

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: ENGINEERING MATHEMATICS – I	Course Code : 15SC01M
Semester : I	Core / Elective : Core
Teaching Scheme in Hrs (L:T:P) : 4:0:0	Credits : 4 Credits
Type of course : Lecture + Assignments	Total Contact Hours : 52
CIE : 25 Marks	SEE : 100 Marks
Programmes: Common to all Engineering Diploma Programmes	

Pre-requisites:

Basics in Algebra, Trigonometry and Coordinate Geometry in Secondary Education.

Course Objectives:

1. Apply the concept of matrices and determinants and their applications to solve the linear equation in engineering field.
2. Apply the vector algebra in solving the problems of statics and mechanics.
3. Analyse the civil engineering problems using concepts of probability.
4. Evaluate the advanced engineering mathematical problems using logarithms.
5. Apply and evaluate trigonometric concept in vector engineering field.
6. Create the basic concept of calculus.

Course Content:

Topic and Contents	Hours	Marks
LINEAR ALGEBRA		
UNIT-1: MATRICES AND DETERMINANTS	10	31
(a) Matrices: Basic concepts of matrices: Definition, types of matrices and mathematical operations on matrices (addition, subtraction and multiplication of matrices).	02	
(b) Determinant: Definition, problems on finding the determinant value of 2 nd and 3 rd order. Problems on finding unknown quantity in a 2 nd and 3 rd order determinants using expansion. Solving simultaneous linear equations using determinant method (Cramer's rule up to 3 rd order).	04	

<p>(c) Inverse and applications of matrices: Minors and Cofactors of elements of matrix. Adjoint and Inverse of matrices of order 2nd and 3rd order. Elementary row and column operations on matrices. Characteristic equation and characteristic roots (eigen values) of 2x2 matrix. Statement of Cayley-Hamilton theorem and its verification for 2x2 matrix. Solution of system of linear equations using Gauss Elimination method (for 3 unknowns only).</p>	04	
ALGEBRA		
UNITS-2: VECTORS	08	27
<p>Definition of vector. Representation of vector as a directed line segment. Magnitude of a vector. Types of vectors. Position vector. Expression of vector by means of position vectors. Addition and subtraction of vectors in terms of line segment. Vector in plane and vector in a space in terms of unit vector i, j and k respectively. Product of vectors. Scalar product and vector product of two vectors. Geometrical meaning of scalar and vector product. Applications of dot (scalar) and cross (vector) products. Projection of a vector on another vector. Area of parallelogram and area of triangle. Work done by force and moment of force.</p>		
UNITS-3: PROBABILITY AND LOGARITHMS	08	14
<p>(a) Probability: Introduction. Random experiments: outcomes and sample space. Event: Definition, occurrence of an event, types of events. Algebra of events- complementary event, the events A or B, A and B, A but not B, mutually exclusive events, exhaustive events, defining probability of an event. Addition rule of probability. Conditional probability: definition, properties of conditional probability, simple problems.</p> <p>(b) Logarithms: Definition of common and natural logarithms. Laws of logarithms (no proof). Simple problems on laws of logarithms.</p>	06	02

TRIGONOMETRY		
UNIT-4: ALLIED ANGLES AND COMPOUND ANGLES.	16	47
(a)Recapitulation of angle measurement, trigonometric ratios and standard angles. Allied angles: Meaning of allied angle. Signs of trigonometric ratios. Trigonometric ratios of allied angles in terms of θ . Problems on allied angles.	02	
(b) Compound angles: Geometrical proof of $\sin(A+B)$ and $\cos(A+B)$ and hence deduce $\tan(A+B)$. Write the formulae for $\sin(A-B)$, $\cos(A-B)$ and $\tan(A-B)$, problems. Multiple and sub multiple angle formulae for $2A$ and $3A$. Simple problems. Transformation formulae. Expression for sum or difference of sine and cosine of angles into product form. Expression for product of sine and cosine of angles into sum or differences form.	06	
	08	
UNIT-5:COMPLEX NUMBERS	04	09
Meaning of imaginary number i and its value. Definition of complex number in the form of $a + ib$. Argand diagram of complex number $a + ib$ (Cartesian system). Equality of complex numbers. Conjugate of complex number. Algebra of complex numbers, modulus of complex number, principal value of argument of complex number, polar form: $Z = r(\cos\theta + i \sin\theta)$ and exponential form $Z = re^{i\theta}$ of complex number, where r is modulus and θ is principal value of argument of complex number.		
UNIT-6: INTRODUCTION TO CALCULUS	06	17
Limits: Constants and variables. Definition of function. Types of functions: Explicit and implicit function, odd and even functions(definition with example). Concept of $x \rightarrow a$.Definition of limit of a function. Indeterminate forms. Evaluation of limit of functions by factorization, rationalization. Algebraic limits. Statement of $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ where n is any rational number. Proof of $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$ where θ is in radian. Related problems. Standard limit (statement only) 1. $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \log_e a$, 2. $\lim_{x \rightarrow 0} \frac{e^x - 1}{x} = 1$ 3. $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e$, 4. $\lim_{n \rightarrow 0} (1 + n)^{\frac{1}{n}} = e$ Simple problems on standard limits.		
TOTAL	52	145

Course outcomes:

On successful completion of the course, the student will be able to:

1. Find the product of matrices, value of determinants, and inverse of matrix and solve the simultaneous linear equation.
2. Find the product of vectors and their geometrical applications in finding moment of force, work done.
3. Determine probability of various types of events.
4. Solve the problems related to logarithms.
5. Solve the problems on trigonometric functions with angle of any magnitude.
6. Evaluate the limiting value of algebraic and trigonometric functions.

Mapping Course Outcomes with Program Outcomes:

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Find the product of matrices, value of determinants, and inverse of matrix and solve the simultaneous linear equation	1,2,3	R/U/A	10	9	10	12	31
CO2	Find the product of vectors and their geometrical applications in finding moment of force, work done	1,2,3	R/U/A	8	6	15	6	27
CO3	Determine probability of various types of events	1,2,	R/U/A	8	3	5	6	14
CO4	Evaluate the integrations of algebraic, trigonometric and exponential function	1,2,3,10	R/U/A	16	15	20	12	47
CO5	Solve the problems related to logarithms.	1,2	R/A	4	3	0	6	09
CO6	Evaluate the limiting value of algebraic and trigonometric functions	1,2,10	R/U/A	6	6	5	6	17
Total Hours of instruction				52	Total marks			145

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Engineering Mathematics-I	3	3	3	-	-	-	-	-	-	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
 If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference:

1. NCERT Mathematics Text books of class XI and XII.
2. Karnataka State PUC mathematics Text Books of I & II PUC by H.K. Dass and Dr.Ramaverma published by S.Chand & Co.Pvt.Ltd.
3. CBSE Class Xi & XII by Khattar&Khattar published PHI Learning Pvt. ltd.,
4. First and Second PUC mathematics Text Books of different authors.
5. www.freebookcentre.net/mathematics/introductory-mathematics-books.html

Course Assessment and Evaluation:

The Course will be delivered through lectures, class room interaction, exercises and self-study cases.

Method	What		To whom	When/where (Frequency in the course)	Max Marks	Evidence collected	Contributing to course outcomes
DIRECT ASSESSMENT	*CIE	Internal Assessment Tests	Student	Three tests (Average of Three tests will be computed).	20	Blue books	1 to 6
		Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	5	Log of record	1 to 6
	Total			25			
	*SEE	Semester End Examination		End of the course	100	Answer scripts at BTE	1 to 6
INDIRECT ASSESSMENT	Student feedback		Students	Middle of the course	-NA-	Feedback forms	1 to 3, delivery of the course
	End of Course survey			End of course		Questionnaire	1 to 6, Effectiveness of delivery of instructions and assessment methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	25
2	Understanding	40
3	Applying the knowledge acquired from the course	30
	Analysis and Evaluation	5

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 th week of sem 10-11 Am	I/II SEM	ENGINEERING MATHEMATICS –I	20		
	Year:	Course code: 15SC01M			
Name of Course coordinator :			Units: __ CO's: ____		
Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Model Question Paper:

Code: 15SC01M

I Semester Diploma Examination

ENGINEERING MATHEMATICS –I
(Common to All Engineering Diploma Programmes)

Time: 3 Hours.] [Max marks: 100

Note:

- (i) Answer any **Ten** questions from **section-A**, any **Eight** questions from **section-B** and any **Five** questions from **section-C**.
- (ii) Each question carries **3** marks in **section-A**.
- (iii) Each question carries **5** marks in **section-B**.
- (iv) Each question carries **6** marks in **section-C**.

SECTION – A

1. Find the product of $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ -1 \\ 5 \end{bmatrix}$
2. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 1 \\ 0 & -3 \end{bmatrix}$ find $\text{adj}(AB)$.
3. If $A + B = \begin{bmatrix} 3 & -7 \\ 0 & 2 \end{bmatrix}$, $A - B = \begin{bmatrix} 1 & 5 \\ 4 & -6 \end{bmatrix}$ find A.
4. If $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - 5j + 2k$. Find the magnitude of $2\vec{a} + 3\vec{b}$.
5. If $\vec{A} = (3, -4)$, $\vec{B} = (-5, 6)$ find position vector of A and B and also find $|\overline{AB}|$
6. Three coins are tossed simultaneously. List the sample space for event.
7. If $\sin \theta = -\frac{8}{17}$ and $\pi < \theta < \frac{3\pi}{2}$ find the value of $4\tan\theta + 3\sec\theta$.
8. Find the value of $\sin 75^\circ$ using standard angles.
9. Show that $\frac{\text{cosec}(180-A)\cos(-A)}{\sec(180+A)\cos(90+A)} = \cot^2 A$
10. Prove that $\sin(A + B) \sin(A - B) = \sin^2 A - \sin^2 B$.
11. Prove that $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$.
12. Express the product $(1 + i)(1 + 2i)$ in $a + ib$ form and hence find its modulus.
13. Evaluate : $\lim_{x \rightarrow 3} \left[\frac{x-1}{2x^2-7x+5} \right]$
14. Evaluate: $\lim_{x \rightarrow \infty} \left[\frac{3x^2+4x+7}{4x^2+7x-1} \right]$

SECTION – B

1. Find the value of x if $\begin{vmatrix} 1 & x & 0 \\ 2 & -1 & 3 \\ -2 & 1 & 4 \end{vmatrix} = 0$.

2. Find the characteristic equation and its roots of a square matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$
3. Find the *sine* of the angle between the vectors $2i - j + 3k$ and $i - 2j + 2k$.
4. If vector $\vec{a} = i + j + 2k$, $\vec{b} = 2i - j + k$ show that $\vec{a} + \vec{b}$ perpendicular $\vec{a} - \vec{b}$.
5. Find the projection of $\vec{a} = 2i + j - k$ on $\vec{b} = 2i - 3i + 4k$.
6. Prove that $\frac{1}{\log_a abc} + \frac{1}{\log_b abc} + \frac{1}{\log_c abc} = 1$
7. Find the numerical value of $\sin\left(\frac{\pi}{3}\right) \cdot \cos\left(-\frac{\pi}{3}\right) - \cos\left(\frac{\pi}{4}\right) \cdot \sin\left(-\frac{3\pi}{4}\right)$
8. Prove that $\sin(A + B) = \sin A \cos B + \cos A \sin B$ geometrically
9. If $A + B + C = \frac{\pi}{2}$, prove that $\tan A \tan B + \tan B \tan C + \tan C \tan A = 1$.
10. Show that $\frac{\sin 56^\circ - \sin 44^\circ}{\cos 56^\circ + \cos 44^\circ} = \cot 82^\circ$
11. Evaluate: $\lim_{x \rightarrow 0} \left[\frac{\sqrt{1+x+x^2}-1}{x} \right]$

SECTION – C

1. Solve for x, y & z using determinant method
 $x + y = 0$, $y + z = 1$ & $z + x = 3$.
2. Solve the equation $x + y + z = 6$, $2x - 3y + z = 1$ & $x + 3y - 2z = 7$ using Gauss elimination method.
3. A force $\vec{F} = 2i + j + k$ is acting at the point $(-3, 2, 1)$. Find the magnitude of the moment of force \vec{F} about the point $(2, 1, 2)$.
4. A die is thrown twice and the sum of the numbers appearing is absorbed to be. What is the conditional probability that the number 5 has appeared at least once?
5. Prove that $\frac{\cos\left(\frac{5\pi}{2} - \theta\right)}{\sin(4\pi + \theta)} + \frac{\tan(-\theta)}{\cot(\pi - \theta)} = \sec^2 \theta$
6. Prove that $\cos 80^\circ \cos 60^\circ \cos 40^\circ \cos 20^\circ = \frac{1}{16}$
7. Find the modulus and argument of the complex number $z = -\sqrt{3} + i$ and hence represent in argand diagram.
8. Prove that $\lim_{\theta \rightarrow 0} \left(\frac{\sin \theta}{\theta} \right) = 1$ where θ is in radian.

Question Paper Blue Print:**Course: ENGINEERING MATHEMATICS – I****Course Code: 15SC01M**

UNIT NO	HOURS	Each questions to be set for 3 Marks Section - A	Each questions to be set for 5 Marks Section - B	Each questions to be set for 6 Marks Section- C	Weightage of Marks	
1	a	2	2	-	-	31
	b	4	-	1	1	
	c	4	1	1	1	
2	8	2	3	1	27	
3	a	6	1	-	1	14
	b	2	-	1	-	
4	a	8	1	1	1	47
	b	8	4	3	1	
5	4	1	-	1	9	
6	6	2	1	1	17	
TOTAL	52	14	11	08	145	
Questions to be answered		10	08	05	100	

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weigh age of model fixed for each unit.
2. The question paper pattern provided should be adhered to
Section-A: 10 questions to be answered out of 14 questions each carrying 03 marks
Section-B: 08 questions to be answered out of 11 questions each carrying 05 marks.
Section-C: 05 questions to be answered out of 08 questions each carrying 06 marks.
3. Questions should not be set from the recapitulation topics.
4. Questions should not be set from the recapitulation topics.

UNIT-1: MATRICES AND DETERMINANTS

3 MARK QUESTIONS

1. If $A = \begin{bmatrix} 3 & -9 \\ -4 & 7 \end{bmatrix}$, find $A + A'$.
2. If $A = \begin{bmatrix} 2 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & -2 \\ 3 & 1 \\ 2 & 4 \end{bmatrix}$, find AB matrix.
3. If matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ 5 & 1 & 0 \\ 1 & 0 & x \end{bmatrix}$ is a singular matrix, then find the value of x .
4. Find the adjoint of the matrix $A = \begin{bmatrix} 4 & -5 \\ 3 & -2 \end{bmatrix}$.
5. If $A = \begin{bmatrix} 3 & -1 \\ 0 & -2 \end{bmatrix}$ find the characteristic equation.

5 MARK QUESTIONS

1. Solve the equations $x + y = 3$, $2x + 3y = 8$ by Cramer's rule.
2. Solve for x , if $\begin{vmatrix} 1 & 5 & 7 \\ 2 & x & 14 \\ 3 & 1 & 2 \end{vmatrix} = 0$
3. Verify Cayley-Hamilton theorem if $A = \begin{bmatrix} 1 & 3 \\ 2 & -4 \end{bmatrix}$.
4. Verify $A(\text{Adj}A) = |A|.I$. if $A = \begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$.
5. Find the adjoint of the matrix $A = \begin{bmatrix} 3 & -1 & 2 \\ 2 & -3 & 1 \\ 0 & 4 & 2 \end{bmatrix}$

6 MARK QUESTIONS

1. Solve for x & y from the equations $4x + y = 7$, $3y + 4z = 5$, $5x + 3z = 2$ by Cramer's rule.
2. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$
3. Prove that $\text{adj}(AB) = (\text{adj}B)(\text{adj}A)$ if $A = \begin{bmatrix} -1 & 0 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$

- Find the characteristic roots of a matrix $\begin{bmatrix} 1 & -1 \\ -6 & -2 \end{bmatrix}$.
- Solve the equations by Gauss elimination method $3x - y + z = 0$, $x + 2y - 2z = 3$, $3x + z = 4$.

UNIT-2: VECTORS

3 MARK QUESTIONS

- Find the magnitude of vector $2i + 3j - 6k$
- If $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - 5j + 2k$ find magnitude of $3\vec{a} - 2\vec{b}$
- Show that $\cos \theta i - \sin \theta j$ is unit vector
- Show that the vectors $2i + 5j - 6k$, and $7i + 2j + 4k$ orthogonal vectors.
- If $\vec{a} = 5i + 2j - 4k$, and $\vec{b} = 2i - 5j + 3k$ find $\vec{a} \times \vec{b}$.

5 MARK QUESTIONS

- Find cosine of the angle between the vectors $4i - 2j - 3k$ and $2i - 3j + 4k$.
- Find the projection of \vec{b} on \vec{a} if $\vec{a} = 5i + 2j - 4k$ and $\vec{b} = 2i - 5j + 6k$.
- If $\vec{a} = 3i + 2j - 4k$ and $\vec{b} = i - 2j + 5k$ are two sides of a triangle, find its area.
- Simplify $(\vec{a} + \vec{b}) \cdot (\vec{a} - \vec{b})$ and $(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b})$.
- Find the magnitude of moment of force $4i - 2j + 5k$ about $(2, 5, -7)$ acting at $(4, 7, 0)$

6 MARK QUESTIONS

- If $A=(2,5,7)$, $B=(3,9,4)$ and $C=(-2,5,7)$ are three vertices of parallelogram find its area.
- If a force $4i + 6j + 2k$ acting on a body displaces it from $(2,7,-8)$ to $(3,9,4)$. Find the work done by the force.
- Find the sine of the angle between the vectors $4i - 2j - 3k$ and $2i - 3j + 4k$.
- Find the unit vector in the direction perpendicular to both vector $2i - 5j + k$ and $5i + j + 7k$.
- Show that the points whose position vectors are $i - 3j - 5k$, $2i - j + k$ and $3i - 4j - 4k$ form a right angled triangle.

