_1) having slope m .
 - Two points (x_1, y_1) and (x_2, y_2) .
- Find the equation of line joining the points (3, 2) and (–1, 5).
- Find the equation of straight line passing through two points (2, 5) and (3, 7).
- Find the equation of straight line passing through two points (0, 5) and (4, 6).
- Find the equation to the straight line passing through the point (5, 2) and (–3, 3), hence find the slope of the line.
- Find the equation to the straight line passing through the point (4, –3) and (2, 1).
- Write the standard form of straight line
 - General form
 - Having slope m and y - intercept c .
- Find equation of straight line passing through the point (1, 2) which makes an angle 45° to the x - axis.
- Find the equation of straight line passing through the point (1, 2), which is parallel to the line $2x - 3y + 1 = 0$.
- Find the equation to the straight line passing through the point (4, 3) and parallel to the line $3x + 5y - 3 = 0$.
- Find equation of line parallel to $2x + y - 3 = 0$ which passes through the point (2, 3).

20. Find the equation to the straight line passing through the point (5, 2) and parallel to $4x - 3y + 1 = 0$.
21. Find equation of straight line passing through the point (5, 6) and having slope of 3 units by writing its standard form.
22. Find the equation of straight line whose x - intercept and y - intercepts are 3 and 4 units respectively
23. Show that the two lines $2x + y - 4 = 0$ and $6x + 3y + 10 = 0$ are parallel.
24. Show that the lines $3x + 2y - 1 = 0$ and $2x - 3y + 5 = 0$ are perpendicular.
25. Find the value of k , if the lines $(14 + k)x + 4y - 3 = 0$ and $8x - 3y + 1 = 0$ are perpendicular.
26. Find the equation of the line passing through the point $(-3, 2)$ and parallel to the line $4x - y + 7 = 0$.
27. Find equation of line passing through the point $(1, 2)$ and parallel to the line $2x - 3y + 1 = 0$
28. Find equation of line passing through the point $(2, 3)$ and parallel to the line $5x - 4y + 4 = 0$.
29. Find the slope and x - intercept of line $3x + 4y + 7 = 0$.
30. Find the intercepts of the line $3x + 5y - 15 = 0$
31. Find x - intercept and y - intercept of line $2x + 4y + 5 = 0$.
32. Find the slope, x -intercept and y -intercept of the line $2x + 3y - 11 = 0$.

Differential Calculus:

1. If $y = x^3 + 3\cos x + 4e^x + 2$ then find $\frac{dy}{dx}$
2. If $y = e^x + 7^x - 4\log x + \tan x$ then find $\frac{dy}{dx}$
3. If $y = e^{2x} + \cos x + 3\log x - \frac{1}{x} + \sin^{-1} x + 3$ then find $\frac{dy}{dx}$
4. If $y = x^3 + \sin x - \log x - \sqrt{x} + \tan^{-1} x + 5$ then find $\frac{dy}{dx}$
5. If $y = x e^x$ then find $\frac{dy}{dx}$
6. If $y = 2x^3 + 3x^2 + 5x$ then find $y_1(0)$.
7. If $y = 3e^{3x} + \frac{3}{x} - 4\cos x + \log x$ find $\frac{dy}{dx}$.
8. Find $\frac{dy}{dx}$ if $y = 6x^3 - 3\cos x + 4\cot x + 2e^{-x} - \frac{5}{x}$
9. If $y = x^2 + 2x + 3$ then find $\frac{d^2y}{dx^2}$
10. If $y = \log(\sin x)$ then find $\frac{dy}{dx}$
11. If $y = \log(\sec x + \tan x)$ then find $\frac{dy}{dx}$.
12. Find $\frac{d^2y}{dx^2}$ at $x = \pi$ given that $y = \sin x$.
13. Differentiate $\log \sqrt{x}$ w.r.t x .
14. Differentiate $\sin^2 x$ w.r.t x .

15. If $y = \sqrt{\cos x}$ then find $\frac{dy}{dx}$.
16. Find $\frac{dy}{dx}$ given that $y = x \log x$.
17. If $y = x \sin x$ then find $\frac{dy}{dx}$.
18. If $y = \frac{1+x^2}{1-x^2}$ then find
19. If $y = \frac{1+\sin x}{1-\sin x}$ then find $\frac{dy}{dx}$.
20. If $y = \frac{2+x}{2-x}$ find $\frac{dy}{dx}$.
21. If $y = e^{3x} + e^{-2x}$ then find $\frac{d^2y}{dx^2}$.
22. If $y = A \cos mx + B \sin mx$ then prove that $\frac{d^2y}{dx^2}$ at $x = 0$
23. If $y = ae^x + be^{-x}$ then prove that $\frac{d^2y}{dx^2}$ at $x = 0$.

Applications of differential calculus:

24. Find the equation to the tangent to the curve $y = 2x^2 - 3$ at $(1, 3)$.
25. Find the equation to the tangent to the curve $y = 3x^2 + 4x$ at $(1, 2)$.
26. Find the equation to the normal to the curve $y = x^2 + 1$ at $(1, 2)$.
27. Find the equation of the normal to the curve $y = 2x^3 - 5x^2 + 8x - 6$ at the point $(1, -1)$.
28. Find the slope of the tangent to the curve $y = x^2 - 3x + 2$ at $(1, 0)$.
29. Find slope of tangent and normal to the curve $y = x^3 - x$ at the point $(2, 3)$
30. Find equation of tangent to the curve $y = x^2 + x$ at the point $(1, 2)$
31. The displacement of a particle moving along a straight line is $S = t^3 - 2t^2 - 4t + 20$ meters. Find the velocity when $t=3$ secs.
32. The equation of motion is given by $S = 3t^2 + 4t + 6$, find the velocity after 2 seconds.
33. The equation of motion of the particle is $S = t^3 - 2t^2 + 4$ in meter. Find the velocity when $t = 2$ seconds.
34. The displacement of a particle S meters moving along a straight line is $S = 4t^3 - 2t^2 + t$. Find the velocity when $t = 2$ secs.
35. If $S = 6t^3 - 5t^2 + 4$ is the displacement of a particle in time ' t ' sec, find its velocity at $t = 2$ sec.
36. The displacement of a particle in time ' t ' seconds is given by $s = t^3 - 6t^2 - 8$. Find the velocity after 3 seconds.
37. If s is the distance traversed in meters by a particle in time t sec and $s = 4t^3 - 6t^2 + t - 7$, find the velocity and acceleration when $t=2$ sec.

Integration:

1. Integrate $e^x + \frac{1}{1+x^2} - \sin x + x^3$ w.r.t. x
2. Integrate $\sec^2 x - e^{4x} + x^5 - \frac{1}{x}$ w.r.t. x
3. Integrate $x^4 - e^{-2x} + \cos x - 100$ w.r.t. x
4. Evaluate $\int \left(\sin 2x + \frac{2}{x} + e^x + 3\sec^2 x + 5 \right) dx$.
5. Evaluate $\int (x^2(1+x)) dx$
6. Evaluate $\int (x \log x) dx$
7. Evaluate $\int \cos^2 x dx$
8. Evaluate $\int \sin^3 x dx$
9. Evaluate $\int \frac{2x+1}{x^2+x+1} dx$
10. Evaluate $\int (x^2 + x + 9)^{10} (2x+1) dx$
11. Evaluate $\int \frac{e^x}{1+e^x} dx$
12. Evaluate $\int \frac{1 - \cos 2x}{\sin 2x} dx$
13. Evaluate $\int \frac{(x+1)(x-5)}{x} dx$
14. Evaluate $\int \frac{2x-4}{x^2-4x+11} dx$
15. Evaluate the integral $\int x e^x dx$ using integration by parts.
16. Evaluate the integral $\int x \sin x dx$ using integration by parts.

Definite Integrals and Applications:

1. Evaluate $\int_0^1 (2x+1)(x-3) dx$
2. Evaluate $\int_0^{\pi/2} \sin^3 x dx$.
3. Evaluate $\int_0^{\pi/2} \cos^3 x dx$.
4. Evaluate $\int_0^{\pi/2} \sin x dx$.
5. Evaluate. $\int_0^1 x e^x dx$
6. Evaluate $\int_0^1 (x+2)(x-5) dx$.

7. Evaluate $\int_0^1 (3x^2 - 6x + 2) dx$
8. Show that $\int_0^{\frac{\pi}{4}} \tan^2 x \sec^2 x dx = \frac{1}{3}$.
9. Find the area bounded by the curve $y = 3x$, the x -axis and the ordinates between $x = 1$ and $x = 2$.
10. Find the area bounded by the curve $y = x - 5$, the x -axis, the coordinates between $x = 0$ and $x = 5$.
11. Find the area bounded by the curve $y = x^2 + 1$, x -axis and the ordinates $x = 1$, $x = 3$.
12. Find the area bounded by the curve $y = 4x^3$, x -axis and the ordinates $x = 0$ and $x = 2$.
13. Find the area bounded by the curve $y = 3x^2 + 2x$, x -axis and ordinates $x = 0$ and $x = 1$.
14. The curve $y^2 = x + 2$ is rotated about x -axis. Find the volume of solid generated by revolving the curve between $x = 2$ & $x = 5$.
15. With the use of definite integrals find the area bounded by the curve $y = x^3 - 2$, x -axis and $x = 0$ & $x = 1$.
16. Find the area bounded by the curve $y = 4x - x^2 - 3$, x -axis and ordinates $x = 1$ and $x = 3$.
17. Find the volume generated by rotating the curve $y^2 = x^3 - 2$ above x -axis between coordinates $x = 0$ and $x = 2$.
18. Find the volume generated by rotating the curve $y = x + 2$ about x -axis between $x = 0$ and $x = 2$.
19. Find the volume of the solid generated by revolving the curve $y^2 = 3x^2 - 2x + 1$ about x -axis and ordinates $x = 0$ and $x = 2$.
20. Find the volume of the solid generated by rotating the curve $y = x + 1$ about x -axis between $x = 0$ and $x = 2$.



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Computer Science and Engineering	Semester	1/2
Course Name	IT Skills	Type of Course	Integrated
Course Code	25CS01I	Contact Hours	7 per week
Teaching Scheme	3: 0:4	Credits	5
CIE Marks	50	SEE Marks	50 (Practice)

1. Rationale:

In today's fast-changing digital world, foundational IT skills are crucial for technical professionals. This course equips students with hands-on experience in key areas, including computer fundamentals, cybersecurity, problem-solving, **Cloud Computing**, IoT, Artificial Intelligence (AI), and prompt engineering. Additionally, it covers IT certifications to help students build industry-relevant expertise and enhance their job readiness.

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

CO-01	Demonstrate knowledge of computer hardware, software, networking, and internet services.
CO-02	Identify common cyber threats and implement security measures.
CO-03	Apply algorithmic thinking and block-based coding to create simple programs.
CO-04	Explain applications of digital technologies such as Cloud, IoT and AI.
CO-05	Apply AI tools and prompt engineering techniques to generate meaningful outputs.

3. Course Content

W e e k	C O	P O	Lecture(3HRS) (Knowledge Criteria)	Practice(4HRS) (Performance Criteria)
1	1	1, 4	Introduction to Computers ▪ Definition and basic understanding of a computer.	1. Identify the parts of a computer system.