UNIT-3: PROBABILITY AND LOGARITHMS

3 MARK QUESTIONS

- Define equally likely events, Independent event, and mutually exclusive event.
- Define probability of an event.
- A coin is tossed twice. What is the probability that at least one head occurs.
- A die is thrown once, what is the probability an odd number appears.
- If E and F are events such that $P(E)=0.6$, $P(F)=0.3$ and $P(E \cap F)= 0.2$. Find $P(E/F)$.

5 MARK QUESTIONS

1. Prove that $\frac{1}{1+\log_c ab} + \frac{1}{1+\log_a bc} + \frac{1}{1+\log_b ca} = 1$
2. If $x = \log_c ab, y = \log_b bc, z = \log_a ca$,
Prove that $xyz = x + y + z + 2$
3. If $x = \log_{2a} a, y = \log_{3a} 2a, z = \log_{4a} 3a$, prove that $xyz + 1 = 2yz$
4. If $a^2 + b^2 = 7ab$, prove that $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$
5. Solve for x given that $(\log_2 x)^2 + (\log_2 x) - 20 = 0$

6 MARK QUESTIONS

1. An integer is chosen at random from the numbers ranging from 1 to 50. What is the probability that the integer chosen is a multiple of 3 or 10?
2. Two unbiased dice are thrown once. Find the probability of getting the sum of the numbers obtained on the two dice is neither a multiple of 2 nor a multiple of 4.
3. One card is drawn from a well shuffled pack of 52 cards. If E is the event "the card drawn is a king or an ace" and F is the event "the card drawn is an ace or a jack" then find the conditional probability of the event E, when the event F has already occurred.
4. A pair of dice is thrown once. If the two numbers appearing on them are different, find the probability that the sum of the numbers is 6.
5. A family has two children. What is the probability that both the children are boys given that (i) the youngest is a boy. (ii) at least one is a boy?

UNIT-4: ALLIED ANGLES AND COMPOUND ANGLES

ALLIED ANGLES

3 MARKS QUESTIONS

1. Find the value of $\operatorname{cosec}(-1110^\circ)$
2. Find the value of $\frac{\operatorname{cosec}(180^\circ - A)\cos A}{\sec(180^\circ + A)\cos(90^\circ + A)}$
3. 3.If $\sin \theta = \frac{1}{2}$ and $\frac{\pi}{2} < \theta < \pi$, find $\cos \theta$
4. 4. If $A+B+C = 180^\circ$ Prove that $\cot\left(\frac{A+B}{2}\right) = \tan C/2$
5. 5.find the value of $\tan\left(\frac{7\pi}{3}\right)$

5 MARKS QUESTIONS

1. Prove that $\frac{\sin(180^\circ - A)\cos(360^\circ - A)\tan(180^\circ + A)}{\cos(270^\circ + A)\sin(90^\circ + A)\cot(270^\circ - A)} = 1$
2. If $\sec x = 13/5$ and $270^\circ < x < 360^\circ$, Find the value of $\frac{3 \sin x - 2 \cos x}{9 \cos x + 4 \sin x}$
3. Find the value of $\cos 570^\circ \sin 510^\circ - \sin 330^\circ \cos 390^\circ$
4. Evaluate $\frac{\sin(-\alpha)}{\sin(90^\circ + \alpha)} - \frac{\cos(-\alpha)}{\cos(90^\circ - \alpha)} - \frac{\sec(90^\circ - \alpha)}{\cos(180^\circ + \alpha)}$
5. Show that $\tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ + \operatorname{cosec} 135^\circ \sec 315^\circ = 0$

6 MARK QUESTIONS

1. Evaluate $\tan 315^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ + \operatorname{cosec} 135^\circ \sec 315^\circ$
2. Find x if $\frac{x \sin^2 300^\circ \sec^2 240^\circ}{\cos 225^\circ \operatorname{cosec}^2 240^\circ} = \cot^2 315^\circ \tan^2 300^\circ$
3. If $\sin \theta = \frac{-1}{4}$ and $\pi < \theta < \frac{3\pi}{2}$, find the value of $\frac{\cos \theta + \tan \theta}{\cot \theta + \sec \theta}$
4. Evaluate $\frac{\sin(2\pi - A)}{\sin(\pi - A)} - \frac{\tan\left(\frac{\pi}{2} + A\right)}{\cot(2\pi + A)} + \frac{\operatorname{cosec}(-A)}{\sec\left(\frac{\pi}{2} + A\right)}$
5. Show that $\tan^2(315^\circ) \cot(-405^\circ) + \cot(495^\circ) \tan(-585^\circ) = 0$

COMPOUND ANGLES

3 MARKS QUESTIONS

1. Find the value of $\sin 15^\circ$
2. Show that $\tan(45^\circ + \theta) = \frac{1 + \tan \theta}{1 - \tan \theta}$
3. Prove that $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} = 0$
4. Using $\tan(A+B)$, prove that $\cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$
5. Prove that $\frac{\sin 2A}{\sin A} - \frac{\cos 2A}{\cos A} = \sin A$

5 MARKS QUESTIONS

1. Prove that $\cos(A-B) \cos(A+B) = \cos^2 A - \sin^2 B$
2. Show that $\sin\left(A + \frac{\pi}{4}\right) + \cos\left(A + \frac{\pi}{4}\right) = \sqrt{2} \cos A$
3. If $\sin A = \frac{1}{\sqrt{10}}$, $\sin B = \frac{1}{\sqrt{5}}$ prove that $A + B = 45^\circ$
4. Prove that $\tan 3\theta - \tan 2\theta - \tan \theta = \tan \theta \tan 2\theta \tan 3\theta$
5. If $A+B = \frac{\pi}{4}$, prove that $(1 + \tan A)(1 + \tan B) = 2$

TRANSFORMATION FORMULAE

3 MARKS QUESTIONS

- 1 P.T $\frac{\cos A + \cos B}{\sin A + \sin B} = \cot\left(\frac{A+B}{2}\right)$
- 2 P.T $\frac{\sin 68^\circ + \sin 52^\circ}{\cos 68^\circ + \cos 52^\circ} = \sqrt{3}$
- 3 Show that $\cos 40^\circ - \cos 50^\circ = \sqrt{2} \sin 5^\circ$
- 4 Show that $\sin 47^\circ + \cos 77^\circ = \cos 17^\circ$
- 5 Show that $\cos 80^\circ + \cos 40^\circ - \cos 20^\circ = 0$

MARKS QUESTIONS

- 1 P.T $\frac{\sin \theta + \sin 3\theta + \sin 5\theta}{\cos \theta + \cos 3\theta + \cos 5\theta} = \tan 3\theta$
- 2 In any triangle ABC prove that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$
- 3 Show that $\frac{\sin 9^\circ + \cos 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$
- 4 Prove that $\cos 55^\circ + \cos 65^\circ + \cos 175^\circ = 0$
- 5 Prove that $\sin 20^\circ \times \sin 40^\circ \times \sin 80^\circ = \frac{\sqrt{3}}{8}$

MARKS QUESTIONS

- 1 Prove that $\cos 20^\circ \times \cos 40^\circ \times \cos 80^\circ \times \cos 60^\circ = 1/16$
- 2 In any triangle ABC prove that $\sin A + \sin B + \sin C = 4 \cos(A/2) \cos(B/2) \cos(C/2)$
 $\frac{\cos x + \cos 2x - \cos 3x - \cos 4x}{\sin x + \sin 2x + \sin 3x + \sin 4x} = \tan x$
- 3 Show that $\sin x + \sin 2x + \sin 3x + \sin 4x$
- 4 If $A+B+C = 180^\circ$ prove that $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \cos A \cos B \cos C$

5. If $A+B+C = 180^\circ$ prove that $\sin 2A - \sin 2B + \sin 2C = 4 \cos A \cos C \sin B$

UNIT-5: COMPLEX NUMBERS

3 MARK QUESTIONS

1. Evaluate i^{-999}
2. Find the complex conjugate of $(1 + 2i)(3i - 4)$
3. Express $(3 + 4i)^{-1}$ in the form $a+ib$
4. Find the real part and imaginary part of $\frac{1}{\sqrt{2} + i}$
5. If $x + iy = \cos \theta + i \sin \theta$ show that $x + \frac{1}{x} = 2 \cos \theta$

5 MARK QUESTIONS

1. Evaluate $\left(i^{19} + \left(\frac{1}{i}\right)^{25}\right)^2$
2. Find the modulus and amplitude of $(1 - i\sqrt{3})$
3. Express in $a + ib$ form: $\frac{(2+3i)}{(1+3i)(2+i)}$
4. Express the complex number $1 + i$ in the polar form.
5. Find the amplitude of $\sqrt{3} + i$ and represent in Argand diagram.

UNIT-6: INTRODUCTION TO CALCULUS

3 MARK QUESTIONS

1. Evaluate: $\lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3}$
2. Evaluate: $\lim_{\theta \rightarrow 0} \left(\frac{\tan m\theta}{\sin n\theta}\right)$
3. Evaluate: $\lim_{n \rightarrow \infty} \left(\frac{n+1}{n}\right)^n$.
4. Evaluate: $\lim_{x \rightarrow \infty} \left(\frac{3x^2 - 2x + 1}{2x^2 + 5x - 1}\right)$
5. Evaluate: $\lim_{x \rightarrow 0} \left(\frac{1 - \cos 2x}{x^2}\right)$

5 MARK QUESTIONS

1. Evaluate: $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - 1}$.
2. Evaluate: $\lim_{x \rightarrow 0} \left(\frac{\sqrt{a+x} - \sqrt{a-x}}{3x}\right)$
3. Evaluate: $\lim_{x \rightarrow 1} \left(\frac{x^m - 1}{x^n - 1}\right)$

4. Evaluate: $\lim_{\theta \rightarrow 0} \left(\frac{1 - \cos \theta + \tan^2 \theta}{\theta \sin \theta} \right)$

5. Evaluate: $\lim_{x \rightarrow 0} \left(\frac{e^{ax} - e^{bx}}{x} \right)$.

6 MARK QUESTIONS

1. Prove that $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$, if θ is in "radian".

2. Evaluate: $\lim_{x \rightarrow 0} \left(\frac{\sin \pi x}{x-1} \right)$

3. Evaluate: $\lim_{n \rightarrow \infty} \left(\frac{(5-n^2)(n-2)}{(2n-3)(n+3)(5-n)} \right)$.

4. Evaluate: $\lim_{x \rightarrow 1} \frac{x^2 - 5x + 4}{x^2 - 12x + 11}$.

5. Evaluate: $\lim_{x \rightarrow 2} \left(\frac{x^2 - 4}{\sqrt{x+2} - \sqrt{3x-2}} \right)$





Government of Karnataka
Department of Technical Education, Bengaluru

Course: ENGINEERING MATHEMATICS - I

Course code: 15SC01M

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Dr. D.S. Prakash	Asst. Director (LRDC)	DTE, Bengaluru
2	Dr.MokaShekhu, ,	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
3	Sri.Sathyanaraya Dixit,	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru
4	Sri. Guruprasad V	Lecturer (Selection Grade /Science)	APS Polytechnic, Somanahalli
5	Dr.RajasekharHeera,	Lecturer/Science,	Government Polytechnic, Gulbarga.

Curriculum Review committee

	Name	Designation	Institution
1	Dr.MokaShekhu, ,	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
2	Sri.Sathyanaraya Dixit,	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	: APPLIED SCIENCE	Course Code	: 15SC03S
Semester	: I / II	Course Group	: Core
Teaching Scheme in Hrs (L:T:P)	: 4:0:0	Credits	: 4 Credits
Type of course	: Lecture & Assignments	Total Contact Hours	: 52
CIE	: 25 Marks	SEE	: 100 Marks
Programme: Common to all Engineering Diploma Programmes			

Prerequisite:

Dynamics, Heat, Sound, Matter, recent trends in Physics, Basic chemistry in Secondary Education.

Course Objective:

1. Learn concepts of Units, Laws of vectors, parallel forces, moment of force, couple.
2. Learn the fundamentals of properties and behavior of the materials
3. Learn the concepts of heat and thermodynamics.
4. Enhance theoretical and practical principles with applications of sound wave.
5. Understand different types of communication systems.
6. Develop awareness about corrosion, materials, and energy sources in engineering field.

Course Content:

UNIT I: MECHANICS

(08 Hrs)

Units and Measurements: Definition of unit, types of unit (fundamental and derived)

SI units: Definition, Basic and supplementary units, advantages.

Measuring Instruments: Vernier calipers, principle and least count, diagram of vernier calipers with labeling the parts. Screw gauge (pitch, ZE, ZC), principle and least count, diagram of screw gauge with labeling the parts, simple problems.

Scalars and Vectors: Definition of scalar and vector with examples, representation of a vector, definition of resultant, equilibrium and equilibrant. Laws of vectors: Statement of law of parallelogram of forces, Converse law of triangle of forces, Lami's theorem. Deriving an expression for magnitude and direction of resultant of two vectors acting at a point. Resolution of vectors, mentioning rectangular component of resolution of vector.

Experimental verification of law of parallelogram of forces, Converse law of triangle of forces, Lami's theorem. Simple problems on laws of vectors

Parallel forces. Types of parallel forces, Moment of force: definition, S.I unit, types and examples. Couple: definition with examples. Moment of a couple. Conditions of equilibrium of coplanar parallel forces, applications. Experimental verification of Conditions of equilibrium of coplanar parallel forces using moment bar and simple problems.

UNIT-2: PROPERTIES OF SOLIDS AND LIQUIDS:

(10 Hrs)

Properties of solids: Definitions of deforming force, elasticity and plasticity, examples for elasticity and plasticity, definition of stress and its types with examples and its S.I unit, definition of strain and its types with examples, elastic limit, Hooke's law, stress - strain graph with explanation. Modulus of elasticity and its types, derivation of an expression for Young's modulus of a material. Definition of Compressibility and factor of safety. Simple problems on stress, strain and Young's modulus.

Properties of liquids: Definition of thrust and pressure with S.I units. Derivation of expression for pressure at a point inside the liquid at rest, simple problems.

Energy of liquid in motion: Kinetic, Potential energies and Pressure energy in moving liquid. Bernoulli's theorem: statement and expression (No derivation). Cohesive and adhesive forces, angle of contact.

Surface Tension: Definition of surface tension and its S.I unit, factors affecting surface tension, applications of surface tension, capillarity and its applications.

Viscosity: Types of flow of liquid, definition of stream line flow and turbulent flow, definition of viscosity, expression for coefficient of viscosity, experimental determination of coefficient of viscosity of water, effect of temperature on viscosity. List of applications of viscosity. Simple problems.

UNIT III: HEAT AND PROPERTIES OF GASES.

(07Hrs)

Concept of heat & temperature: Definitions of heat and temperature with S.I units, definition of Specific heat of substance with S I unit, equation for specific heat of a substance (no derivation).

Transmission of heat: Definitions of conduction, convection and radiation with examples, definition of thermal conductivity, derivation of co-efficient of thermal conductivity(K) and its S.I unit. Applications of conduction, convection and radiation, simple problems on K.

Gas laws: Statement of Boyle's law, Charle's law, Gay-Lussac's law, derive the relation between them ($PV=nRT$), definition of C_p and C_v , relation between them (Mayer's equation no derivation), simple problems on Boyle's law and Charle's law.

Thermodynamics: Definition of thermodynamics, Laws of thermo dynamics: Zeroth law, 1st law and 2nd law (only statement), types of thermodynamics process: isothermal process, adiabatic process.

UNIT IV: WAVE MOTION

(10Hrs)

Simple Harmonic Motion: Definition of periodic motion with example, definition of Simple Harmonic Motion, representation of S.H.M with respect to particle in circular motion, derivation of displacement of a particle executing S.H.M. Definitions of period, frequency, amplitude, in case of vibrating particle.

Wave: Definition of wave, wave period(T), wave frequency (n or f), wave amplitude (a), wave length(λ) and wave velocity (v) in case of wave motion. Derive the relation between v , n and λ . simple problems.

Types of waves: Mechanical and Non mechanical waves with examples. Definition of longitudinal and transverse waves, differences.

Propagation of sound waves in air: Newton's formula for the velocity of sound in air and Laplace's correction to it, various factors affecting velocity of sound in air. Simple problems.

Vibrations: Free vibrations, Forced vibration, Damped vibrations and Un-damped vibrations with examples. Resonance with examples. Laws of transverse vibrations of stretched string, derivation of equation for fundamental frequency of vibrations of stretched string. Simple problems.

Experiment to determine the unknown frequency of a given tuning fork by absolute and comparison methods using sonometer.

Stationary waves: Formation of stationary waves and their characteristics. Experimental determination of velocity of sound in air by using resonance air column apparatus.

Beats: Formation of Beats, definition of beat frequency, its applications.

UNIT V:MODERN PHYSICS

(07Hrs)

Electromagnetic waves: Definition, generation of electromagnetic waves and their properties.

Electromagnetic spectrum: Definition, classification and its applications.

Lasers: Principle and listing the types of Laser, properties of Laser, applications.

Nano-Technology: Definition of Nano-Technology, advantages and dis-advantages of nano-Technology.

Advance Communication Systems: Basic elements of communication systems with block diagram, List commonly used terms in electronic communication systems.

Satellite communication: Introduction, advantages and disadvantages,

Optical fiber: principle and applications.

UNIT VI: INDUSTRIAL CHEMISTRY

(10 Hrs)

Electrolysis: Definition of electrolyte, types of electrolytes with examples, definition of electrolysis. Arrhenius theory of electrolytic dissociation. Mechanism of Electrolysis. Faradays laws of Electrolysis: state and explain.

Corrosion: Definition, necessary conditions for corrosion, electrochemical theory of corrosion, list the preventive methods of corrosion.