			- Generations of Computers - Classification of computer based on their size, purpose, functionality, and technology. - Functional Block Diagram of a Digital Computer. Memory Systems: Types of Memory and Their Usage: Primary Memory, Secondary Memory: Input/output Systems Software: System software vs. application software	2. Identify the operating system and hardware specifications of a computer.. 3. Basic folder/ file operations (GUI based) 4. Install application software such as web browser, scratch. 5. Hardware scavenger hunt (students identify components in disassembled PC images). Case Study: Prepare a report on important factors to be considered while buying a computer (based on purpose and budget).
2	1	1, 4	Internet skills: - What is Computer Networks? - Types of Networks. Physical and Logical address, Protocols, Key Devices in a Network (Router, Switch, Modem, Access Point) - What is Internet? Common Applications of the Internet; - Browsers, Web Server, Client-Server Model, URL, Search Engine, Domain name and domain name system, websites. - Personal website, website hosting.	1. Explore and list 3 real-world examples for each type of network (LAN, MAN, WAN). 2. Find your Physical (MAC) and Logical (IP) Address 3. Create an email account (e.g., Gmail, Outlook) and explore its security settings 4. Using a Search Engine Effectively : Search for "How does a Search Engine work?" 5. Design, develop and host a personal website using any free platform such as wix.com or worldpress.com 6. Test Internet speed
3	2	1, 4, 7	Cybersecurity - Introduction to Cybersecurity - What is Cybersecurity? - CIA -triad - Importance and Risks - Common Threats: Malware, Phishing, Ransomware, Social Engineering - Cybersecurity Best Practices	1. Identify different cyber threats using real-world examples 2. Install and run an antivirus scan 3. Create strong passwords using password managers 4. Enable and test multi-factor authentication (MFA) 5. Implement User Access Control (UAC) settings on a system 6. Identify safe vs. unsafe websites using browser security indicators

			Secure Authentication and Access Control - Importance of Strong Passwords and - Multi-Factor Authentication (MFA) - Role of User Access Control and Privileged Accounts - Password Management Tools Safe Browsing and Data Protection - Secure Websites (HTTPS, SSL Certificates) - Identifying Fake Websites and Links - Basics of Encryption and Secure File Sharing - Importance of Backups	7. Encrypt and decrypt a file using built-in OS tools 8. Set up and perform a basic data backup
4	2	1, 4, 5, 7	Cyber security best practices - Awareness on cyber safety - Do's and don'ts w.r.t - Password Management - Safe Browsing and Email Habits - Software and System Security - Data Protection and Backup - Social Engineering and Phishing Awareness - Secure Mobile and IoT Devices - Staying Safe from Online Predators, Cyberbullying and Cyber harassment, Using Social Networks Safely.	1. Spot Fake Websites and Phishing Emails 2. Analyze real vs. fake websites (check for HTTPS, domain names, security certificates). 3. Identify phishing emails (hover over links, check sender email, grammar errors). 4. Update and Patch Management - Check if your OS and software are up to date (Windows Update, Linux apt upgrade). - Test an antivirus scan and remove unnecessary apps. 5. Implement a Backup Strategy 6. Encrypt and Secure Sensitive Files 7. Recognizing Scam Calls and Messages
5	3	1, 2, 3, 4, 7	Introduction to Problem Solving - What is problem-solving? - Problem-solving cycle. - Introduction to block-based coding (Scratch, Blockly, MIT App Inventor / Klaritree or similar tool).	1. Explore the interface of the block coding tool 2. Develop algorithms and draw flowchart - for basic arithmetic operations. - Metric conversions.

			Understanding algorithms, flowcharts, and sequencing.	
6	3	1, 2, 3, 4, 7	What are variables? Storing and updating values. Using variables for score counters and timers. Basic Elements of Block-Based Coding: - Motion Blocks - Looks Blocks - Events Blocks - Control Blocks - Operators Blocks - Variables Blocks	- Create a simple animated sequence (e.g., making a sprite move in Scratch). - Design a flowchart for a real-world task - Create a score counter for a simple game. - Develop an interactive greeting app that responds to user input.
7	3	1, 2, 3, 4, 7	Decision Making - What are conditions? (if, if-else, nested if). - Boolean logic (AND, OR, NOT). - Applying conditional logic in games and applications.	- Develop algorithms and draw flowchart to demonstrate comparison and logical operations (eg. Comparison of two number) - Create an interactive story with decision-making (yes/no choices). - Build a traffic light simulator using conditional statements.
8	3	1, 2, 3, 4, 7	Understanding Loops and Repetition - Importance of loops in coding. - Types of loops (repeat, repeat until, forever). - Practical use of loops in problem-solving.	- Create a bouncing ball animation using loops. - Design a counting program that prints numbers from 1 to 20 using loops.
9	4	1, 4, 7	Cloud Computing - What is Cloud Computing? Cloud Computing benefits and use cases - Cloud service models (IaaS, PaaS, SaaS)	- Create a free cloud account (AWS, Azure, or GCP) - Explore the cloud console and key services - Set up cloud storage and upload/download files - Create Online Forms and Surveys to capture data using cloud services
10	4	1, 4, 7	Internet of Things (IoT) - What is IoT? - Characteristics	Create a simple visual block code to blink LED in Arduino board using visual block code, upload code to Arduino board and demonstrate.

			- Components of IoT (Sensors, Actuators, Communication, Cloud, Analytics) - Use Cases of IoT across various industries. - Examples of IoT in everyday life	2. Create a Traffic signal controller with 3 LED (RED, YELLOW and GREEN), upload code to Arduino board and demonstrate. Note : Students and Teachers to use visual block code platform such as a. https://www.tinkercad.com/ b. https://mblock.cc for building IoT application and demonstration.
1 1	4, 5	1, 4, 7	Artificial Intelligence - What is AI? - Types of AI (Weak AI, Strong AI, General AI) - AI in Everyday Life: Real-world applications - AI Systems like prediction, recommendation ,etc. - AI Applications (Healthcare, Finance, Robotics, etc.)	Explore AI tools such as : ChatGPT, Deepseek, Gemini,Grok, Copilot, NapkinAI, Sora,etc
1 2	5	1, 4, 7	Prompt Engineering - What is Prompt Engineering? - Role of AI language models - Types of AI prompts: Direct, Instructional, Conversational - Understanding AI capabilities and limitations Structuring Effective Prompts - Key principles of writing effective prompts - Clarity, specificity, and context in prompts - Role of tone, format, and constraints Domain-Specific Prompting - Using AI for content creation (writing, marketing, coding) - AI in education and research - Customizing prompts for business applications	- Exploring different AI models (ChatGPT, Claude, Bard) - Testing basic prompts and analyzing responses - Improving weak prompts - Experimenting with structured vs. unstructured prompts
1 3	1, 2,	1, 7	IT Certifications and Career Paths	Research and present a report on popular IT certifications.