Batteries: Basic concept, classification and applications of batteries.

Fuel cells: Definition, mentioning the types and advantages.

Metallurgy: Definitions of minerals, ore, flux, slag, alloys. Purpose of making alloys, composition and uses of alloys.

Polymers: Definition and classification of polymers, methods of polymerization and applications.

Composite materials: Definition, types, advantages and dis-advantages of composite materials.

Solutions: Definition of solute, solvent, solutions. Saturated and unsaturated solutions, concentration of solutions: normal, molar and molal solutions, simple problems on concentration of solution.

pH Value: Hydrogen ion concentration and concept of pH, definition of pH of solution, pH scale, applications of pH in different fields.

Course Delivery:

The Course will be delivered through lectures, class room interaction and exercises.

Course Outcome:

On successful completion of the course the student will be able to:

1. Determine the dimensions of objects using measuring instruments and analyze vector in mechanics.
2. Create knowledge of properties of matter applicable to engineering.
3. Apply the concepts of thermal properties of matter and gas laws related to engineering.
4. Analyse the different concepts of waves and vibration in the field of engineering.
5. Analyse the recent trends in physics related to engineering.
6. Apply the basic concepts of chemistry in the field of engineering.

Mapping Course Outcomes with Program Outcomes:

CO –PO mapping

	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Determine the dimensions of objects using measuring instruments and analyze vector in mechanics	1,2,3,4,9	R/U/A	08	8	10	6	24
CO2	Create knowledge of properties of matter applicable to engineering.	1,2	R/U/A	10	6	15	6	27
CO3	Apply the concepts of thermal properties of matter and gas laws related to engineering	1,2,3,9	R/U/A	07	4	10	6	20
CO4	Apply the different concepts of waves and vibration in the field of engineering.	1,2,3,9	R/U/A	10	4	10	18	32
CO5	Apply the recent trends in physics related to engineering.	1,2,6	R/U/A	07	4	10	6	20
CO6	Apply the basic concepts of chemistry in the field of engineering.	1,2,6	R/U/A	10	4	20	6	30
		Total Hours of instruction		52	Total marks			153

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Applied Science	3	3	3	1	-	2	-	-	2	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3. If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2. If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1. If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference Books:

1. Principle of physics for class XI and XII by V.K.Mehata and Rohit Mehta, as per Karnataka state PUC syllabus S.Chand and Company, New Delhi
2. Engineering chemistry for Diploma by Ranjan Kumar Mahapatra (PHI Learning Pvt. Ltd., New Delhi)
3. Basic Physics by Kongbam Chandramani Singh (PHI Learning Pvt. Ltd., New Delhi)
4. Principle of physics by P.V.Naik (PHI Learning Pvt. Ltd. New Delhi)

Website:

1. www.rsc.org/Education/Teachers/resources/Inspirational/.../4.3.1.pdf
2. [www.nanogloss.com/nanotechnology/advantages and disadvantages](http://www.nanogloss.com/nanotechnology/advantages%20and%20disadvantages)
3. [www.freebookcentre.net/physics/ introductory-physics-books.html](http://www.freebookcentre.net/physics/introductory-physics-books.html)

e-books:

1. Introduction to physics – II, Robert P Johnson.
2. Lecture notes physics university of Rochester.
3. Text book of Physics poynting J.H Thomson sir J.J.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Books	1 to 6
		Class room Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	05	Log of Activity	1 and 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 3 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 6 Effectiveness of delivery of instructions and assessment

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th week of sem 10-11 Am	I/II SEM	APPLIED SCIENCE	20			
	Year:	Course code:15SC03S				
Name of Course coordinator :			Units:___ CO's:_____			
Question no	Question	MARKS	CL	CO	PO	
1						
2						
3						
4						

Note: Internal Choice may be given for each CO at the same cognitive level (CL).

Question Paper Blue Print:

Course Title : **APPLIED SCIENCE** Course Code : **15SC03S**

Name and Unit No.	Allotted Hours	Questions to be set for (2marks)	Questions to be set for (5marks)	Questions to be set for (6marks)
		PART - A	PART - B	PART - C
Mechanics I	08	04	02	01
Properties of Solids and Liquids II	10	03	03	01
Heat and properties of gases III	07	02	02	01
Wave motion IV	10	02	02	03
Modern Physics V	07	02	02	01
Industrial chemistry VI	10	02	04	01
Total	52	15	15	8

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weightage of model fixed for each unit.
2. The question paper pattern provided should be adhered to
Part – A: 10 questions to be answered out of 15 questions each carrying 02 marks
Part – B: 10 questions to be answered out of 15 questions each carrying 05 marks.
Part – C: 05 questions to be answered out of 08 questions each carrying 06 marks.

Model Question Paper:

Code:15SC03S

I Semester Diploma Examination
APPLIED SCIENCE
(Common for All Engineering Programmes)

Time: 3 Hours][Max Marks: 100

- Note:** i) Answer any 10 questions from section A, each carry 02marks.
ii) Answer any 10 questions from section B, each carry 05 marks.
iii) Answer any 05 questions from section C, each carry 06 marks.

SECTION – A

1. Define Unit.
2. Differentiate scalars and vectors.
3. Define Resultant of forces.
4. Define moment of couple.
5. Define plasticity.
6. Define compressibility.
7. Define viscosity of liquid.
8. Define specific heat of substance.
9. Define thermodynamics.
10. Define time period.
11. Define beats.
12. Define Electro-magnetic waves.
13. Define Nano-Technology.
14. Define electrolyte.
15. Define composite materials.

PART-B

1. Draw a neat diagram of Vernier calipers and label its parts.
2. Write the condition for equilibrium of coplanar parallel forces with an example.
3. Explain stress-strain graph.
4. Define K.E of liquid in motion. State Bernoulli's theorem.
5. Define capillarity? Write any three application of surface tension.
6. State 1st law of thermodynamics. Explain isothermal & adiabatic process.
7. State the three gas laws.(Boyle's law, Charle's law & Gay-Lussac law)

8. Explain mechanical & non-mechanical waves with examples.
9. Distinguish between longitudinal & transverse waves.
10. Write any three advantages and two disadvantages of F.M.
11. Write the principle of laser. List its properties.
12. Explain the mechanism of electrolysis of HCL.
13. Write the basic concepts of batteries. Mention any three applications of batteries.
14. Distinguish between minerals and ore. Write any three applications of pH.
15. Define composite materials. Write the advantages of composite materials.

PART-C

1. Derive an expression for magnitude and direction of resultant of two forces acting at a Point.
2. Describe an experiment to determine coefficient of viscosity of water by Poiseuille's method.
3. 1.25cc volume of a gas at 15°C & 755mm of mercury pressure. Calculate volume at NTP.
4. Derive an expression for fundamental frequency of transverse vibrations of stretched string.
5. Describe an experiment to find the unknown frequency of the given tuning fork using sonometer by comparison method.
6. Calculate the velocity of sound in air at 25°C & 75cm of mercury pressure, if the density of air at 0°C & 76cm of mercury pressure is 1.29kgm^{-3} . (given $\gamma=1.41$ for air).
7. Write the basic elements of communication system with block diagram.
8. Explain any two methods of polymerization.

---0-0-0---

Model Question Bank:

Course Title : **APPLIED SCIENCE**

Course Code : **15SC03S**

UNIT – I : MECHANICS

PART – A (02MARKS QUESTIONS)

1. Define unit of a physical quantity.
2. Define fundamental and derived units.
3. List supplementary units in S.I systems.
4. Define S.I units give two eg of S.I, basic units.
5. Define least count of measuring instrument.
6. Write the principle of Vernier calipers and screw gauge.
7. Define least count of Vernier calipers?
8. Define pitch of a screw.
9. Define ZE and ZC in screw gauge.
10. Define scalar quantity & give its examples.
11. Define vector quantity & give its examples.
12. Write the relation between resultant and equilibrant.
13. State law of parallelogram of vectors.
14. State Converse law of triangle of forces.
15. State Lami's theorem.
16. Define moment of force.
17. Write the two rectangular component of a vector.
18. Write how moment of force is measured.
19. Discuss why the handles of the doors and windows are fixed at the end.
20. Define couple.
21. Define is moment of couple.
22. Write how you measure moment of couple.
23. Define equilibrium.
24. Write the conditions of equilibrium when number of co-planar parallel forces acting on a body.
25. Define like & unlike parallel forces.

PART – B (05 MARKS QUESTIONS)

1. Mention seven basic units and two supplementary units of SI system.
2. Draw a neat diagram of Vernier calipers and label its parts.
3. Draw a neat diagram of Screw Gauge and label its parts.
4. Explain parallel forces with their types.

5. List two types of moment of force. Write any three applications of couple.
6. Write the advantages of S.I system.
7. Mention the difference between scalars and vectors.
8. State Converse law of triangle of forces; write the line diagram & equation of Converse law of triangle of forces.
9. State Lami's theorem, write the line diagram & equation of lami's theorem
10. Define moment of force, write the equation to measure moment of force & give its examples.

PART – C (06 MARKS QUESTIONS)

1. Derive an expression for magnitude and direction of resultant of two forces acting at a point.
2. Derive an expression for horizontal and vertical components of force acting at an angle θ with horizontal.
3. Write the conditions for equilibrium of coplanar parallel forces acting on a rigid body with equations & diagram.
4. Describe an experiment to verify law of parallelogram of forces.
5. Describe an experiment to verify Converse law of triangle of forces.
6. Describe an experiment to verify Lami's theorem.
7. Describe an experiment to verify the conditions of equilibrium of co-planar parallel forces using moment bar.
8. A main scale is divided into 0.5 mm the length of vernier attached to it is 12mm and is divided into 25 equal parts. Calculate the value of 1 vsd and L.C of vernier.
9. In Vernier calipers, main scale is divided into 1mm; 9 division of main scale is divided into 10 equal parts on Vernier scale. In a setting zero of Vernier scale lies between 4.8cm and 4.9cm, and 7th division of vernier coincide with the main scale division. What is the total reading?
10. A screw gauge has a pitch of 0.5mm and 50 divisions on head scale. The reading when jaws touch is +5div. When gripping a wire the reading is 3 turns and 17 div. What is the diameter of the wire?
11. The resultant of two equal forces acting at a right angle to each other is 1414N. Find the magnitude of each force.
12. Two forces of 5kg wt. and 10kg wt. acts at right angles to one another. Find the magnitude and direction of the resultant forces.
13. Two unlike parallel forces equal to 20N and 12N acts at two points A and B on a rigid body. Find the magnitude and direction of their resultant and the point where it acts if $AB=0.8m$
14. Two like parallel forces equal to 80N and 100N act on a body at two points A and B. If $AB=0.6m$, find the magnitude and the point where their resultant acts.
15. Three forces P, Q and 100 N acting on a body in equilibrium. If the angles opposite to P and Q are 120° and 150° respectively. Find the magnitude of P and Q.

UNIT II: PROPERTIES SOLIDS & LIQUIDS

PART – A (02MARKS QUESTIONS)

1. Define plasticity.
2. Define elasticity.
3. Define deforming force.
4. Define restoring force.
5. Define stress.
6. Write the types of stress.
7. Define strain.
8. Write the type of strain.
9. Define elastic limit.
10. State Hooke's law.
11. Define Young's modulus.
12. Define Bulk modulus.
13. Define Rigidity modulus.
14. Define compressibility? Write its S.I unit.
15. Write S.I units of stress and strain.
16. Define pressure of liquid.
17. Write equation for the pressure at a point inside the liquid at rest.
18. State Bernoulli's theorem.
19. Define cohesive force.
20. Define Adhesive force.
21. Write reason why glue stick to paper?
22. Define angle of a contact.
23. Name the type of angle of a contact formed for water and glass, water and mercury.
24. Define surface tension.
25. List the factors affecting surface tension.
26. Define capillarity.
27. Write any four applications of capillarity.
28. List the applications of surface Tension.
29. Write the equation used to determine surface tension of water by capillary raise method.
30. Define viscous force.
31. Give two examples of viscous liquid.
32. Define co-efficient of viscosity. Write its S.I unit.
33. List the factors affecting viscosity of liquid.
34. Write the effect on viscosity of gas if temperature is increased.
35. Write any four applications of viscosity.
36. List the types of flow of liquid.

PART – B (05 MARKS QUESTIONS)

1. Explain elasticity with an example.
2. Define elasticity and list three types of moduli of elasticity.
3. Define strain. Write the types of strain. Give e.g. for each type of strain.
4. Define stress. Write the types of stress. Give e.g. for each type of stress.
5. Define elastic limit. State Hooke's law? Write its mathematical form .
6. Explain stress-strain graph.
7. Define compressibility and factor of safety. Write the SI unit of stress.
8. Define thrust and pressure, write their SI units.
9. Define K.E and P.E of liquid. State the Bernoulli's theorem.
10. Define cohesive and adhesive force with an example.
11. Define pressure energy and angle of contact.
12. Define two types of flow of liquid with an example.
13. Define angle of a contact. What type of angle of contact is formed for water and glass, water and mercury? List the factors affecting surface tension.
14. Define capillarity. Write any four applications of capillarity.
15. Write the difference between stream line flow and turbulent flow of liquids.
16. Define viscosity and write the effect of temperature on viscosity of liquid & gas.
17. Define stress and explain the types of stress.
18. Define strain and explain the types of strain.
19. State Hooke's law? List any three applications of viscosity.
20. Define surface tension. Mention any three factors affecting surface tension.

PART – C (06 MARKS QUESTIONS)

1. Derive an expression for young's modulus of elasticity.
2. Derive an expression for pressure at any point inside the liquid at rest.
3. Derive an expression for co-efficient of viscosity of liquid.
4. Describe an experiment to determine the surface tension of water by capillary rise method.
5. Describe an experiment to determine coefficient of viscosity of water by Poiseuille's method.
6. A uniform wire of length 0.5m and diameter 0.0006m when stretched by a mass of 5kg extends by 0.0004m. Calculate Young's modulus of wire.
7. A wire of length 1m is fixed at one end and a mass of 1kg is hung from free end, the area of cross section of the wire is $2.5 \times 10^{-6} \text{ m}^2$ and the Young's modulus of the material of the wire is $2 \times 10^{11} \text{ Nm}^{-2}$. Calculate stress, strain and extension of the wire.
8. A spring 60cm long is stretched by 2cm by the application of a load 200g. What will be the length when the load of 500g is applied (given $g = 980 \text{ cm/s}^2$).

9. A rectangular tank is 3m long, 2m wide and 1.5m in height, it contains water to a depth of 1m, the density of water is 1000kg/m^3 . Calculate the pressure at the bottom of the tank.
10. Calculate the pressure at the bottom of a swimming pool 10m wide if the water is 3m deep, the density of water is 1000kg/m^3 .
11. A square plate of 6cm side moves parallel to another plate with a velocity of 10cm/s, both the plates being immersed in water ($\eta = 0.01\text{poise}$). If the distance between the plates 0.5mm. Calculate the viscous force.
12. In a certain experiment on the flow of water through a capillary tube, the following data were obtained. Volume of water coming out per minute = 15cc; pressure head of water = 30cm
Length of tube = 25cm; radius of tube = 0.05cm; calculate coefficient of viscosity of water ($g=980\text{cm/s}^2$, density = 1gm/cc)
13. A castor oil of viscosity 98.6NS/m^2 fills the space between two horizontal plates 1cm apart. If the lower plate is stationary and upper plate is moving horizontally with a velocity of 3m/s. Find the tangential force per unit area.

UNIT-III: HEAT AND PROPERTIES OF GASES.

PART – A (02MARKS QUESTIONS)

1. Define heat & write SI unit of heat.
2. Define temperature & write SI unit of temperature.
3. Define specific heat of substance & write its SI unit.
4. Define conduction of heat.
5. Define convection of heat.
6. Define Radiation of heat.
7. Define Thermal conductivity.
8. Define specific heat of a gas at constant volume.
9. Define specific heat of a gas at constant pressure.
10. State Boyle's law.
11. State Charle's law.
12. State Gay-Lussac's law
13. Define isothermal process.
14. Define adiabatic process.
15. Define thermodynamics.
16. State zeroth law of thermodynamics.
17. State Ist law of Thermodynamics.
18. State IInd law of Thermodynamics
19. Write Mayer's equation.

PART – B (05 MARKS QUESTIONS)

1. Write any five differences between heat & temperature.

2. Define heat, temperature & specific heat of Substance. Write Mayer's equation for gas.
3. Define conduction, convection, radiation and thermal conductivity.
4. Write any five applications of conduction.
5. Write any five applications of convection.
6. Write any five applications of radiation.
7. Define C_p & C_v , write the relation between them.
8. Define conduction, write applications of conduction.
9. Define convection, write applications of convection.
10. Define radiation, write applications of radiation..
11. State 1st law of thermodynamics, explain isothermal & adiabatic process.
12. Derive an expression for coefficient of thermal conductivity (K).
13. Compare the three modes of transfer of heat.
14. State the three gas laws. (Boyle's law, Charle's law & Gay-Lussac's law).
15. State zeroth law, 1st law & 2nd law of thermodynamics.