	3, 4	- Overview of IT certifications (Entry-level to Expert) - Importance of certifications in IT careers - Choosing the right certification based on career goals (Networking, Security, Cloud, Development, etc.)	2. Identify career interests and match them with relevant certifications. 3. Develop a career roadmap with certification milestones.
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4. References

Sl No	Description
1	<i>Computer Fundamentals</i> by P.K. Sinha (11th Ed.)
2	<i>Data Communications and Networking</i> by Behrouz Forouzan (5th Ed.)
3	<i>Cybersecurity for Beginners</i> by Raef Meeuwisse – Covers threats
4	<i>Coding for Kids: Scratch</i> by Jon Woodcock
5	<i>Cloud Computing Basics</i> by Anders Lisdorf
6	<i>IoT for Beginners</i> by Adeel Javed
7	<i>Artificial Intelligence: A Guide for Thinking Humans</i> by Melanie Mitchell
8	<i>The Tech Career Guide</i> by Aki Ito
9	Learn Prompting
10	AI Playground
11	Tinkercad Circuits
12	Blockly Games
13	https://onlinecourses.swayam2.ac.in
14	https://www.geeksforgeeks.org
15	Essentials of Prompt Engineering Coursera
16	https://www.ncerc.ac.in

5. Suggestive Online courses

Sl no	Topic Name	Reference Courses	Self Assessment Link	Source
1	Cyber security	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_014222737382490112870/overview		Coursera
2	Security Attacks	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384249523170508816531_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/html/lex_auth_01384249741937049615982_shared?collectionId=lex_auth_01384249523170508816531_sharedandcollectionType=Course	IIHT
3	Introduction to Problem Solving	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0131149320724398081685_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/iap/lex_auth_0132344659742228487432_shared?collectionId=lex_auth_0131149320724398081685_sharedandcollectionType=Course	Infosys Wingspan
4	Flowcharts	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0135015559136952327909/overview		Skillsoft

5	Block coding	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01317717283605708885_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/html/lex_auth_013165205899452416510_shared?collectionId=lex_auth_01317717283605708885_sharedandcollectionType=Course	IIHT
6	Block coding	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944046684160001693_shared/overview		IIHT
7	Cloud Computing	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_29245015089922640000_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/iap/lex_auth_01268242367501107260_shared?collectionId=lex_29245015089922640000_sharedandcollectionType=Course	Infosys Wingspan
8	Internet of Things	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_21553622882521997000_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/iap/lex_12361814852557394000_shared?collectionId=lex_21553622882521997000_sharedandcollectionType=Course	Infosys Wingspan
9	Artificial Intelligence	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_8840337130015322000_shared/overview	https://infyspringboard.onwingspan.com/web/en/viewer/iap/lex_26105618936746710000_shared?collectionId=lex_8840337130015322000_sharedandcollectionType=Course	Infosys Wingspan

6. CIE Assessment Methodologies

Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1 Theory Test	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 - Portfolio evaluation (20) - Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/AWS /any other (30)	1-13		50	
Total					50 Marks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 20 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

Rubrics for the Mini Project (if included) should be defined by the course coordinator.

7. 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

8. Theory Test model question paper

Program		Computer Science and Engineering			Semester -1	
Course Name		IT Skills			Test	III
Course Code		25CS01I	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. Explain the significance of the functional block diagram of a digital computer with a neat diagram. (5) b. Explain the evolution of computers through different generations, highlighting key technological advancements in each generation. (10) c. Explain the different types of networks (LAN, MAN, WAN) with suitable real-world examples. How do they differ in terms of scale and application?(10)			L2	1	25
2	a. Classify computers based on size and purpose. Provide one real-world use case for each type. (5) b. Explain how advancements in computer generations (from			L2	1	

	vacuum tubes to AI) have impacted business productivity. (10) c. Describe the client-server model using the example of an online banking website. (10)			
Section – 2				
3	a. <i>A friend unknowingly clicks a phishing link and shares their bank credentials. Using the CIA triad, explain the potential risks. Then, outline steps they should take immediately to mitigate damage. (10)</i> b. What is Multi-Factor Authentication (MFA)? How does it improve authentication security? Provide an example (8) c. Define Cybersecurity and explain the CIA Triad model. Why is it essential in today's digital world? (7)	L2	2	25
4	a. Describe the importance of password management tools. How do they contribute to secure authentication? Illustrate with examples of popular tools. (10) b. Explain how HTTPS and SSL certificates ensure secure browsing. How can users verify a website's security? (8) c. Compare phishing and ransomware attacks in terms of intent, delivery method, and impact. (7)	L2	2	
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**

9. CIE Practice Test model question paper

Program	Computer Science and Engineering			Semester	1
Course Name	IT Skills			Test	II
Course Code	25CS01I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
You have been hired as an IT Support Specialist in a company. Your first assignment is to set up a secure computer system, connect it to a network, and develop a simple automated task using block-based coding. You are required to: - Set up a computer system by identifying its hardware and software specifications. - Find and document system details like CPU, RAM, storage, and operating system. - Identify whether the installed software is system software or application software. - Configure network settings and verify the internet connection. - Retrieve and document the IP address, MAC address, and default gateway. - Ensure cybersecurity best practices to protect the system and online accounts. - Develop a simple program using block-based coding (Scratch, Blockly, or MIT App Inventor) to automate a basic task. - Create an interactive quiz that asks a user three questions and gives feedback on their answers. OR - Develop a program where a sprite moves when arrow keys are pressed.				2	50
Scheme of assessment Computer System Setup - 10 Network Configuration and Internet Connectivity - 10 Cybersecurity Best Practices – 10 Block-Based Coding - 20					
Total Marks					50