PART – C (06 MARKS QUESTIONS)

1. With usual notations prove that $pV = nRT$
2. Define thermal conductivity. Derive an equation for co-efficient of thermal conductivity (K).
3. Define specific heat of a substance. Derive an equation for specific heat of substance.
4. Describe an experiment to verify Boyle's law.
5. The volume of a gas at 27°C at 2 atmospheric pressure is 2 liters.
If the pressure is double & absolute temperature is reduced to half.
What will be the new volume of gas?
6. A sealed glass bulb contains air at 30°C at normal pressure. The bulb is immersed in an oil bath & heated gradually. Find the temperature in degree centigrade at which the bulb bursts if it can withstand a maximum pressure of 3.5 atm.
7. The volume of certain mass of a gas at STP is $2 \times 10^{-4} \text{ m}^3$. Find its volume at 27 °C at pressure $2.2 \times 10^5 \text{ Pa}$.
8. The volume of a gas at 15°C is 1.25 cc & 755 mm of mercury pressure. Calculate volume at NTP.
9. How much heat is required to raise the temperature of 5 kg of copper from 27°C to its melting point of 1063°C? Given that specific heat of copper is 400 J/kg°C.
10. A hot iron ball of mass 0.2 kg is dropped into 0.5 g of water at 10°C. The resulting temperature is 30°C. Calculate the temperature of the hot ball. Specific heat of iron = 336 J/kg°C and specific heat of water = 4200 J/kg°C.
11. A silver rod 0.15 m long has cross-sectional area of 0.0003 m². If one end is maintained at 10°C and other end at 75°C. How much heat will flow through the rod in 5 minutes? Given that co-efficient of thermal conductivity of silver = 406 J/ms°C.

UNIT-IV: WAVE MOTION

PART – A (02MARKS QUESTIONS)

1. Define frequency and amplitude of a vibrating particle.
2. Write the relation between frequency and time period.
3. Define periodic motion with example.
4. Define S.H.M with example.
5. Write the equation for displacement of the particle in S.H.M.
6. Define wave motion.
7. Define wave period, wave frequency.
8. Write the relation between wave velocity, wavelength & wave frequency
9. Define non mechanical wave. Give an example.
10. Define mechanical wave. Write two types of Mechanical wave
11. Define transverse wave & give an example.
12. Define longitudinal wave & give an example.
13. Write any two differences between transverse wave and longitudinal wave.
14. Write two characteristics of transverse wave.
15. Write two characteristics of longitudinal wave.
16. Write Newton's equation for velocity of sound in a medium and name the terms involved in the equation.
17. Write the Newton's Laplace equation for velocity of sound in air
18. Write the effect of pressure on velocity of sound in air.
19. Write the effect of temp on velocity of sound in air.
20. Write the equation for velocity of sound in air at 0°C.
21. Write the effect of humidity on velocity of sound in air.
22. Define free and forced vibration.
23. Define natural frequency.
24. Define resonance.
25. Give any two practical examples of resonance.
26. Define how stationary waves are produced?
27. Write any two characteristics of stationary waves.
28. Define nodes and antinodes.
29. Write the difference between stationary waves and progressive waves.
30. Write the fundamental note in vibration of stretched string.
31. Write the formula for the fundamental frequency of vibration of stretched string.
32. State the law of tension as applied to the vibration of stretched string.
33. State the law of length as applied to the vibration of stretched string.
34. State the law of mass per unit length as applied to the vibration of stretched string.
35. Define beats.
36. Define beat frequency.
37. Write any two applications of beats.

38. Write how beat frequency can be calculated?

PART-A (05 MARKS QUESTIONS)

1. Define period, frequency & amplitude of vibrating particle.
2. Explain mechanical & non mechanical waves with examples.
3. Define longitudinal waves & transverse waves.
4. Define beat and beat frequency.
5. Obtain the relation between v , n and λ .
6. Define periodic motion & SHM with example in each.
7. Derive an expression for displacement of a particle executing SHM.
8. Define wave period, wave frequency, wave amplitude, wave length and wave velocity.
9. Distinguish between longitudinal & transverse waves.
10. Explain propagation of sound waves in air with practical example.
11. Describe Newton's formula for velocity of sound in air.
12. Explain Newton's formula for velocity of sound in air and hence Laplace correction to it.
13. Explain various factors affecting velocity of sound in air.
14. What is stationary wave? Mention the characteristics of stationary waves.
15. Why the soldiers are asked to break steps while marching across bridges.

PART- C (06 MARKS QUESTIONS)

1. Derive an expression for displacement of a particle executing SHM
2. Derive an expression for velocity of wave in terms of its frequency and wavelength.
3. Derive an expression for fundamental frequency of vibrations of stretched string.
4. Describe an experiment to determine the velocity of sound in air at room temperature by resonance air column method.
5. Describe an experiment to find the unknown frequency of the given tuning fork using sonometer by comparison method.
6. Describe an experiment to determine frequency of Turing fork by absolute method using sonometer.
7. A wave of frequency 600MHZ travels at a speed of 3×10^8 m/s. Calculate its wavelength & calculate the frequency of same type of wave whose wavelength is 40m.
8. If the frequency of tuning fork is 500Hz & velocity of sound is 300m/s. Find how far sound travels while the fork completes 25 vibrations.
9. Calculate the velocity of sound in air at 25°C & 75cm of mercury pressure, if the density of air at 0°C & 76cm of mercury pressure is 1.29kgm^{-3} . (Given $\gamma=1.41$ for air).
10. Calculate the speed of sound at -50°C & at $+100^\circ\text{C}$, given speed of sound at 0°C is 332 m/s.
11. The density of air at NTP is 1.293kgm^{-3} & $\gamma=1.402$. Calculate the frequency of a tuning fork which emits sound of wavelength 0.75m at 26°C .
12. A string of length 2m is stretched by a force of 3200N. If the frequency of vibration is

- 100Hz. Find the mass of the string.
13. A string has length of 0.3m & weight 2×10^{-3} kg. What must be the tension in the string so that when vibrating string transversely, it has a fundamental frequency 320 Hz?
 14. A Sonometer wire of 0.5m long vibrates in two segments & is stretched by a force of 5kg wt. Calculate the frequency of the note emitted. ($g=9.8\text{m/s}^2$ linear density of the wire= 0.018kg/m).
 15. The frequency of Sonometer wire is doubled when the tension is increased by 12kg wt. Find the original tension.

UNIT V: MODERN PHYSICS

PART – A (02MARKS QUESTIONS)

1. Define electromagnetic waves.
2. State two characteristics of electromagnetic waves.
3. Write how electromagnetic waves are produced?
4. Define electromagnetic spectrum.
5. Write any two uses of electromagnetic spectrum.
6. Write the principle of LASER.
7. List any two types of LASER.
8. Write any two principle of LASER.
9. Write any two applications of LASER.
10. Define nanotechnology.
11. Write two advantages of nanotechnology.
12. Write two disadvantages of nanotechnology.
13. Write what do you mean by communication?
14. Write the basic elements of communication system.
15. List any two commonly used terms in electronic communication system.
16. Write two advantages of communication satellite.
17. Write two disadvantages of communication satellite.
18. Define optical fiber.
19. Write the principle of optical fiber.
20. Write two advantages of optical fiber.

PART-B (05 MARKS QUESTIONS)

1. Describe the generation of electromagnetic waves.
2. Write any five properties of electromagnetic waves.
3. Explain how electromagnetic spectrum is classified?
4. Write any five applications of electromagnetic spectrum.
5. Explain the principle of LASER. List the properties of LASER.
6. Write any five advantages of LASER.
7. Write five advantages of nanotechnology.
8. Write advantages and disadvantages of nanotechnology.

9. Write the block diagram of communication system.
10. List any five commonly used terms in electronic communication system..
11. Write five advantages of satellite communication.
12. Write any five disadvantages of satellite communication.
13. Write any five advantages of optical fiber.
14. Explain satellite communication. List any two disadvantages of satellite communication system.

PART- C (06 MARKS QUESTIONS)

1. Define electromagnetic waves. Write four properties of electromagnetic waves.
2. Define electromagnetic spectrum. Explain how electromagnetic spectrum is classified.
3. Write the applications of electromagnetic spectrum.
4. List six applications of LASER.
5. Write six advantages of nanotechnology.
6. Write what you mean by communication system. Write the block diagram of communication system..
7. Define satellite communication system. Write four advantages of satellite communication system.
8. Write the principle of optical fiber. Write four applications of optical fiber.

UNIT VI INDUSTRIAL CHEMISTRY

PART – A (02MARKS QUESTIONS)

1. Define electrolysis.
2. Define electrolyte.
3. Write any four examples of electrolyte.
4. Define strong and weak electrolyte.
5. Write any two postulates of Arrhenius theory of electrolytic dissociation.
6. State Faradays Ist law of electrolysis.
7. State Faradays IInd law of electrolysis.
8. Define corrosion.
9. List any two preventive methods of corrosion.
10. Define batteries.
11. Write any two applications of batteries.
12. Define fuel cells.
13. Write any two types of fuel cells.
14. Write any two advantages of fuel cells.
15. Define minerals.
16. Define ore.
17. Define flux.
18. Define slag.
19. Define an alloy.
20. Write any two uses of alloys.

21. Define polymers.
22. Define polymerization.
23. Write any two applications of polymers.
24. List the methods of polymerization.
25. Define composite materials.
26. Write any two types of composite materials.
27. Write two advantages of composite materials.
28. Write two disadvantages of composite materials.
29. Define solute.
30. Define solvent.
31. Define solution.
32. Define saturated solution.
33. Define unsaturated solution.
34. Define concentration of a solution.
35. Define normal solution.
36. Define molar solution.
37. Define molal solution.
38. Define pH of a solution.
39. Write any two applications of pH.
40. Write hydrogen ion concentration in case of neutral solution.

PART-B (05 MARKS QUESTIONS)

1. Explain the mechanism of electrolysis of HCl.
2. Define corrosion. Write the necessary condition of corrosion.
3. Write any five postulates of Arrhenius theory of electrolytic dissociation.
4. State Ist and IInd Faraday's laws of electrolysis.
5. Write any five preventive methods of corrosion.
6. Write the classification of batteries. Write two applications of batteries.
7. Write two types of fuel cells. List any three advantages of fuel cells.
8. Define alloys. Write the purpose of making alloys.
9. Write the classification of polymers. Write any three applications of polymers.
10. Define composite material. Write any two advantages of composite materials.
11. Calculate the concentration of solution when 110 gm of copper sulphate is dissolved in 550 gm of a solvent.
12. Define pH of a solution. Explain acid, base, and neutral solution on the basis of pH value.

PART- C (06 MARKS QUESTIONS)

1. State and explain Faraday's laws of electrolysis?
2. Explain the mechanism of electrolysis of HCl.
3. Define corrosion. Write the necessary condition for corrosion.
4. Write any six preventive methods of corrosion.
5. Explain the electrochemical theory of corrosion.

6. Mention what is battery? Write the applications of batteries.
7. Define fuel cells. Mention the types of fuel cells.
8. Write the advantages of fuel cells.
9. Define minerals, ore, flux, slag and alloys?
10. Write the composition steel. List three uses of alloys.
11. Explain any two methods of polymerization.
12. Write the applications of polymers.
13. Write the advantages and disadvantages of composite materials.
14. Define molar and normal solution. What is concentration of a solution?
15. Write any six applications of pH.

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Government of Karnataka
Department of Technical Education, Bengaluru

Course: APPLIED SCIENCE

Course code: 15SC03S

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Mr. R B Pawar	Principal	Govt. Polytechnic, Bijapur
2	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
3	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
4	Dr. HanumanthaNayak	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
5	Ms. Bhagirathi B N	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru

Curriculum Review Committee

	Name	Designation	Institution
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3	Smt. Revathi	Selection Grade Lecturer	M.E.I. Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: CONCEPTS OF ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code : 15EC01T
Semester : I	Course Group : Core
Teaching Scheme (L:T:P) : 4:0:0 (in Hours)	Credits : 4 Credits
Type of course : Lecture + Assignments	Total Contact Hours : 52
CIE : 25 Marks	SEE : 100 Marks
Programme: Computer Science and Engineering	

Pre-requisites	: Mathematics and Science in Secondary Education.
Course Objectives	:To introduce the concept of electrical current, voltage, power, energy, electrical circuits and measuring instruments, magnetic fields, electromagnetic induction and fundamentals of AC circuit. Introduction of Transformers, and Motors, protective devices and Earthing in Computer field. Introduction to Battery, UPS, electronic components and their applications.

Course Unit-wise Weightage of Marks:

Unit Nos.	Topics	Teaching Hours	SEE Max. Marks
1	ELECTRIC CIRCUIT FUNDAMENTALS	10	30
2	ELECTROMAGNETISM	04	10
3	AC FUNDAMENTALS	14	40
4	TRANSFORMERS & STEPPER MOTORS	4	10
5	PROTECTIVE DEVICES	6	15
6	BASICS OF ELECTRONICS& UPS	14	40
Total		52	145

Course Outcomes

On successful completion of the course, the student will be able to:

1. Understand the fundamentals of electric circuits, parameters, measuring instruments, and different laws. Solve problems.
2. Understand the basic concepts of magnetic fields and electromagnetic induction.
3. Understand the fundamentals of AC circuits and solve problems.
4. Differentiate the applications of transformers, stepper motors and brushless DC motor.
5. Explain the need of protective devices in Computer field.
6. Understand the concept of Electronics, select UPS and maintenance of battery.

Composition of Educational Components

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 145)
1	Remembering	25	35
2	Understanding	45	65
3	Application	30	45
Total		100	145

Course Outcome linkage to Cognitive Level

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Understand the fundamentals of electric circuits, parameters, measuring instruments, and different Laws. Solve problems.	<i>R/U/A</i>	1,2,10	10
CO2	Understand the basic concepts of magnetic fields and electromagnetic induction.	<i>R/U</i>	1,2,10	04
CO3	Understand the fundamentals of AC circuits and solve problems.	<i>R/U/A</i>	1,2,10	14
CO4	Differentiate the applications of transformers, stepper motors and brushless DC motor.	<i>U/A</i>	2,10	4
CO5	Explain the need of protective devices in Computer field.	<i>U/A</i>	2,10	6
CO6	Understand the concept of Electronics, select UPS and maintenance of battery.	<i>R/U/A</i>	1,2,10	14
			Total sessions	52

Legend: R; Remember, U: Understand A: Application

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for (5marks) PART - A			Questions to be set for (10marks) PART - B			Marks weightage (%)
				R	U	A	R	U	A	
1	ELECTRIC CIRCUIT FUNDAMENTALS	10	30	1	1			1	1	20
2	ELECTROMAGNETISM	04	10	1				0.5		7
3	AC FUNDAMENTALS	14	40		1	1	1	1	1	28
4	TRANSFORMERS & STEPPER MOTORS	4	10		1				0.5	7
5	PROTECTIVE DEVICES	6	15			1		1		10
6	BASICS OF ELECTRONICS& UPS	14	40	1	1		1	1	1	28
Total		52	145	9 (45 Marks)			10 (100 Marks)			100

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
CONCEPTS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	3	-	-	-	-	-	-	-	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
 If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Contents

UNIT-I

ELECTRIC CIRCUIT FUNDAMENTALS: Current, Voltage- EMF and Resistance, Ohm's Law, Problems on Ohm's law equivalent resistance of resistors connected in series and parallel. Problems on resistance combinations .Circuit conditions – open, close and short circuit, Kirchoff's voltage and current laws, Problems on KVL, KCL, Electrical Power and Energy, Problems on Electrical Power and energy. Meters used to measure Current, Voltage, Resistance, inductance and capacitance ,Power and Energy.

UNIT-II

ELECTROMAGNETISM: Magnetic field, Magnetic Flux, Flux density, MMF, Reluctance, permeability, Faraday's Laws of Electro Magnetic induction, Inductance, Statically induced EMF, Dynamically Induced EMF, Self-inductance, Mutual inductance, Self-induced EMF, Mutually induced EMF.

UNIT-III

AC FUNDAMENTALS: Alternating current, amplitude, frequency and time period, Average value, Maximum value, RMS value and Form factor for sine wave, Simple problems, phase difference, Differentiate between single phase and three phase AC supply, Vector diagram, Impedance Diagram, Voltage triangle, and Wave forms , Resistance, Reactance and Impedance , Power and power factor in pure R, pure L, pure C , series R-L, series R-C, series R-L-C circuits. Problems to find X_L , X_c , and Z, Power, Power Factor in R-L, R-C, R-L-C series circuit. Comparison of DC and AC current.

UNIT-IV

TRANSFORMERS & STEPPER MOTORS: Construction and working of Transformer, Turns ratio, current and voltage ratios, ratings of transformers; Types of transformers and their applications, Applications of Stepper motor, Spindle motor, and Brushless DC motors.

UNIT-V

PROTECTIVE DEVICES: Switch- different types of switches with their symbols, Fuse- necessity of fuse, ratings and types, Relay- symbol, working principle of relay. Necessity of grounding/earthing of any electrical/electronic equipment. Need of spike busters for protection of computers. Need of antistatic device and types of antistatic devices for protection of computer components.

UNIT-VI

BASICS OF ELECTRONICS: Conductors, insulators and semiconductors with examples Intrinsic and Extrinsic Semi-conductors, Operation and V-I characteristics of PN junction diode, Working of Half wave, full wave and bridge rectifier circuits, Filters- Types of filters, C filter, Transistor – symbol, types, applications, Transistor as a switch, Op-Amp - Block diagram, Ideal characteristics and Op-Amp as Inverting Amplifier and Non-Inverting amplifier. SMPS – Meaning, working, block diagram, advantages, ratings

UPS:

Need of UPS, UPS block diagram ,UPS ratings and back-up time with example, Criteria for Selection of UPS ; Battery- Types , Ah rating, Maintenance of battery.

References:

1. Principles of Electronics ,V.K. Mehta &Rohit Mehta, S. Chand Technical Publication
2. A Textbook of Electrical Technology, B.L.Theraja &A.K.Theraja, S. Chand Volume I
3. Electronic Components - Dr. K Padmanabhan & P. Swaminathan, Laxmi Publications, ISBN :978-81-318-0714-9
4. Electronic Principles, Albert Malvino and David Bates, Tata Mcgraw Hill Publication, ISBN 9780070634244.

Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

Course Assessment and Evaluation

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three IA tests for Theory: (Average marks of Three Tests to be computed).	20	Blue Books	1 to 6
		Classroom Assignments		Student Activities	05	Log of Activity	1 to 6
	TOTAL				25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	ALL CO's
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		All Cos
	End Of Course Survey			End Of The Course	Questionnaires		All Cos

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Suggested Student Activities:

Each Student has to prepare a self-hand written report of 3 pages or solved in a blue book considering any one of the following topics.