Sign of the Course Coordinator

Signature of the HOD

10.SEE- Model Practice Question Paper

Program	Computer Science and Engineering		Semester	1
Course Name	IT Skills	Course Code : 25CS011	Duration	180 min
Questions			CO	Marks
As an IT specialist, you are tasked with setting up a secure digital environment for a small business. You must: - Configure and document the computer hardware and software specifications of a system. - identify the IP and MAC addresses and enable basic security settings. - identify phishing threats and implement Multi-Factor Authentication (MFA). - Develop a simple interactive program using block-based coding that automates a basic business task of greeting customers - Use AI tools to generate a business report and refine the output using effective prompt engineering techniques.			1,2,3,5	50
Scheme of assessment - System setup - 10 - Cybersecurity Measures - 10 - Block-Based Coding and Algorithmic Thinking - 10 - Report Submission and Presentation - 20				
Total Marks				50

1.Signature of the Examiner

2. Signature of the Examiner

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

Sl.No.	Particulars	Specification	Quantity
01	Desktop/Laptop PC with Windows/Linux	Intel i3, 500GB Hard Disk/SSD, 8GB RAM, Monitor, Mouse, Keyboard or higher configuration	30
02	Internet Connection	100 Mbps speed or higher subscription	1
03	LAN connectivity/ High speed Wireless AP	32 Port Switch with LAN cabling/ Wifi Adapters (32 No.)	1
04	Online UPS	5KV with 3 -6 hours backup	1
05	Projector	Multimedia Projector	1

06	White Board	Plane white board / Smart Board/Smart TV	1
07	Audio Speakers	Multimedia, Two-way hybrid speaker system	2



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>

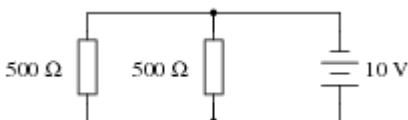
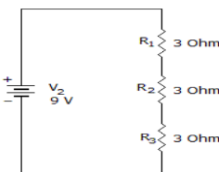
5. CIE Assessment Methodologies

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
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	Computer Science and Engineering	Semester	2
Course Name	Thinking Programming with Python	Type of Course	Integrated
Course Code	25CS21I	Contact Hours	8 Hours per week
Teaching Scheme	4:0:4	Credits	6
CIE Marks	50	SEE Marks	50 (Theory)

1. Rationale:

The course aims to combine foundational problem-solving skills with practical programming experience in Python. This integrated approach enables learners to develop a logical mindset while gaining hands-on coding experience in one of the world's most versatile and beginner-friendly programming languages. The course goes beyond teaching programming syntax. It's an essential step toward developing logical, computational, and technical proficiency for success in the digital age.

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

CO-01	Apply computational thinking to solve the given problem and illustrate the solution as an algorithm
CO-02	Develop programs using fundamental programming concepts.
CO-03	Design, code, and debug a Python program to solve a problem
CO-04	Identify and resolve both syntactical and semantic errors.
CO-05	Apply modular programming approach to optimize the program.

3. Course Content

Week	CO	PO	Lecture(4HRS) (Knowledge Criteria)	Practice(4HRS) (Performance Criteria)
1	1	1,2	Computational Thinking Introduction, Components, Importance and Applications of CT in various fields. Decomposition: Consider a problem statement to learn decomposition (refer table 1 for examples) – Pattern recognition: Analogy; Classification; Sequencing; Ranking; Series	Organize Games and Activities to instill Computational Thinking
2	1	1,2	Algorithmic thinking Problem Types for Algorithmic Solutions [definition and examples] ▪ Searching Problems ▪ Sorting Problems ▪ Optimization Problems	For a given problem ▪ Identify the key components (input, output and logic) of an algorithm ▪ Develop a step-by-step algorithm to solve it.

			▪ Graph Problems ▪ String Processing Problems ▪ Numerical Problems ▪ Combinatorial Problems ▪ Cryptographic Problems Algorithm Representation: Natural Language, Pseudocode, Flowchart <i>[Note: Sorting Algorithms: designed to arrange data in a specific order Examples: Bubble Sort, Merge Sort, Quick Sort]</i>	
3	2	1	Introduction to Programming What is programming? ; Why we need Programming; How to Think like a programmer; Programming Paradigms; Programming Languages and their Paradigms	Organize Games and Activities to instill Programmer Thinking
4	2	1,4	Basic Programming Concepts: Syntax ; Tokens and types; Variable -Rules for creating variables; constants; datatypes; errors ; comments ; Best programming practices;	Setup and get familiar with Your Development Environment such as VsCode
5	2	1,4	Introduction to python programming: Features and applications ; Data types (primitive); Assignment statement; Type conversion;	Practice Programs to understand datatype, and their conversion.
6	3,4	1,2,4	Input and output statements: input (); print (); Formatting output - string concatenation, format() and f-strings; Debugging techniques.	Practice Programs to understand reading input and formatting output
7	3,4	1,2,4	Operators and their Precedence Expressions	Practice Programs to understand Operators and Expressions
8	3,4	1,2,3,4	Flow control Conditional statements: if, if-else, if-elif, match case	Practice programs to understand the concept of conditional statements
9	3,4	1,2,3,4	Iterative statement – for loop: structure of the for loop using range();concept of break and continue with the for loop;	Practice programs to understand the concept of for loop
10	3,4	1,2,3,4,	Iterative statement - While loop : structure; concept of Break, continue, pass statements with while loop;	Practice programs to understand the concept of while loop

11	3,4	1,2,3,4	Nested loops : Use cases of nested loops; control flow in nested loops using break, continue, and else;	Practice programs to understand the concept of nested loops
12	3,4,5	1,2,3,4,5,7	Functions : Need for functions ; create function ; function call: with and without arguments; return statements; Variable scope	Practice programs to understand the concept of functions
13	3,4,5	1,2,3,4,5,7	Modules and Packages : Significance of modules and packages; Import and use built-in modules; Create new module; Create a package with multiple modules; import statement (import, import...as .., from....import, import *)	Practice programs to understand the concept of modules and packages