- Using suitable meters/ instruments give the practical working circuits to measure Resistance, Current, Voltage, Inductance, Capacitance, Power and Energy in DC and AC (Single phase) Circuits.
- Report on different materials used for electromagnets with their properties.
- Applications of Electro Magnetic Induction, statically induced and dynamically induced emf, self and mutual induced emfs.
- Practical applications of Single Phase AC supply and Three phase AC supply with their operating voltages and other electrical parameters.
- Report on Construction and working of Stepper motor, Spindle motor, and Brushless DC motors.
- Report on modern methods to protect Computer/ Server system/ Super Computers from Power and Transient surges.
- Report on safety measures and rules to be followed while servicing Computers and also in Computer laboratory.
- Visit nearby Battery charging and inverter (UPS) shop or show room and prepare a report of the visit.
- Report on working conditions of Batteries in laboratories of your Polytechnic.
- Visit nearby electronics shop/ market and identify the different diodes and rectifier with their ratings.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students Grand Average/Total						14/4 =3.5 ≈4				

**Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing**

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1. Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3. Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4. Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
Total marks						14/4=3.5 ≈4				

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th week of sem 10-11 Am	I/II SEM		20			
	Year:					
Name of Course coordinator : CO's: _____			Units: __			
Question no	Question		MARKS	CL	CO	PO
1						
2						
3						
4						

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
2 nd Test/ 10 th week, 15Sept 15, 10-11 AM	I SEM, C S& Engg.	Concepts of Electrical and Electronics Engg.	20		
	Year: 2015-16	Course code: 15EC01T			
Name of Course coordinator : Units Covered :3 and 4 Course Outcomes : 3 and 4 <p style="text-align: center;">Instruction : (1). Answer all questions (2). Each question carries five marks</p>					
Question No.	Question		CL	CO	PO
1	Define the following with SI units, (a). Amplitude (b). Time period (c). Frequency.		R	3	1,2,10
2	List out the differences between Single phase and Three phase AC supply. OR A Series RL circuit with $R = 20 \Omega$ and $L = 20 \text{ mH}$ is connected across 230 V, 50 Hz ac supply. Calculate the Impedance, Current and Power factor.		U A	3	1,2,10
3	Explain the different types of Transformers.		U	4	2, 10
4	What is a Stepper Motor? List out the applications of Stepper Motors. OR A transformer with 240 turns on the primary and 60 turns on the secondary draws 0.6A from a 230V ac supply. Find the secondary current and emf.		U A	4	2, 10

CL: Cognitive Level, R-Remember, U-Understand, A-Application, PO: Program Outcomes

Model Question Paper

I Semester Diploma Examination
Concepts of Electrical and Electronics Engineering Code: 15EC01T

Time: 3Hours

Max Marks: 100

Note:

- 1) Answer any **SIX** questions from a set of 9 questions From **PART A**. Each question carries 5 marks.
- 2) Answer any **SEVEN** questions from a set of 10 questions from **PART B**. Each question carries 10 marks.

PART-A

- 1) State and explain Ohm's law. What are its limitations?
- 2) Define and mention their units:
 - i) MMF
 - ii) Mutual induction
- 3) State and explain Faraday's laws of Electro Magnetic induction.
- 4) Bring out the comparison between DC and AC supply.
- 5) Explain the necessity of grounding.
- 6) List the applications of motors.
- 7) Explain the working of transistor as a switch.
- 8) Draw the block diagram of an Op-amp.
- 9) Write a short note on maintenance of battery.

PART-B

- | | |
|--|---|
| 10) a) Define the following and mention their units | 4 |
| i) Electric current | |
| ii) Potential difference | |
| b) Explain the different circuit conditions. | 6 |
| 11) a) State and explain Kirchhoff's current law. | 5 |
| b) Define the following and mention their units | |
| i) Magnetic flux density | |
| ii) Reluctance | 5 |
| 12) a) Differentiate between single phase and three phase AC supply. | 6 |

b) Define the following	4
i) RMS value	
ii) Average value	
13) a) Explain the principle of operation of a stepper motor.	6
b) Write a short note on fuses.	4
14) a) Explain the working of a transformer.	5
b) Explain the types of transformers.	5
15) a) Define conductor, semiconductor and insulator with examples.	6
b) Define	4
i) Intrinsic Semiconductor	
ii) Extrinsic Semiconductor	
16) a) Explain the working of half wave rectifier.	6
b) Explain the necessity of filters. List the types of filters.	4
17) a) With a neat circuit diagram, explain the working of OP-Amp inverting amplifier.	5
b) List the characteristics of ideal OP-Amp.	5
18) a) What is an inductor? Mention its different types.	5
b) What do you mean by a switch? Classify the switches based on their operation.	5
19) a) Define turns ratio, current ratio, voltage ratio.	5
b) What is a transistor? Mention different types of transistors with their symbols.	5

Model Question bank

Course Title: CONCEPTS OF ELECTRICAL AND ELECTRONICS ENGINEERING	Course Code: 15EC01T
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Cognitive Level: REMEMBER

- 1) Define Electric Current, voltage, and resistance. Write the SI units.
- 2) Mention the meters to measure Electric Current, voltage, and resistance.
- 3) Define ohms law. What are the limitations of it?
- 4) Define Electric Power and ii) Energy, write its SI units and meters used to measure
- 5) Define self-inductance and mutual inductance mention their units:
- 6) Define flux density and mmf and mention their units:
- 7) State and explain Faraday's laws of Electro Magnetic induction.
- 8) Define and explain self-inductance.
- 9) Define and explain mutual inductance
- 10) Define self-induced emf and mutual induced emf.
- 11) Explain self-induced emf?
- 12) Define RMS value.
- 13) Define Average value and RMS value
- 14) Define inductive reactance and capacitive reactance
- 15) Define power factor. Give the relation between resistance, impedance and power factor.
- 16) What is rectifier?
- 17) List different types of filters.

Cognitive level: UNDERSTAND

- 18) State and explain Ohm's law. What are its limitations?
- 19) Explain open, close and short circuit conditions.
- 20) State and explain Kirchhoff's current law.
- 21) Draw AC voltage wave form and mark all the parameters.
- 22) Explain Construction and working of Transformer,
- 23) Explain working of Transformer.
- 24) List out different types of Transformers and write its applications.
- 25) List out different types of Motors and write its applications.
- 26) List out different types of switches and write its symbols.
- 27) Explain working principle of relay.

- 28) What is the necessity of earthing? Write its types.
- 29) Explain conductors, insulator and semiconductors with examples.
- 30) Explain Intrinsic and Extrinsic Semi-conductors.
- 31) Explain operation and VI characteristics of PN junction diode,
- 32) Explain operation of Diode using VI characteristics.
- 33) Explain half wave rectifier with a neat circuit diagram.
- 34) Explain working of half wave rectifier.
- 35) Explain working of full wave rectifier.
- 36) Explain working of bridge rectifier.
- 37) List types of filters and explain any one.
- 38) Explain Ideal characteristics of an Op-Amp.
- 39) List the ideal characteristics of OP-AMP .
- 40) Name different types of batteries and list its applications
- 41) Explain the working of SMPS with block diagram.

Cognitive Level: APPLICATION

- 42) Explain Kirchhoff's voltage and current laws.
- 43) A 100 W light bulb burs on an average of 10 hours a day. Find the weekly consumption of energy.
- 44) If the voltage across a 10 K Ohm resistor is 500V, what is the power dissipated in the resistor.
- 45) State Faraday's laws of Electro Magnetic induction.
- 46) Differentiate between single phase and three phase AC supply.
- 47) An RLC series AC circuit has $R=200\text{Ohm}$ and $L=0.05\text{ H}$ and $C= 3.53\text{ micro farads}$.
If it is connected across 230V 50 HZ supply. Calculate i) Current ii) Power factor iii) Power
- 48) Compare single phase system with three phase system.
- 49) A transformer with 240 turns on the primary and 30 turns on the secondary draws 0.6A from a 240V line. Find the secondary current.
- 50) Explain brushless DC Motor.
- 51) List the applications of stepper motor.
- 52) Explain Transistor as a switch.
- 53) Explain working principle of relay.
- 54) What is the necessity of earthing? Mention its types.
- 55) Explain the Need of spike busters for protection of computers.
- 56) Explain the need of antistatic device for protection of computer components.

- 57) List the types of antistatic devices for protection of computer components
- 58) Differentiate conductors, insulator and semiconductors with examples.
- 59) Explain UPS with block diagram.

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	: APPLIED SCIENCE LAB	Course Code	: 15SC04P
Semester	: I / II	Course Group	: Core
Teaching Scheme in Hrs (L:T:P)	: 0:2:4	Credits	: 3 Credits
Type of course	: Tutorial & Practical	Total Contact Hours	: 78
CIE	: 25 Marks	SEE	: 50 Marks
Programme	: Common to all Engineering Diploma Programmes		

Prerequisite:

Applied Science theory in the current semester.

Course objective:

1. Learn to measure different dimensions of objects accurately using measuring instruments.
2. Enhance the vectorial concepts of concurrent forces.
3. Learn the concepts of properties of fluids.
4. Enhance the practical concept of resonance.

Experiments:

PART- A

1. Vernier Calipers:

- a) To determine the dimensions of given solid cylinder and hence calculate its volume.
- b) To determine the dimensions of given hollow cylinder and hence calculate its volume

Activity: To calculate the density of material of given solid/hollow cylinder knowing its volume and mass.

2. Screw Gauge:

- a) To determine the thickness of given metal and glass plate.
- b) To determine the diameter of given thin wire and hence to calculate its volume.
- c) To determine the diameter of given metallic sphere and hence to calculate its volume.

Activity: 1. To calculate volume of such half meter length wire.
2. To calculate volume of such number (50 or 75 etc) of spheres.

3. Laws of concurrent forces:

- a) Verify the law of parallelogram of forces.

b) Verify the converse law of triangle of forces.

c) Verify Lami's theorem.

Activity: To determine the weight of given body using law of parallelogram of forces.

4. Moment bar:

To verify the conditions of equilibrium of coplanar parallel forces acting on a body.

Activity: To determine the weight of given body using moment bar.

PART-B

5. Viscosity:

a) To determine the co-efficient of viscosity of water by poiseuille's method (for a given radius of capillary tube)

Activity: To plot a graph of ht versus V and to find ht/V from slope.

6. Sonometer:

a) To determine the frequency of given tuning fork by comparison method.

b) To determine the frequency of given tuning fork by absolute method.

Activity: 1. Plot a graph of 'n' versus 'l' from the graph, find the frequency unknown
Tuning fork

2. Plot a graph of \sqrt{T} versus 'l' from the slope of graph find \sqrt{T}/l

3. To calculate linear density 'm' by knowing \sqrt{T}/l and 'n'

7. Resonance:

a) To determine the velocity of sound in air at room temperature by using resonance air column apparatus. (for single resonating length)

Activity: 1. To calculate velocity of sound in air at 0°C .

2. To determine the unknown frequency of tuning fork.

8. Surface Tension:

a) To determine the Surface Tension of water by capillary rise method using Travelling Microscope. (radius of capillary tube is given)

Activity: Calculate radius of the capillary tube by knowing the surface tension of the liquid and height of liquid column in capillary tube.

9. Boyle's law:

a) To verify Boyle's law using Boyle's law apparatus.

Activity: 1. To plot a graph of pressure versus volume

2. To plot a graph of $1/\text{pressure}$ versus volume.

Course outcome:

On successful completion of the course, the student will be able to:

1. Measure the various dimensions of given objects using instruments.
2. Apply the vector concepts in engineering.
3. Apply the acquired knowledge of fluid dynamics in the field of engineering.
4. Apply the concepts of wave motion in engineering.

Mapping Course Outcomes with Program Outcomes:

CO –PO mapping

	Course Outcome	Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Measure the various dimensions of given objects using instruments.	1,2	1,2,3,4,9	U/A	24
CO2	Apply the vector concepts in engineering.	3,4	1,2,9	U	16
CO3	Apply the acquired knowledge of fluid dynamics in the field of engineering.	5,8,9	1,2,3,9	A	24
CO4	Apply the concepts of wave motion in engineering.	6,7	1,2,3,9	U	14
Total Hours of instruction					78

U-Understanding; A-Application;

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Applied Science lab	3	3	3	1	-	-	-	-	3	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average of Two Test marks will be computed)	10	Blue Books	1 to 4
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Record Book	1 to 4
		Class room Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	05	Log of Activity	1 to 4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts at BTE	All the CO's
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 2 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire	1 to 4 Effectiveness of delivery of instructions and assessment	

Note: I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering and Understanding	35
2	Applying the knowledge acquired from the course	45
3	Analysis	05
4	Evaluation	05
5	Creating new knowledge	10

Reference Books:

1. Practical physics by pro. J.D.Belani and N.J.Belani. Published by Nebhandas Hiranand.
2. Practical physics by C.L. Arora. Published by S. Chand and company.
3. www.jac production.co.za

Model Question Bank:

Course: **APPLIED SCIENCE LAB** Course Code: **15SC04P**

PART- A

1. Determine the dimensions of given Solid Cylinder using Vernier Caliper and hence calculate its volume.
2. Determine the dimensions of given Hollow Cylinder using Vernier Caliper and hence calculate its volume.
3. Determine the thickness of given metal and glass plate using screw gauge.
4. Determine the diameter of given thin wire using screw gauge and hence, to calculate its volume.

5. Determine the diameter of given metallic sphere using screw gauge and hence, calculate its volume.
6. Verify the law of parallelogram of forces.
7. Verify the converse of triangle law of forces.
8. Verify lami's theorem.
9. Verify the conditions of equilibrium of coplanar parallel forces using Moment bar.

PART- B

10. Determine the coefficient of viscosity of water by Poiseuille's method
(For a given radius of capillary tube)
11. Determine the frequency of given tuning fork by comparison method using sonometer.
12. Determine the frequency of given tuning fork by absolute method using sonometer.
13. Determine the velocity of sound in air at room temperature by using resonance Air column Apparatus.
14. Determine the Surface Tension of water by capillary rise method.
(For a given radius of capillary tube)
15. Verify Boyle's law using Boyle's law apparatus.

Scheme of Valuation for SEE (Semester End Examination)

Sl. no.	Performance	Max. Marks
1	Writing Observation, Tabular column, formula.	05x2=10
2	Conduction of experiment.	10x2=20
3	Calculation and Result.	05x2=10
4	Viva Voce.	10
TOTAL		50 Marks

Note: The students will submit record books at the time of semester end exam.

Guidelines for Question Paper Setting

The question paper must be prepared by selecting **ONE** experiment from **PART – A** and **ONE** question from **PART – B**.

Specification of the Apparatus Required for Applied Science Lab

The following are the specification of the apparatus required for science lab, and number of apparatus required for the batch of 20 students.

Sl. No.	Name of the Apparatus	Specification	Required Number
1	Vernier calipers	With L.C 0.01cm having Metallic scale marked in cm, with objects :solid cylinder &hollow cylinder	10
2	Screw gauge	U-Shaped metallic frame with L.C 0.01mm with objects :glass plate, metal plate, thin wire and metallic sphere	10
3	Law of concurrent forces apparatus	Vertical Drawing Board fixed with pulleys. Weights 50g each with weight hangers set	10
4	Moment bar	Having two vertical metallic stands, two spring balances measuring up to 500 g .horizontal bar.	10
5	Surface tension apparatus	Traveling microscope, having L.C 0.005cm, both horizontal and vertical movement of telescope, eye piece with fine cross-wire, slow moving stand, beaker, with capillary tube	10
6	Viscosity apparatus	Aspiratory bottle, cork, capillary tube, stopwatch, measuring jar. With stand to keep Aspiratory bottle	10

7	Boyle's law apparatus	Wide bore glass tube mounted vertically in front of a scale graduated 0 to 60cm Zero corresponds to the inside of the closed (top) end of the tube Air is confined in the tube by a coloured oil contained in a metal pressure chamber Pressure chamber is fitted with a Bourdon type gauge calibrated 0 to 3.5kg cm ² (0 to 50 lb/in ²) actual pressure A valve is fitted to the air inlet tube from the pump As the pressure in the oil chamber is increased, oil level and its actual (total) pressure are directly indicated Tube is made of extra strong glass and is securely covered with transparent plastic on the front Overall height of apparatus approx. 690mm	05
8	Sonometer	Wooden box fixed with meter scale, pulley, metallic string, weight with weight hanger (500g each)	10
9	Resonance air column apparatus	Consists of a resonance tube brass N.P. 100cms, reservoir brass N.P. 250ml & meter scale both sides millimeters, which are mounted on wooden polished board. The reservoir is caged in wooden block that has sliding facility.	10
10	Electronic balance	0.1g accuracy 500g capacity	01
11	Tuning fork set	Set of eight tuning forks of different frequency blue steel(Ragg's type)	06

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Government of Karnataka
Department of Technical Education, Bengaluru

Course: APPLIED SCIENCE LAB

Course code: 15SC04P

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Mr. R B Pawar	Principal	Govt. Polytechnic, Bijapur
2	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
3	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
4	Dr. HanumanthaNayak	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
5	Ms. Bhagirathi B N	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru

Curriculum Review Committee

	Name	Designation	Institution
1	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
2	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
3	Smt. Revathi	Selection Grade Lecturer	M.E.I. Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: BASIC ELECTRONICS LAB	Course Code : 15EC02P
Semester : I	Course Group : Core
Teaching Scheme (L:T:P) : 0:2:4 (in Hours)	Credits : 3 Credits
Type of course : Tutorial + Practical	Total Contact Hours : 78
CIE : 25 Marks	SEE : 50 Marks
Programme: Computer Science and Engineering.	

Pre-requisites: Knowledge of Concepts of Electrical & Electronics Engineering.

Course Objectives : To provide practical working knowledge of Electrical and Electronics Engg. and to make the student;

1. Recognise DC and AC supply.
2. Understand the basic concepts of electric circuits.
3. Understand the concepts of basic electronics.

Course Outcome:

On successful completion of the course, the student will be able to:

1. Identify and Measure various electrical parameters.
2. Verify different Laws and understand.
3. Measure the parameters of transformer.
4. Plot characteristics of diode.
5. Understand rectifier and filter circuits.
6. Use Op-Amp as amplifier.

Course Contents:

Practical Experiments

1. Identify different AC/DC power supply terminals and tabulate measured voltage between terminals.
2. Measure the value of the resistance by using (i) Analog and Digital Multi-meters and (ii) by Colour coding.
3. Measure current, voltage, resistance, inductance and capacitance using Ammeter, Voltmeter, Multi meter and LCR meters.
4. Generate AC signals using signal generator and measure Amplitude & Time period.
5. Verify ohm's law experimentally.
6. Verify Kirchhoff's current law.
7. Verify Kirchhoff's Voltage law.
8. Find transformation ratio of a single phase transformer.
9. Plot V-I Characteristics of Junction diode (only forward bias).
10. Construct half wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
11. Construct half wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
12. Construct Full wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
13. Construct Full wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
14. Construct Bridge rectifier using PN junction diode without filter and trace input and output voltage waveform
15. Construct Bridge rectifier using PN junction diode with filter and trace input and output voltage waveform
16. Use Op-Amp as inverting amplifier.
17. Use Op-Amp as non-inverting amplifier.

Resources:

1. Principles of Electronics ,V.K. Mehta & Rohit Mehta, S. Chand Technical Publication
2. A Textbook of Electrical Technology, B.L.Theraja & A.K.Theraja, S. Chand Volume I
3. <http://www.facstaff.bucknell.edu>
4. <http://electrical4u.com/>
5. <http://www.electronics-tutorials>

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	20
2	Understanding	20
3	Application/ Analysis	60
Total		100

Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome	Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1 Identify and Measure various electrical parameters.	1,2,3,4	2, 3, 8, 9, 10	R/U/A	12
CO2 Verify different Laws and understand.	5,6,7	2, 3, 8, 9, 10	U/A	9
CO3 Measure the parameters of transformer.	8	2, 3, 8, 9, 10	U/A	3
CO4 Plot characteristics of diode.	9	2, 3, 8, 9, 10	U/A	3
CO5 Understand rectifier and filter circuits	10,11,12, 13,14,15	2, 3, 8, 9, 10	U/A	18
CO6 Use Op-Amp as amplifier.	16,17	2, 3, 8, 9, 10	U/A	6

U-Understanding; A-application/ Analysis; App-Application

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Basic Electronics Lab	-	3	3	-	-	-	-	3	3	3

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.
METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
IF $\geq 40\%$ OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
IF $< 5\%$ OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS CONSIDERED NOT-ADDRESSED.

Course Delivery:

The Course will be delivered through Tutorial, classroom interaction, group discussion, practical exercises and assignments.

Tutorial - 1Hr:

Staff-in-charge will

1. Explain the concept of experiment to be conducted.
2. Teach required selection of components/ meters/ equipment/ suitable wires for the experiment to be conducted.
3. Ask students to draw the circuit.
4. Give clear instructions about safety precautions to be followed while conducting experiment.

Conduction/ Execution - 2 Hr:

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Practical	Evidence Collected	Course Outcomes
Direct Assessment Method	CIE (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average marks of both the tests to be computed)	10	Blue Books	1 to 6
		Record Writing		Record Writing (Average of Marks allotted for each experiment.)	10	Lab Record	1 to 6
				Student Activity	05	Log of Activity	1 to 6
		TOTAL		25			
	SEE (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts	1 to 6
Indirect Assessment Method	Student Feedback on course		Students	Middle of The Course	Feed Back Forms		1 to 6
	End of Course Survey			End of The Course	Questionnaire		1 to 6

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Suggested Student Activities:

Each Student has to prepare a self-hand written report of 3 pages or solved in a blue book considering any one of the following topics.

1. Soldering practice for a better solder.
2. Mini-Projects: Rectifier circuits with and without filters, and OPAMP circuits.
3. List out the different protective devices used in your laboratories or house with their ratings.
4. Visit nearby Battery charging shop or show room and prepare a report of the visit.
5. Prepare a report of the conditions of batteries available in the Polytechnic.
6. For given voltage, current, Ah ratings of individual cell, and required voltage and current rating of battery, prepare a report of calculations for number of cells and their method of connections and calculate the rating of UPS.
7. Report on block diagram, internal parts and working of CRO.
8. Report on block diagram, internal parts and working of DC Regulated power supply.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students Grand Average/Total						14/4				
						=3.5				
						≈4				

**Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing**

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1. Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3. Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4. Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
Total marks						14/4=3.5 ≈4				

SCHEME OF VALUATION IN SEE

Sl. no.	Performance	Max. Marks
1	Identification of meters, Electronic components	05
2	Writing one Circuit diagram and procedure.	10
3	Conduction of experiment	20
4	Result	05
5	Oral	10
TOTAL		50

Model Question Bank

Course Title: **BASIC ELECTRONICS LAB**

Course Code:


15EC02P

1. Construct a circuit to verify ohm's law.
2. Construct a circuit to verify Kirchhoff's current and Voltage laws.
3. Conduct an experiment to find transformation ratio of a given Transformer.
4. Conduct an experiment to Plot V-I Characteristics of Junction diode (forward bias only).
5. Construct a half wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
6. Construct a half wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
7. Construct a Full wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
8. Construct a Full wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
9. Construct a Bridge rectifier using PN junction diode without filter and trace input and output voltage waveform
10. Construct a Bridge rectifier using PN junction diode with filter and trace input and output voltage waveform
11. Conduct an experiment to connect Op-Amp as inverting amplifier.
12. Conduct an experiment to connect Op-Amp as non-inverting amplifier.

Materials required for Basic Electronics Lab

Sl. No	Name of equipment	Numbers Required as per norms
1.	0-15 V at 2/1A continuously variable power supply with current limit.	10
2.	0-30V at 2/1A continuously variable power supply with current limit	10
3.	Function generator	05
4.	Dual trace oscilloscope.	06
5.	Digital multimeters	10
6.	Analog multimeters	05
7.	Volt meters DC 0-100mV, 0-1/2, 0-10, 0-15/30V	20
8.	Volt meters AC 0-150/300V	10
9.	Ammeters DC 0-100 μ A, 0-10mA, -100mA	4 each
10.	Ammeters AC 0-100 μ A, 0-1 μ A, 0-100mA, 0-1A, 0-5/10A	20
11.	Decade resistance boxes	03
12.	Rheostats assorted	20
13.	LCR meter	02
14.	Single phase transformer 1KVA, 2KVA	02each
15.	Diodes	L/S
16.	Electronic components –resistors, inductors, capacitors, transformers hook up wires etc	L/S
17.	Analog IC-OPAMP 741etc.	L/S
18.	Bread boards	L/S

Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Basic Computer Skills Lab		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15CS11P
	Type of Course: Tutorial and Practical's	Credit : 03	Core/ Elective: Core
CIE- 25 Marks			SEE- 50 Marks

Pre-requisite

Knowledge of English comprehension.

Course Objectives

Will learn and understand the Basics of Computers and apply the application tools like word processor, spread sheet and presentation.

Course Outcome

On successful completion of the course, the students will be able to attain CO:

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Understand and identify the models, components of a computer along with its connections, operating system concepts along with internet operation	1-7	U	1,2,3,4,8,10	15
CO2	Demonstrate skills using word processor	8-13	A	1,2,3,4,8,9,10	24
CO3	Demonstrate skills using spreadsheet presentation	14-18	A	1,2,3,4,8,9,10	24
CO4	Demonstrate skills using presentation	19-21	A	1,2,3,4,8,9,10	15
			Total sessions		78

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Basic Computer Skills Lab	3	3	3	3	-	-	-	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Tutorials and Practice**Unit – I*****Computer hardware and software***

1. Identify and understand the models of Computers, Identify and understand front panel switches and back panel connections of a Computer system, Identify and understand the physical components of a Computer.
2. Conduct computer system connection and understand the booting process.
3. Study and Practice of Basic DOS Commands.
4. Familiarization of GUI based Operating System Environment.
5. Practice creating Icons and Folders, Creating/Opening of file, Editing and saving the document, Copy, Cut and Paste operations, built-in utilities of OS like – Text Editors, Paint, Calculator, etc.
6. Practice browsing of different sites using Search Engine.
7. Practice Creating E-Mail accounts, Sending, Receiving of E-Mails.

Unit –II***Word Processing***

8. Create a Business Letter and Personal Letter.
9. Create a Company Letter head.
10. Create a Simple Newsletter with minimum three columns. Insert a Clip Art in the Newsletter.
11. Create a Resume for a Job Application.
12. Create the Cover Page of a Project Report (use Word Art, insert Picture Image).
13. Prepare the class time table of your class.

Spreadsheet

14. Create a worksheet with five columns. Enter ten records and find the sum of all columns using auto sum feature.
15. You have a monthly income of Rs.11000. Your monthly expenditures are: Rent- Rs 3500, Food- Rs. 1500, Electricity- Rs.110, Phone- Rs. 160, and Cable TV-Rs. 300. Prepare a worksheet with the Monthly Income, the Monthly Expenditures listed and summed, monthly savings amount (what's left over each month) calculated, and the amount saved per day (assuming 30 days in a month).
16. Create a worksheet containing the Pay details (containing Basic pay, DA, HRA ,Other Allowance , Deductions- PF, PT, Insurance, Gross and Net salary) of the Employees using Formulas.
17. Create a Simple Bar Chart to highlight the sales of a company for three different periods.
18. Create a Pie Chart for a sample data and give legends.

Presentation

19. Using presentation tool, Create a simple Presentation consisting of 4-5 slides about Input and Output Devices.
20. Create a presentation about a Book containing Title, Author, Publisher and Contents.
21. Create an automated (with timings & animation) Presentation with five slides about different Models of Computers. Use Presentation tool.

Mini-Project [CIE- 05 Marks]

Prepare a mini project of a minimum of 5 pages of report, using the above concepts of Unit-I and/or Unit-II

References

1. Computer Fundamentals Concepts, Systems, Application, D.P.Nagapal, S.Chand Publication, RP-2014, ISBN: 81-219-2388-3
2. <http://www.tutorialsforopenoffice.org/>
3. <http://www.libreoffice.org/get-help/documentation/>

Software Tools

Any open source tool or equivalent proprietary tools

Course Delivery

The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two Tests (average of two tests will be computed)	10	Blue books	1,2,3,4
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4
				Mini Project	05	Report	1,2,3,4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.

2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities/Mini Project..

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	20
3	Application	70

Format for Student Activity / Mini project Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.25=4

**All student activities should be done in a group of 4-5 students with a team leader.*

Scheme of Evaluation for End Exam

SN	Scheme	Max. Marks
1	Testing Skills/ Abilities from Unit - I	10
2	Writing steps on any one from Unit -II	10
3	Execution	10
4	Presentation of Result	10
5	Viva voce	10
Total		50
Note:		
<ol style="list-style-type: none"> 1. Candidate shall submit Lab Record for the Semester End Examination. 2. Student shall be allowed to execute directly even if he / she is unable to write the procedure 3. In case of change in experiment or no write up, marks will not be awarded for writing procedure/steps. 		

Resource Requirements for Basic Computer Skills Lab

(For an Intake of 60 Students [3 Batches])

Hardware requirement

Sl. No.	Equipment	Quantity
1	PC systems (latest configurations with speakers)	20
2	Laser Printers	03
3	Networking (Structured) with CAT 6e / Wireless 24 Port switches / Wireless Router I/O Boxes for networking (as required)	03
4	Broad Band Connection	01

Software Requirement:

Linux, Libre Office/Open Office/ Kingsoft Office/ any equivalent software.

Note: Student: Computer ratio in the Lab should be strictly **1:1** for a batch of twenty Students.

Note: *One Question from Unit-I and Unit-II*

UNIT-I

1. Identify Physical components of a Computer System.
2. Demonstrate Internal and External DOS Commands and differentiate between them.
3. Create and Rename the file using DOS Commands.
4. Create a directory and copy a file inside the directory using DOS Commands.
5. Demonstrate the basic formatting features in Text Editors.
6. Create two file in a folder and place the shortcut of these files on the desktop.
7. Demonstrate how search engine may be used in browsing Internet.
8. Create an E-mail account
9. Create and Send an E-mail with a picture attachment.
10. Demonstrate how documents can be downloaded using Internet.

UNIT-II

11. Using Word Processor Application create a Business Letter.
12. Using Word Processor Application create a Personal Letter.
13. Using Word Processor Application create a letter head for company.
14. Using Word Processor Application create a Simple Newsletter with minimum of three columns. Insert a Clip art in the newsletter.
15. Using Word Processor Application create a Resume for a Job application.
16. Using Word Processor Application create the cover page of a Project Report (use Word Art, insert Picture Image).
17. Prepare the class time table for your class using Word Processor Application.
18. Using Spreadsheet Application, create a worksheet with five columns. Enter ten records and find the sum of all columns using auto sum feature.
19. You have a monthly income of Rs.11000. Your monthly expenditures are Rent- Rs 3500, Food- Rs. 1500, Electricity- Rs.110, Phone- Rs. 160, and Cable TV-Rs. 300. Prepare a worksheet with the Monthly Income, the Monthly Expenditures listed and summed, monthly savings amount (what's left over each month) calculated, and the amount saved per day (assuming 30 days in a month). Use Spreadsheet Application.

20. Using Spreadsheet Application, create a worksheet containing the pay details (containing Basic pay, DA, HRA ,Other Allowance , Deductions- PF, PT, Insurance, Gross and Net salary) of the employees using formulas.
21. Using Spreadsheet Application, create a Simple Bar Chart to highlight the sales of a company for three different periods.
22. Using Spreadsheet Application, create a Pie Chart for a sample data and give legends.
23. Using presentation tool, Create a simple Presentation consisting of 4-5 slides about Input and Output Devices.
24. Create a presentation about a book containing Title, Author, Publisher and Contents.
25. Create an automated (timings & animation) Presentation with five slides about different Models of Computers. Use Presentation tool.

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Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: ENGINEERING MATHEMATICS – II	Course Code : 15SC02M
Semester : II	Course Group : Core
Teaching Scheme (L:T:P) : 4:0:0(in hours)	Credits : 4 Credits
Type of course : Lecture + Assignments	Total Contact Hours : 52
CIE : 25 Marks	SEE : 100 Marks
Programmes: Common to all Engineering Diploma Programmes	

Pre-requisites:

Engineering Mathematics-I, in First Semester Diploma curriculum.

Course Objectives:

1. Apply the concept of straight line and conic section in engineering field.
2. Determine derivatives of functions involving two variables.
3. Apply the concepts of differentiation in physics and engineering courses.
4. Evaluate the integrals of functions of two variables.
5. Apply the concepts of definite integrals and its application over a region.
6. Solve the ODE of first degree, first order in engineering field.

Course Contents:

Topic and Contents	Hours	Marks
Unit-1: COORDINATE GEOMETRY	08hr	23
<p>a. Straight lines: Different forms of equations of straight lines: $y = mx + c,$ $y - y_1 = m(x - x_1),$ $y - y_1 = \left(\frac{y_2 - y_1}{x_2 - x_1}\right)(x - x_1).$ General equation of a line $ax + by + c = 0$ (graphical representation and statements) and problems on above equations. Equation of lines through a point and parallel or perpendicular to a given line. Problems.</p> <p>b. Conic Section: Definition of conic section. Definition of axis, vertex, eccentricity, focus and length of latus rectum. Geometrical representation of parabola, ellipse and hyperbola: Equations of parabola $y^2 = 4ax,$</p>	04 hr	
	04hr	

<p>Equation of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and</p> <p>Equation of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (without proof of above 3 equations). Equations of parabola, ellipse and hyperbola with respect to x-axis as axis of conic.</p> <p>Finding axes, vertices, eccentricity, foci and length of latus rectum of conics. Problems on finding the above said equations with direct substitution.</p>		
UNIT – 2: DIFFERENTIAL CALCULUS	15hr	39
<p>Differentiation.</p> <p>Definition of increment and increment ratio. Definition of derivative of a function.</p> <p>Derivatives of functions of x^n, $\sin x$, $\cos x$ and $\tan x$ with respect to 'x' from first principle method. List of standard derivatives of $\operatorname{cosec} x$, $\sec x$, $\cot x$, $\log_e x$, a^x, e^x.....etc.</p> <p>Rules of differentiation: Sum, product, quotient rule and problems on rules. Derivatives of function of a function (Chain rule) and problems. Inverse trigonometric functions and their derivatives.</p> <p>Derivative of Hyperbolic functions, Implicit functions, Parametric functions and problems.</p> <p>Logarithmic differentiation of functions of the type u^v, where u and v are functions of x. Problems.</p> <p>Successive differentiation up to second order and problems on all the above types of functions.</p>		
UNIT – 3: APPLICATIONS OF DIFFERENTIATION.	07hr	17
<p>Geometrical meaning of derivative. Derivative as slope. Equations of tangent and normal to the curve $y = f(x)$ at a given point- (statement only). Derivative as a rate measure i.e. to find the rate of change of displacement, velocity, radius, area, volume using differentiation. Definition of increasing and decreasing function. Maxima and minima of a function.</p>		
UNIT-4: INTEGRAL CALCULUS.	12hr	30
<p>Definition of Integration. List of standard integrals. Rules of integration (only statement)</p> <p>1. $\int kf(x)dx = k \int f(x)dx$. 2. $\int \{f(x) \pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$</p> <p>problems. Integration by substitution method. Problems.</p> <p>Standard integrals of the type</p>		

$1. \int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + c$ $2. \int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right) + c.$ $3. \int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1}\left(\frac{x}{a}\right) + c$ <p style="text-align: center;">(1 to 3 with proof)</p> $4. \int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \log\left(\frac{x-a}{x+a}\right) + c \quad \text{if } x > a > 0.$ $5. \int \frac{dx}{a^2 - x^2} = \frac{1}{2a} \log\left(\frac{a+x}{a-x}\right) + c \quad \text{if } a > x > 0. \quad (4 \& 5 \text{ without proof})$ <p>and problems on above results Integration by parts of the type $\int x^n e^x dx$, $\int x \sin x dx$, $\int x \cos x dx$, $\int x \log x dx$, $\int \log x dx$, $\int \tan^{-1} x dx$, $\int x \sin^2 x dx$, $\int x \cos^2 x dx$ where $n=1, 2$. Rule of integration by parts. Problems</p>		
UNIT – 5: DEFINITE INTEGRALS AND ITS APPLICATIONS	05 hr	22
Definition of Definite integral. Problems on all types of integration methods. Area, volume, centres of gravity and moment of inertia by integration method. Simple problems.		
UNIT – 6: DIFFERENTIAL EQUATIONS.	05 hr	14
Definition, example, order and degree of differential equation with examples. Formation of differential equation by eliminating arbitrary constants up to second order. Solution of O. D. E of first degree and first order by variable separable method. Linear differential equations and its solution using integrating factor.		
Total	52	145

Course Delivery:

The Course will be delivered through lectures, class room interaction, exercises, assignments and self-study cases.