4. References:

Sl No	Description
1	<i>Think Like a Programmer</i> (V. Anton Spraul)
2	<i>Automate the Boring Stuff with Python</i> – Al Sweigart
3	<i>Python Crash Course</i> – Eric Matthes
4	Introduction to Computation and Programming Using Python – John V. Guttag
5	How to Think Like a Computer Scientist: Learning with Python – Allen B. Downey
6	Programming for the Puzzled – Srini Devadas
7	Introduction to Algorithmic Thinking – Daniel Zingaro
8	CS50 Python Course - Harvard's CS50P: Introduction to Python
9	Google Python Course -
10	Codecademy Python Course
11	Coursera: Python for Everybody – University of Michigan

5. Suggestive Online courses

Sl no	Topic Name	Reference Courses	Self Assessment Link	Source
1	Computational Thinking	TOC - Problem Solving Using Computational Thinking Infosys Springboard		Coursera
2	Algorithmic thinking	TOC - Programming Fundamentals using Python - Science Graduates - Foundation Program Infosys Springboard		Infosys Wingspan
3	Introduction to Programming	TOC - Programming Fundamentals using Python - Science Graduates - Foundation Program Infosys Springboard		Infosys Wingspan
4	Basic Programming Concepts:	TOC - Programming Fundamentals using Python - Science Graduates - Foundation Program Infosys Springboard		Infosys Wingspan
5	Introduction to python programming:	TOC - Basics of Python Infosys Springboard	Basics of Python - Self Assessment - Viewer Page Infosys Springboard	Infosys Wingspan

6	Input and output statements:	TOC - Programming Fundamentals using Python - Science Graduates - Foundation Program Infosys Springboard	Assessment - Programming Fundamentals using Python - Science Graduates - Viewer Page Infosys Springboard	Infosys Wingspan
7	Operators and their Precedence Expressions			
8	Flow control Practice programs to understand the Conditional statements			
9	Iterative statement			
10	Nested loops			
11	Functions			
12	Modules and Packages			

6. Suggestive Program List

week	Suggested program/ activity list
1	Case based learning: - Improving the Transport System in the Countryside - Analyzing the Reach of Government Schemes - Smart Irrigation System for Optimal Water Usage - Impact of Social Media on Students
2	Problem / use case based learning Devise an Algorithm and draw flowchart for problems such as - Swapping two values - Finding largest / smallest among two/three number - Computing area/ perimeter of given shape (circle, triangle, rectangle, square) - Metric conversion (meter – KM, pound – kilo gram, Celsius – Fahrenheit) - Determine given number is even or odd, positive or negative.
3	<u>Think Like a Programmer - Google Books</u> <u>Think Like a Programmer: Introduction (youtube.com)</u> General problem solving techniques- refer the book or youtube videos https://www.codecademy.com/resources/blog/how-to-think-like-a-programmer/
4	Prepare Your Development Environment: - Download and install the necessary compiler or interpreter - Python: Download from python.org. - Java: Install the Java Development Kit (JDK) from Oracle or OpenJDK. - Verify the installation by checking the version using the terminal/command prompt - Install an IDE (for python VSCode or Pycharm)

	▪ Open your IDE and explore its features: ▪ Create a new project. ▪ Write a simple "Hello, World!" program. ▪ Learn to run and debug your code. ▪ Explore useful features like syntax highlighting, auto-completion, and integrated terminal.
5	Create variables, assign values, and display their data types: a. Create variables of different data types and assign values b. Display the values and their respective data types using the <code>type()</code> function. Assignment Statements: a. Single variable assignment: Assign a value to a single variable. b. Multiple variable assignment: Assign values to multiple variables in one statement. c. Assign the same value to multiple variables. Type Conversion a. Demonstrate Python's ability to convert types automatically during operations. b. Use functions like <code>int()</code>, <code>float()</code>, <code>str()</code>, or <code>bool()</code> to explicitly convert data types.
6	1. Write a program that: a. Accepts user input for name and age. b. Prints a formatted message using different string formatting methods. 2. Read message from the user and Format it with different methods and display. 3. Demonstrate swapping the values(numerical) of two variables using a temporary variable.
7	1. Write python equivalent expressions for math expressions such as a. $f = ax + b$ b. $f = a^2 + b^2 + 2ab$. c. $f = a^3 + b^3 + 3ab(a + b)$ d. $area = \pi r^2$ e. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ f. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ 2. Translate textual problem statements into Python expressions 3. Write a program that: a. Accepts two numbers from the user. b. Converts them to integers (if they are not already). c. Performs arithmetic operations (add, subtract, multiply, divide) and displays the results with the data types and appropriate message. 4. Calculate the total cost of an item after applying a 15% discount to its original price of Rs150. 5. Calculate the compound interest on a principal of Rs10000 at an annual interest rate of 5% for 3 years, compounded annually. 6. Compute area of triangle, rectangle. 7. Swapping values of two variables without using a temporary variable