Course outcome:

On successful completion of the course, the student will be able to:

1. Formulate the equation of straight lines and conic sections in different forms.
2. Determine the derivatives of different types of functions.
3. Evaluate the successive derivative of functions and its application in tangent, normal, rate measure, maxima and minima.
4. Evaluate the integrations of algebraic, trigonometric and exponential function.
5. Calculate the area under the curve, volume by revolution, centre of gravity and radius of gyration using definite integration.
6. Form and solve ordinary differential equations by variable separable method and linear differential equations.

Mapping Course Outcomes with Program Outcomes:

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Formulate the equation of straight lines and conic sections in different forms.	1,2,3,10	R/U/A	08	6	5	12	23
CO2	Determine the derivatives of different types of functions.	1,2,3,10	R/U/A	15	12	15	12	39
CO3	Evaluate the successive derivative of functions and its application in tangent, normal, rate measure, maxima and minima.	1,2,3,10	R/U/A	07	6	5	6	17
CO4	Evaluate the integrations of algebraic, trigonometric and exponential function	1,2,3,10	R/U/A	12	9	15	6	30
CO5	Calculate the area under the curve, volume by revolution, centre of gravity and radius of gyration using definite integration	1,2,3,10	R/U/A	05	6	10	6	22
CO6	Form and solve ordinary differential equations by variable separable method and linear differential equations.	1,2,3,10	R/U/A	05	3	5	6	14
		Total Hours of instruction		52	Total marks			145

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Engineering Maths-II	3	3	3	-	-	-	-	-	-	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
 If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference Books:

1. NCERT Mathematics Text books of class XI and XII.
2. Higher Engineering Mathematics by B.S Grewal, Khanna publishers, New Delhi.
3. Karnataka State PUC mathematics Text Books of I & II PUC by H.K. Dass and Dr. Ramaverma published by S.Chand & Co.Pvt. ltd.
4. CBSE Class Xi & XII by Khattar & Khattar published PHI Learning Pvt. ltd.,
5. First and Second PUC mathematics Text Books of different authors.
6. E-books:www.mathebook.net
7. www.freebookcentre.net/mathematics/ introductory-mathematics -books.html

Course Assessment and Evaluation:

Method	What		To whom	When/where (Frequency in the course)	Max Marks	Evidence collected	Contributing to course outcomes
DIRECT ASSESSMENT	*CIE	Internal Assessment Tests	Student	Three tests (Average of Three tests to be computed).	20	Blue books	1 to 6
		Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	5	Log of record	1 to 6
	Total			25			
	*SEE	Semester End Examination		End of the course	100	Answer scripts at BTE	1 to 6
INDIRECT ASSESSMENT	Student feedback		Student	Middle of the course	-NA-	Feedback forms	1 to 3, delivery of the course
	End of Course survey			End of course		Questionnaire	1 to 6, Effectiveness of delivery of instructions and assessment methods

*CIE – Continuous Internal Evaluation *SEE – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	31
2	Understanding	41
3	Applying the knowledge acquired from the course	25
	Analysis Evaluation	3

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 th week of sem 10-11 Am	I/II SEM	ENGINEERING MATHEMATICS –II	20		
	Year:	Course code: 15SC02M			
Name of Course coordinator :			Units: __ CO's: ____		
Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

II Semester Diploma Examination
ENGINEERING MATHEMATICS –II
(For All Engineering Diploma Programmes)

Time: 3 Hours][Max. Marks: 100

NOTE: i) Answer any 10 questions from section A, 8 questions from section B and 5 questions from section-C

ii) Each question carries 3 marks in section A.

ii) Each question carries 5 marks in section B.

iii) Each question carries 6 marks in section C.

SECTION-A

1. Find the equation of the line passing through the point (2,-3) with slope 1/3.
2. Find the equation of parabola with vertex (2,0) and focus (5,0)
3. Differentiate: $(3x + 8)^7$ with respect to x.
4. If $y = \cos^{-1} x$ show that $\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}$.
5. If $y = x^x$, find $\frac{dy}{dx}$.
6. If $y = \frac{1+\sin x}{1-\sin x}$ find $\frac{dy}{dx}$.
7. Find the equation to the tangent to the curve $2x^3 + 5y - 4 = 0$ at (-2,4).
8. The volume of the sphere is increasing at the rate of 6cc/sec. Find the rate of change of radius when the radius is 3 cm.
9. Integrate: $(2x + 1)(x + 5)$ with respect to x
10. Evaluate: $\int \tan^2 x dx$
11. Evaluate: $\int \frac{\cos x}{1+\sin x} dx$
12. Evaluate: $\int_0^{\pi/4} (\sec^2 x + 1) dx$.
13. Find area bounded by the line $x + 2y = 0$, x-axis, and ordinates $x = 0$, and $x = 4$ by integration.
14. Form differential equation for curve $y^2 = 4ax$

SECTION – B

1. Find the equation of line passing through the point (2,5) and (-3,2).
2. Differentiate $\sqrt{x} + \log x + \sin^{-1} x + e^{\tan x} - a^x$ with respect to x.
3. Differentiate $\tan x$ with respect to x using first principal method.
4. If $y = \sinh 3x \cosh 2x$ then find $\frac{dy}{dx}$.
5. If $S = t^3 - t^2 + 9t + 8$, where S is distance travelled by particle in t seconds. Find the velocity and acceleration at $t = 2$ sec.
6. Integrate: $\frac{1}{x} - \tan x + e^{-3x} + \frac{1}{1+x^2} + 5$ with respect to x.
7. Evaluate: $\int \frac{(1+\log x)^2}{x} dx$
8. Evaluate: $\int x \sin x dx$

9. Evaluate: $\int_0^{\pi/2} \cos 5x \cos 3x \, dx$
10. Evaluate: $\int_0^{\pi/2} \cos^3 x \, dx$
11. Solve the differential equation $\sin^2 y \, dx - \cos^2 x \, dy = 0$

SECTION – C

1. Find the equation of median through B in a triangle with vertices A(-1, 3), B(-3, 5) and C(7, -9)
2. Find the equation of hyperbola, given that vertices are $(\pm 7, 0)$ and eccentricity, $e=4/3$
3. If $x^y = a^x$, show that $\frac{dy}{dx} = \frac{x \log_e a - y}{x \log_e x}$.
4. If $y = e^{\tan^{-1} x}$ then show that $(1 + x^2) \frac{d^2 y}{dx^2} + (2x - 1) \frac{dy}{dx} = 0$.
5. Find the maximum and minimum values of the function $f(x) = 2x^3 - 21x^2 + 36x - 20$.
6. Evaluate: $\int \tan^{-1} x \, dx$
7. Find the volume of solid generated by revolving the curve $y = \sqrt{x^2 + 5x}$ between $x=1$ & $x=2$.
8. Solve the differential equation $x \frac{dy}{dx} - 2y = 2x$

Question Paper Blue Print:Course: **ENGINEERING MATHEMATICS – II** Course Code: **15SC02M**

UNIT NO		HOURS	Each questions to be set for 3 Marks Section - A	Each questions to be set for 5 Marks Section - B	Each questions to be set for 6 Marks Section- C	Weightage of Marks
1	a	4	01	01	01	23
	b	4	01	--	01	
2		15	04	03	02	39
3		07	02	01	01	17
4		12	03	03	01	30
5		05	02	02	01	22
6		05	01	01	01	14
TOTAL		52	14	11	08	145
Questions to be answered			10	08	05	100

Guidelines to Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weight age of model fixed for each unit.
2. The question paper pattern provided should be adhered to
Section-A: 10 questions to be answered out of 14 questions each carrying 03 marks.
Section-B: 08 questions to be answered out of 11 questions each carrying 05 marks.
Section-C: 05 questions to be answered out of 08 questions each carrying 06 marks.
3. Questions should not be set from the recapitulation topics.

Model Question Bank:

Course Title: **ENGINEERING MATHEMATICS – II**

Course Code: **15SC02M**

UNIT-1: STRAIGHT LINES AND CONIC SECTION:

3 MARK QUESTIONS

1. Find the equation of the straight line passing through (2,3) and having slope 5.
2. Find the slope and x-intercept and y-intercepts of the line $2x + 3y - 11 = 0$.
3. Find the vertex and focus of the parabola $(y - 2)^2 = 8x$.
4. Show that the lines $3x-2y+2=0$, $2x+3y+7=0$ are perpendicular.
5. Find the eccentricity of the ellipse $\frac{x^2}{64} + \frac{y^2}{9} = 1$

5 MARK QUESTIONS

1. Find the equation to the line passing through the point (6,-4) and perpendicular to the line $7x-6y+3=0$.
2. Find the equation to the line passing through the point (2,3) parallel to the line joining the points (-8,-6) & (2,-4).
3. Find the equation of straight line inclined at 135° to the x-axis having y-intercept $\frac{2}{3}$.
4. Find the equation of straight line joining the points (2,3) & (-4,6).
5. Find the equation of the line passes through (-3,-2) which is perpendicular to x-axis.

6 MARK QUESTIONS

1. Find the equation to the median of the triangle through the vertex A with vertices A(-1,3), B(-3,5) & C(7,-9).
2. The vertices of a quadrilateral taken in order are A(1,2), B(2,1), C(3,4) & D(-1,-2). Find the equation to the diagonal BD.

- Obtain the equation of the hyperbola in the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, whose eccentricity is 8 and distance between the foci is 12.
- Find the equation of the ellipse with length of major axis is 8 and minor axis is 3.
- Find the equation to the line passing through point (3,-2) and perpendicular to the line joining points (5,2) & (7,-6).

UNIT-2: DIFFERENTIATION:

3 MARK QUESTIONS

- Find $\frac{dy}{dx}$, if $y = 2x^2 - 3x + 1$.
- Differentiate $x \tan x$ with respect to x .
- Find $\frac{dy}{dx}$, if $x^2 + y^2 = 25$
- Find $\frac{dy}{dx}$ if $x = ct, y = \frac{c}{t}$,
- If $y = 4ax$, find $\frac{d^2y}{dx^2}$.

5 MARK QUESTIONS:

- Differentiate the function x^n by method of first principle.
- Find $\frac{dy}{dx}$ if $y = 6x^3 - 3 \cos x + 4 \cot x + 2e^{-x} - \frac{5}{x}$.
- Find $\frac{dy}{dx}$ if $y = \frac{\cos x + \sin x}{\cos x - \sin x}$
- Find $\frac{dy}{dx}$ if $y = (\cos x)^{\sin x}$
- If $y = \tan^{-1} x$, prove that $(1 + x^2)y_2 + 2xy_1 = 0$

6 MARK QUESTIONS:

- Find $\frac{dy}{dx}$ if $y = \frac{x \log x}{1 + \sin x}$
- Find $\frac{dy}{dx}$ if $x = a \cos^3 \theta, y = a \sin^3 \theta$ at $\theta = \frac{\pi}{4}$.
- Find $\frac{dy}{dx}$ if $y = x^{x^{x^{x^{\dots}}}}$.
- If $y = \tan^{-1} \left(\frac{1+x}{1-x} \right)$, find $\frac{dy}{dx}$.
- If $y = e^{m \sin^{-1} x}$, prove that $(1 - x^2)y_2 - xy_1 - m^2y = 0$

UNIT-3 APPLICATIONS OF DIFFERENTIATION

3 MARK QUESTIONS

1. Find the slope of the tangent to the curve $x^2 + 2y^2 = 9$ at a point (1, 2) on it.
2. Find the slope of the normal to the curve $y = 2 - 3x + x^2$ at (1, 0).
3. The law of motion of a moving particle is $S = 5t^2 + 6t + 3$ where 'S' is the distance in metres and 't' time in seconds. Find the velocity when $t=2$.
4. Find the rate of change of area of a circle with respect to its radius.
5. Show that the curve $2x^3 - y = 0$ is increasing at the point (1, 2).

5 MARK QUESTIONS

1. For a moving body vertically upwards, the equation of motion is given by $S = 98t - 4.9t^2$. When does the velocity vanish?
2. Find the equation to the tangent to the curve $y = 2x^2 - 3x - 1$ at (1,-2).
3. A circular patch of oil spreads on water and increases its area at the rate of 2 sq.cm/min. find the rate of change of radius when radius is 4 cm.
4. The volume of the spherical ball is increasing at the rate of 36π cc/sec. Find the rate at which the radius is increasing. When the radius of the ball is 2cm.
5. Find the max value of the function $y = x^3 - 3x + 4$.

6 MARK QUESTIONS

1. Find the max & min values of the function $y = x^5 - 5x^4 + 5x^3 - 1$.
2. Find the equation of normal to the curve $y = x^2 + 2x + 1$ at (1,1).
3. If S is the equation of motion where $S = t^3 - 2t^2$ find its acceleration when velocity is 0.
4. The volume of sphere is increasing at 3c.c per second. Find the rate of increase of the radius, when the radius is 2cm.
5. Water is flowing into a right circular cylindrical tank of radius 50 cms at the rate of 500π cc/min. Find how fast is the level of water going up.

UNIT-4: INTEGRATION

3 MARK QUESTIONS

1. Evaluate: $\int (x^2 + x + 1) dx$.
2. Evaluate: $\int \cot^2 x dx$
3. Evaluate: $\int e^{5x+8} dx$
4. Evaluate: $\int \frac{1}{2x+5} dx$
5. Evaluate: $\int \sin^5 x \cos x dx$

5 MARK QUESTIONS

1. Evaluate $\int \left(x^4 - \frac{1}{x} + \operatorname{cosec}^2 x - e^{-2x} + \cos x \right) dx$.
2. Evaluate: $\int \cos^3 x \, dx$
3. Evaluate: $\int \sin 6x \cos 2x \, dx$
4. Evaluate: $\int \log x \, dx$
5. Evaluate: $\int \frac{(\tan^{-1} x)^3}{1+x^2} dx$

6 MARK QUESTIONS

1. Evaluate: $\int (\tan x + \cot x)^2 dx$.
2. Evaluate: $\int (x+1)(x-2)(x-3) dx$
3. Evaluate: $\int x^2 \cos x \, dx$
4. Prove that $\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1} \left(\frac{x}{a} \right) + c$
5. Evaluate: $\int \frac{1}{9\sin^2 x + 4\cos^2 x} dx$

UNIT-5: DEFINITE INTEGRATION AND ITS APPLICATION.

3 MARK QUESTIONS

1. Evaluate: $\int_2^3 (2x + 1) dx$.
2. Evaluate: $\int_0^{\pi/4} \sec^2 x \, dx$.
3. Evaluate: $\int_0^2 e^x \, dx$
4. Evaluate: $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$.
5. Evaluate: $\int_0^{\pi/2} \cos x \, dx$.

5 MARK QUESTIONS

1. Evaluate: $\int_0^{\pi/2} \sin 3x \cos x \, dx$.
2. Evaluate: $\int_0^{\pi} \frac{\cos x}{1+\sin^2 x} dx$.
3. Evaluate: $\int_0^1 x(x-1)(x-2) dx$.
4. Find the area bounded by the curve $y = x^2 + 1$ the x-axis and ordinates $x = 1, x = 3$.
5. Find the volume of the solid generated by the revolving of the curve $y^2 = x^2 + 5x$ between the ordinates $x=1, x=2$ about x-axis.

6 MARK QUESTIONS

1. Evaluate: $\int_0^1 \frac{\cos(\tan^{-1} x)}{1+x^2} dx$.
2. Find the area between the curves $y = x^2 + 5$ and $y = 2x^2 + 1$.
3. Find the volume of ellipsoid generated by revolving $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between the ordinates $x = \pm a$ about x-axis.
4. Find the centre of gravity of a solid hemisphere.
5. Determine the moment of inertia of a uniform rod of length $2l$, Cross-sectional area “a” about an axis perpendicular to the rod and passing through the mid-point of the rod.

UNIT-6: INTEGRATION

3 MARK QUESTIONS

1. Write the order and degree of the differential equation $\left(\frac{dy}{dx}\right)^8 + 3\frac{d^2y}{dx^2} - ye^x = 0$.
2. Form the differential equation by eliminating arbitrary constants in $y = m e^{2x}$.
3. Solve $x dx + y dy = 0$.
4. Solve $\frac{dy}{1+y^2} = \frac{dx}{1+x^2}$.
5. Solve $e^x dx + dy = 0$.