8	- Create a program to manage airline ticket bookings based on the passenger's selected class: "economy", "business", or "first". - Prompt the user to input details such as name, age, destination, and class preference (economy, business, or first). - Validate inputs (e.g., ensure the name contains only letters, age is a positive integer, and class selection is valid). - Display appropriate error messages for invalid entries and allow the user to re-enter the data. - Build a system to suggest clothing based on the temperature. - If temperature $\geq 30^{\circ}\text{C}$, suggest "Wear light clothes." - If $20^{\circ}\text{C} \leq \text{temperature} < 30^{\circ}\text{C}$, suggest "Wear moderate clothing." - If temperature $< 20^{\circ}\text{C}$, suggest "Wear warm clothes." - Implement a discount system for an e-commerce website. - If the total purchase is $\geq \text{Rs}5000$, apply a 20% discount. - If $\text{Rs}2000 \leq \text{total} < \text{Rs}5000$, apply a 10% discount. - If total $< \text{Rs}2000$, no discount is applied. - Create a program that simulates an ATM machine to check: - If the entered PIN is correct, allow the user to proceed. - Validate that the withdrawal amount doesn't exceed the account balance. - Ensure that the withdrawal amount is in multiples of a specific denomination (e.g., Rs100).
9	- Generate numbers from 1 to 10 using range(). - Generate numbers for a given range. - Write a program to display square numbers from 1 to 10. - Write a Python program that accepts an integer input from the user and determines whether the number is a prime number or not. If the number is prime, display an appropriate message; otherwise, indicate that it is not prime. - Write a Python program that accepts a message and a number from the user. The program should then print the specified message the given number of times. - Write a Python program to calculate the factorial of a given number. The program should: - Accept a non-negative integer as input. - Use an iterative approach to compute the factorial. - Handle invalid inputs (e.g., negative numbers or non-numeric inputs) by displaying appropriate error messages. - Evaluation of mathematical series like $S=1+2+3+\dots+n$ $S=1^2+2^2+3^2+\dots+n^2$ $H_n=1+1/2+1/3+\dots+1/n$
10	- Implement the Euclidean algorithm to find the GCD of two integers using a while loop. - Collect daily weather data (e.g., temperature, humidity) from the user. Allow data entry to continue until the user decides to stop or inputs a sentinel value. - Simulate a loan repayment system where a borrower pays a fixed amount each month. Continue reducing the loan balance until it is fully paid off, and display the balance after each payment.

	4. Write a program that simulates a countdown timer. Start with a given number of seconds and decrement until it reaches zero, displaying the countdown at each step. 5. Write a program that takes an integer and calculates the sum of its digits using a while loop. 6. Write a program that simulates a simple user authentication system. The program should: - Repeatedly ask the user to input their username and password. - Verify the entered credentials against a pre-defined username and password. - Allow the user up to three attempts to enter the correct credentials. - Provide appropriate feedback for each attempt (e.g., "Incorrect username or password"). - If the correct credentials are provided within three attempts, display a success message and terminate the program. - If all three attempts are exhausted, display a failure message and terminate the program.
11	1. Write a program to identify all prime numbers within a user-defined range. The program should: - List all the prime numbers within the range. - Calculate and display the total count of prime numbers found. - Compute and display the sum of these prime numbers. 2. Write a Python program to perform the following tasks for a user-defined range of integers: - Identify and list all non-prime numbers within the given range. - Categorize the non-prime numbers into even and odd. - Count the total number of even and odd non-prime numbers. - Calculate and display the sum of even and odd non-prime numbers separately. 3. Write a Python program to perform the following tasks for a user-defined range of integers: - Identify and list all palindrome numbers within the specified range. - Count the total number of palindrome numbers found. - Display the results in a user-friendly format. 4. Write a program to generate and display a multiplication table for numbers 1 to 10. 5. Generate star or number patterns like a pyramid or diamond shape.
12	1. Write simple functions for arithmetic calculations (e.g., addition, factorial). 2. Define a function <code>assign_priority()</code> for ticketing system which assigns priorities to support tickets based on the issue type (low, medium, high and returns a priority level. 3. Define function <code>calculate_interest()</code> for banking system, to calculate the interest on savings accounts based on the principal amount, rate, and time period. 4. An online store offers a discount based on the total purchase amount. If the customer's total purchase exceeds a certain threshold, they get a percentage discount. Define a function <code>apply_discount()</code> that accepts the total amount and returns the final price after discount.

13	1. Create a module that includes a function to calculate the area of a circle and use it in another script. 2. Create a package for a small project, such as a calculator application with modules for arithmetic, trigonometric, and logarithmic operations.
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7. 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-2Practice Test	7	180	50	
3	CIE-3TheoryTest	10	90	50	
4.	CIE-4Practice Test	13	180	50	
5	CIE-5 ▪ Portfolio evaluation (20) ▪ Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/AWS /any other (30)	1-13		50	
Total					50 arks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 20 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

Rubrics for the Mini Project (if included) should be defined by the course coordinator.

8. 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

9. CIE Theory Test model question paper

Program	Computer Science and Engineering			Semester – 2	
Course Name	Thinking Programming with Python			Test	I/III
Course Code	25CS21I	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. You are tasked with organizing a class party. The goal is to ensure everything is well-prepared, including food, decorations, activities, and invitations. Use decomposition to break down this problem into smaller, manageable tasks. – (10 M) b. Identify the pattern and provide an explanation to complete the series. (10M) 1. 3, 6, 11, 18, 27, __, __, __, __ 2. 1, 1, 2, 3, 5, 8, __, __, __, __ 3. 2, 4, 12, 48, __, __, __, __ 4. A2, B4, C8, D16, __, __, __, __ c. Explain the four pillars of computational thinking. – (5M)		L2,L3	1	25
2	a. You are tasked with organizing a birthday party for your best friend. The goal is to ensure the party runs smoothly. To accomplish this, break the task into smaller, manageable steps and write down the plan. – (10M) b. A magical machine only accepts even numbers and rejects odd ones. If you input an even number, the machine lights up green; if you input an odd number, it lights up red. Write an algorithm and draw flowchart to help a wizard decide whether a number can be accepted by the machine or not.- (7M) c. Identify different types of problems and provide an example algorithm to solve each. - (8M)		L2,L3	1	
Section – 2					
3	a. Explain the concept of a variable. Why are variables essential in programming? b. Define tokens. List and explain the different types of tokens with examples. c. List the rules for naming variables in Python. Provide examples of valid and invalid variable names. d. Why are constants important in programming? Illustrate with an example where a constant would be beneficial.		L2	2	25

	e. What are syntax errors, logical errors, and runtime errors?			
4	a. How can learning programming enhance one's logical thinking, creativity, and problem-solving abilities? b. Explain the concept of "thinking like a programmer" and its importance in solving real-world problems. c. Explain how identifying patterns in problems can lead to efficient solutions. Use an example to demonstrate this process. d. Trace the evolution of programming paradigms through the generations of programming languages. e. A team is building a web application with a real-time chat feature. Discuss which programming paradigms and languages might be best suited for this task and why.	L2	2	
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

10.CIE Practice Test model question paper

Program	Computer Science and Engineering			Semester	2
Course Name	Thinking Programming with Python			Test	II/IV
Course Code	25CS21I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
Write a program that performs the following tasks: 1. Generate Random Numbers: Generate a random number within a given range [a, b], where a and b are user inputs. 2. Determine non-prime Number: Determine that generated random number is not prime. 3. Classify non-prime Number: Further classify numbers into: Even / Odd Instructions: ▪ Clearly identify and describe the key concepts needed to develop the program. ▪ Structure the program into separate, reusable modules or functions.				1,2,3,4	50
Scheme of assessment a) Program Design and Conceptual Clarity (Clear identification of the key concepts, Explanation of the logic and methodology used and organization of the program.) - 10 b) Implementation and Execution - 30 c) Best Practices (Code Readability and Error Handling)- 10					
Total Marks					50

Signature of the Course Coordinator

Signature of the HOD

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

Sl.No.	Particulars	Specification	Quantity
01	Desktop/Laptop PC with Windows/Linux	Intel i3, 500GB Hard Disk/SSD, 8GB RAM, Monitor, Mouse, Keyboard or higher configuration	30
02	Internet Connection	100 Mbps speed or higher subscription	1
03	LAN connectivity/ High speed Wireless AP	32 Port Switch with LAN cabling/ Wifi Adapters (32 No.)	1
04	Online UPS	5KV with 3 -6 hours backup	1
05	Projector	Multimedia Projector	1
06	White Board	Plane white board / Smart Board/Smart TV	1
07	Audio Speakers	Multimedia, Two-way hybrid speaker system	2



**Government of Karnataka
Department of Technical Education**

Programme	All Diploma Programmes (Audit Course)	Semester	II
Course Code	Programme Specific	Type of Course	Audit
Course Name	Indian Constitution	Contact Hours	2 hours/week 26 hours/semester
Teaching Scheme	L:T:P :: 2:0:0	Credits	2
CIE Marks	50	SEE Marks	-

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

CO-01	CO1	Understand Preamble, salient features and importance of Indian Constitution.
CO-02	CO2	Understand Fundamental rights, duties and Directive principles of state policy.
CO-03	CO3	Understand Parliamentary system of governance, Structure, Functions, Power of Central, state governments (Legislative, Executive) and Judiciary.
CO-04	CO4	Understand Panchayat Raj Institutions and Local self-governments, UPSC, KPSC, NHRC, Status of women, RTE etc.

2. Course Content

Week	CO	Detailed Course Content	Contact Hours
1	1	Introduction to constitution of India-Formation and Composition of the Constituent Assembly-Salient features of the Constitution-Preamble to the Indian Constitution	2
2	1,2	Fundamental Rights- Definition, The right to equality, The right to freedom, The right against exploitation, The right to freedom of religion.	2
3	1,2	Cultural and educational rights and The right to constitutional remedies. Fundamental Duties, Directive principles of state policy.	2
4	1,3	Parliamentary system of governance- Structure of Parliament- Lok Sabha and Rajya Sabha. Functions of parliament- Legislative, Executive, Financial Function Powers of Lok Sabha and Rajya Sabha.	2
5	1,3	Procedure followed in parliament in making law, Annual financial statement (Budget) – procedure in parliament with respect to estimates, Appropriation bill, Supplementary, additional grants, Vote on account, votes on credit and exception grant, special provisions, rules of procedure.	2
6	1,3	Structure of union executive, Power and position of President. Vice President, Prime minister and council of ministers.	2

7	1,3	Structure of the judiciary: Jurisdiction and functions of Supreme Court, high court, and subordinate courts.	2
8	1,3	Federalism in the Indian constitution- Division of Powers: Union list, State list and concurrent list. Structure of state legislation, Legislative assembly and Legislative council.	2
9	1,3	Functions of state legislature, Structure of state executive-Powers and positions of Governor, Speaker, Deputy Speaker, Chief Minister and council of minister.	2
10	4	Local self-government- meaning-Three tier system, Village Panchayath-Taluk panchayat Zilla panchayath, Local bodies-Municipalities and Corporations, Bruhath Mahanagara Palike, Functions of Election commission, UPSC, KPSC.	2
11	4	Amendment of the constitution, Human Rights-Definition-constitutional provisions-right to life and liberty-Human Rights of Women-Discrimination against women steps that are to be taken to eliminate discrimination against women in Education, employment, health care, Economic and social life,	2
12	4	Status of Women in India - Women in rural areas, Constitutional Safeguards - Dowry Prohibition act 1961- Domestic violence act 2005- Sexual harassment at work place bill 2006. Human Rights of Children- Who is a child- list the Rights of the Child- Right to education, Protection of Children from Sexual Offences Act (POCSO)-2012-	2
13	1,4	National Human Rights Commission Constitution- Powers and function of the Commission-Employee rights- Provisions made, Contractual-Non contractual employee rights-Whistle blowing-definition-Aspects-Intellectual Property Rights (IPR)-Meaning-Need for protection- Briefly description of concept of patents, Copy right, Trademark	2
Total in Hours			26 Hrs

REFERENCES

1. Introduction to the Constitution of India- Dr. Durga Das Basu
2. Empowerment of rural women in India-Hemalatha H.M and Rameshwari Varma, Hema Prakashana.

4. CIE Assessment Methodologies

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

5. CIE Theory Test model question paper

Program				Semester -2	
Course Name	Indian Constitution			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.					

Signature of the Course Coordinator Signature of the HOD Signature of the IQAC Chairman