5 MARK QUESTIONS

1. Form the differential equation by eliminating arbitrary constants A and B in $y = Ae^x + Be^{-x}$.
2. Form the differential equation by eliminating arbitrary constants in $y = a \cos mx + b \sin mx$.
3. Solve $(1 + y)dx + (1 + x)dy = 0$.
4. Solve $\frac{dy}{dx} + 3y = e^{2x}$.
5. Solve $\frac{dy}{dx} + y \tan x = \cos x$

6 MARK QUESTIONS

1. Solve $x(1 + y^2)dx + y(1 + x^2)dy = 0$.
2. Solve $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$.
3. Solve $x \frac{dy}{dx} + y = x^3$
4. Solve $\frac{dy}{dx} + 3y = e^{2x}$.
5. Solve $\frac{dy}{dx} + 2y \cot x + \sin 2x = 0$



Government of Karnataka
Department of Technical Education, Bengaluru

Course: ENGINEERING MATHEMATICS - II

Course code: 15SC02M

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Dr. D.S. Prakash	Asst. Director (LRDC)	DTE, Bengaluru
2	Dr.MokaShekhu	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
3	Sri.Sathyanaraya Dixit	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru
4	Sri. Guruprasad V	Lecturer (Selection Grade /Science)	APS Polytechnic, Somanahalli
5	Dr.RajasekharHeera	Lecturer/Science,	Government Polytechnic, Gulbarga.

Curriculum Review committee

	Name	Designation	Institution
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2	Sri.Sathyanaraya Dixit	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru



GOVERNMENT OF KARNATAKA
DEPARTMENT OF TECHNICAL EDUCATION
Board of Technical Examinations, Bengaluru

Course Title	: COMMUNICATION SKILLS IN ENGLISH	Course Code	: 15CP01E
Semester	: I / II	Course Group	: Core
Teaching Scheme (L:T:P)	: 4:0:0 (in hours)	Credits	: 4 Credits
Type of course	: Theory	Total Contact Hours	: 52
CIE	: 25 Marks	SEE	: 100 Marks

Pre-requisites:

- Basic Knowledge of Grammar
- Listening, Speaking, Reading and Writing Skills as acquired in Secondary Education

Course Objectives:

The students shall be able to:

- Learn to apply the basic grammar in day to day communication in English
- Comprehend the given ideas in a passage and be able to effectively express the same in written form
- Enrich their vocabulary through reading
- Face oral examinations and interviews
- Express their ideas creatively through (spoken/written) exercises

Course Delivery:

The Course will be delivered through lectures, class room interactions, exercises and case studies as detailed below:

Sl. No.	Description	Teaching contact hours
1.	Text	24
2.	Grammar	18
3.	Descriptive writing	5
4.	Comprehension	5
Total		52

Text book: Communication Skills in English for Polytechnics – by ORIENT BLACKSWAN publishers – published by NITTTR Chennai

Course Content:

UNIT I: CAREER PLANNING

(09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Spelling; Grammar- Parts of Speech; Newspaper Reading and Comprehension; Descriptive Writing – Describing Objects; Listening/ Speaking Exercise – Self Introduction.

UNIT-II: THE GREAT INDIAN PSYCHOTHERAPY

(09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Prefixes and Suffixes; Grammar – Articles and Prepositions; Descriptive Writing – Describing People; Listening/ Speaking Exercises – Listening to speeches and writing gist of it in one's own words.

UNIT III: GLOBAL WARMING

(08Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Synonyms and Antonyms; Grammar – Auxiliaries, Question Tags and Short-form Answers; Descriptive Writing – Describing Places; Listening/ Speaking Exercises – Narrating one's own experiences of different situations in their day- to-day life.

UNIT IV: RENDEZVOUS WITH A WOMAN CORPORATE GIANT

(09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Homonyms, Homophones, Homographs; Grammar – Subject-Verb Agreement; Descriptive Writing – Describing Processes; Listening/ Speaking Exercises – A short presentation on a given topic ;Paraphrasing of Proverbs; Different kinds of Interviews.

UNIT V: A UNIQUE PATIENT

(09 Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Compound words; Grammar –Tenses; Descriptive Writing – Describing Events (Eg: College Day, National Festivals, Etc.); Comprehension of a paragraph; Quiz – Questions on health and hygiene.

UNIT VI: A FARMER'S WIFE

(08 Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Formation of plurals; Grammar – Active and Passive Voices; Descriptive Writing – Describing one's goal and its attainment; Developing hints into a paragraph; Comprehension of an unseen passage.

Reference Books:

1. **HIGH SCHOOL ENGLISH GRAMMAR AND COMPOSITION** BY WREN AND MARTIN (S.CHAND & CO.)
2. **THE KING'S GRAMMAR** BY SANJAY KUMAR SINHA (S.CHAND & CO.)
3. **STRENGTHEN YOUR WRITING** BY V.R. NARAYANA SWAMY (ORIENT BLACKSWAN)
4. **ESSENTIAL ENGLISH** BY E. SURESH KUMAR et.al (ORIENT BLACKSWAN)
5. **ENGLISH GRAMMAR & COMPOSITION AND EFFECTIVE BUSINESS COMMUNICATION** BY M.A.PINK AND THOMAS S.E. (S.CHAND & CO.)
6. **WHAT YOUNG INDIA WANTS: SELECTED ESSAYS AND COLUMNS** BY CHETAN BHAGAT (RUPA PUBLICATION, NEW DELHI)
7. **CHICKEN SOUP FOR THE INDIAN DOCTOR'S SOUL** BY JACK CANFIELD et.al (WESTLAND LIMITED PUBLISHERS)
8. **SOFT SKILLS** BY K. ALEX(S.CHAND AND COMPANY)
9. **"REFLECTIONS": I PUC ENGLISH COURSE BOOK**, PUBLISHED BY DEPT.OF PRE-UNIVERSITY EDUCATION, GOVT OF KARNATAKA
10. **A PRACTICAL COURSE FOR WRITING SKILLS IN ENGLISH** BY J.K.GANGAL. (PHI PUBLICATIONS)
11. **ENGLISH LANGUAGE LABORATORIES – A COMPREHENSIVE MANUAL** BY NIRA KONAR (PHI LEARNING)

Course outcomes:

On successful completion of the course, the student will be able to:

1. Read their text, and respond to basic comprehension questions
2. Enhance the students' English grammar skills by using the following grammatical components in written and verbal communication
 - Parts of speech
 - Auxiliaries
 - Articles
 - Tenses
 - Active and Passive voice
 - Prepositions
 - Question Tags and Short form answers
 - Prefixes and Suffixes
 - Subject-Verb Agreement
 - Homonyms/Homophones/ Synonyms /Antonyms
3. Communicate an idea in series logically connected sentences by describing an event such as objects, people, places, processes, expanding proverbs and also conducting activity such as group discussion, presentation, reporting and documentation
4. Comprehend the given passage and able to answer the linked questions

Mapping Course Outcomes with Program Outcomes:

CO –PO Mapping

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Read their text, and respond to basic comprehension questions	5, 6, 7,9	R/U	24	30	25	-	55
CO2	Enhance the student English grammar skills by using the following grammatical components in written and verbal communication <ul style="list-style-type: none"> • Parts of speech • Auxiliaries • Articles • Tenses • Active and Passive voice • Prepositions • Question Tags and Short form answers • Prefixes and Suffixes • Subject-Verb Agreement • Homonyms/Homophones/ Synonyms /Antonyms 	9	U/A	18	-	16	25	41
CO3	Communicate an idea in series logically connected sentences by describing an event such as objects, people, places, processes, expanding proverbs and also conducting activities such as group discussion, presentation, reporting and documentation	7,8,9,10	U/A	7	-	-	15	15
CO4	Comprehend the given passage and able to answer the linked questions	8,9,10	U/A	3	-	10	-	10
		Total Hours of instruction		52	Total marks			121

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Program Outcomes									
	1	2	3	4	5	6	7	8	9	10
COMMUNICATION SKILLS IN ENGLISH	-	-	-	-	3	3	3	1	3	1

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Question Paper Blue Print:

Course: COMMUNICATION SKILLS IN ENGLISH

Course code: 15CP 01E

Sl. No.	Content	Knowledge	Comprehension	Application	Total
1.	TEXT				55
a	Lesson	30	25		
2.	GRAMMAR				41
a	Parts of speech			4	4
b	Auxiliaries: Primary and Modals			3	3
c	Articles			3	3
d	Identification of tenses			4	4
e	Active and Passive voice			4	4
f	Prepositions	4			4
g	Question tags			3	3
h	Short form answers			2	2
i	Prefixes and Suffixes	2			2
j	Homonyms/Homophones/	4			4
k	Synonyms and Antonyms	4			4
l	Agreement of the Verb with its Subject	4			4
3.	DESCRIPTION WRITING				15
a	Descriptive writing – Describing objects, people and places, Process and Events			15	
4.	COMPRHENSION				10
a	Comprehension of an unseen passage		10		
	Total	48	35	38	121

Question Paper Pattern:

Sl. No.	Source	Question	Type	Marks
1.	Textual Units	Answer any twelve of the following questions in one or two sentences each	15 questions to be asked from 6 Textual Units	$12 \times 2 = 24$
2.	Textual Units	Write short notes on any three of the following	5 questions to be asked from 6 Textual Units	$3 \times 5 = 15$
3.	Grammar	Identify the parts of speech of the underlined words	4 sentences are to be given and word to be identified is underlined	$4 \times 1 = 4$
4.	Grammar	Fill in the blanks using suitable Auxiliaries	3 sentences are to be given.	$3 \times 1 = 3$
5.	Grammar	Fill in the blanks using suitable Articles	3 sentences are to be given	$3 \times 1 = 3$
6.	Grammar	Identification of Tenses	4 sentences are to be given	$4 \times 1 = 4$
7.	Grammar	<u>Active and Passive Voice:</u> Change the voice of the verb in the following sentences	4 sentences are to be given for changing the voice of the verb	$4 \times 1 = 4$
8.	Grammar	<u>Prepositions:</u> Fill in the blanks with appropriate prepositions	4 sentences are to be given	$4 \times 1 = 4$
9.	Grammar	<u>Question Tags:</u> Add question tags	3 sentences are to be given	$3 \times 1 = 3$
10.	Grammar	<u>Short form answers:</u> Give short form answers	2 sentences are to be given	$2 \times 1 = 2$
11.	Grammar	<u>Prefixes and Suffixes:</u> Add Prefixes/Suffixes to the stem words	2 stem words are to be given	$2 \times 1 = 2$
12.	Grammar	<u>Homonyms, Homophones and Homographs:</u> Use the following words in your own sentences.	4 words are to be given	$4 \times 1 = 4$
13.	Grammar	<u>Synonyms / Antonyms:</u> Give the	2 words each are to be given	

		Synonyms/Antonyms for the following words		2 x 1= 2
14.	Grammar	<u>Agreement of the Verb with its Subject:</u> Fill in the blanks with verbs that agree with their subjects	4 sentences are to be given	4 x 1= 4
15.	Composition	<u>Descriptive Writing:</u> Describe objects, people, places and processes	3 questions are to be given	2 x 5 = 10
16.	Composition	<u>Comprehension of an unseen passage:</u> Read the following passage and answer the questions that follow	Questions to be set for 10 marks	10
	Total	-	-	100

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weightage of marks fixed for each category. (As per model question paper)
2. The question paper pattern provided should be adhered to.
3. Care must be taken so that there is only one possible answer for all 'fill in the blanks' questions.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Books	1 and 2
		Class room Assignments		Any one Activity(*)	05	Log of Activity	3
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 4
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 3 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 4 Effectiveness of delivery of instructions and assessment

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit. Any decimals shall be rounded off to the next higher digit. **Eg: 15.1** should be rounded of to **16**.

* Class room Assignments: Evaluated for any ONE activity

Suggested list of Tutorial Exercises leading to the Development of Speaking Skills

1. Introducing oneself
2. Discussion about weather
3. Discussion about hobbies
4. Discussing holiday plans
5. Telephonic conversation
6. Talking about favorite sports, movie, TV shows etc.
7. Description about one's goal and its attainment.

8. Any other topic of your/students' choice.

MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Exemplary	Student Score
	1	2	3	4	5	
Speaks on the given topic	Does not perform any duties assigned to them	Performs very few duties but unreliable	Performs very few duties	Performs nearly all duties	Performs all duties assigned	Ex: 4
Students' Enunciation	Does not enunciate clearly	Enunciation not up to the mark	Enunciation adequate	Enunciation above average	Enunciation extremely good	3
Presentation Skills	Poor presentation	Scope for improvement	Average presentation skills	Presentation effective	Excellent Presentation	2
Submission of Assignment	Does not collect any information relating to the topic	Collects very limited information	Collects some information	Collects much information	Collects a great deal of information	5
Average / Total marks = (4+3+2+5) /4 = 14/4= 3.5 = 4						4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (course coordinator) for assessing the given activity.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1.	Remembering	42
2.	Understanding the course	25
3.	Applying the knowledge acquired from course	33

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/ Date and Time	Semester/ Year	Course / Course Code	Max. Marks		
Ex: I test/6 th week of sem. 10-11 a.m.	I/II SEM	COMMUNICATION SKILLS IN ENGLISH	20		
	Year: 2015-16	Course Code:15CP01E			
Name of Course Coordinator :			Units: 2 CO's: 2		
Question No.	QUESTIONS	MARKS	CL	CO	PO
I	<p>Answer any <u>five</u> of the following in one or two sentences each:</p> <ol style="list-style-type: none"> 1. What do you mean by career? 2. Define 'Career Planning'? 3. What should be the major focus of career planning? 4. What are the questions often asked by the young? 5. What are the three traits as identified by the author? 6. How have the content of our films changed? 7. What has startled global experts? 	5x 2 = 10	R/U	1	5,7,9
II	<p><u>Grammar:</u></p> <p>1. Identify the parts of speech of the underlined words:</p> <ol style="list-style-type: none"> a. <u>All</u> spoke in his favour. b. Let us <u>even</u> the ground. <p>2. Fill in the blanks with suitable articles:</p> <ol style="list-style-type: none"> a. Charlie is ___ European. b. She is ___ untidy girl. <p>3. Fill in the blanks with appropriate prepositions:</p> <ol style="list-style-type: none"> a. Caesar was killed ___ Brutus ___ a dagger. b. We arrived ___ Belagavi ___ 6 o' clock. <p>4. Add Suffix and Prefix to the following:</p> <p style="padding-left: 20px;">_____ nation _____</p>	<p>2 x 1 = 2</p> <p>2 x 1 = 2</p> <p>4 x 1 = 4</p> <p>2 x 1 = 2</p>	U/A	2	9

Sources:

UNIT 1: CAREER PLANNING: SOFT SKILLS -BY DR. K. ALEX

UNIT 2: THE GREAT INDIAN PSYCHOTHERAPY: WHAT YOUNG INDIA WANTS: SELECTED ESSAYS AND COLUMNS - BY CHETAN BHAGAT

UNIT 3: GLOBAL WARMING: AN ESSAY BY DR. B.M.RAVINDRA, RETD. DY. DIR., DEPT. OF MINES AND GEOLOGY

UNIT 4: RENDEZVOUS WITH A WOMAN CORPORATE GIANT: ESSENTIAL ENGLISH BY E. SURESH KUMAR et.al.

UNIT 5: A UNIQUE PATIENT: CHICKEN SOUP FOR THE INDIAN DOCTOR'S SOUL - BY JACK CANFIELD et.al.



Government of Karnataka
Department of Technical Education, Bengaluru

Course: **COMMUNICATION SKILLS IN ENGLISH**

Course code: 15CP 01E

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1.	Mrs. Geetha K.	Selection Grade Lecturer	GRICP, Bengaluru
2.	Mr. C.V. Inamdar	Selection Grade Lecturer	Govt. Polytechnic, Belagavi
3.	Mrs. Bharathi Naik	Selection Grade Lecturer	Women's Polytechnic, Mangaluru
4.	Mrs. Rajyashree Srikant	Selection Grade Lecturer	Govt. Polytechnic, Bagepalli
5.	Mrs. Sunitha M.N.	Selection Grade Lecturer	HMS Polytechnic, Tumakuru
6.	Mr. Deepak Dongre	Selection Grade Lecturer	Govt. Residential Women's Polytechnic, Shivamogga

Review committee

	Name	Designation	Institution
1.	Mrs. Rajyashree Srikant	Selection Grade Lecturer	Govt. Polytechnic, Bagepalli
2.	Mrs. Shailaja D.	Lecturer	Women's Polytechnic, Bengaluru

Model Question Paper:

Code: 15CP 01E

I / II Semester Diploma Examination
COMMUNICATION SKILLS IN ENGLISH
(Common to all Diploma programmes)

Time: 3 Hours]

[Max. Marks: 100

Note:

- (i) Answer all the questions as directed.
- (ii) Spelling and grammatical errors shall be penalized.
- (iii) Answers to Question No. I and II are based on the prescribed text.

I. Answer any TWELVE of the following in one or two sentences each:

2 x 12 = 24

1. What do you mean by career?
2. Define 'Career Planning'?
3. What should be the major focus of career planning?
4. What are the questions often asked by the young?
5. What are the three traits as identified by the author?
6. How have the content of our films changed?
7. What is Global Warming?
8. How does Global Warming occur?
9. What are the major causes for Global Warming?
10. What was the usual talk when the parents of the children met?
11. What ambition did Nooyi's mother have for her daughter?
12. Who is the sinner according to the poem?
13. Why did the farmer commit suicide?
14. Explain in your own words the reason for the farmer's visit to the clinic.
15. Describe how the doctor fixed the bull's tooth.

II. Write short notes on any THREE of the following:

5 x 3 = 15

1. How does career planning play a major role in making career choices?
2. How does our environment contribute to our numbness to injustice?
3. Explain in your own words the traditional and modern views of one or two facts expressed in the interview?
4. Explain in your own words the reason for the farmer's visit to the clinic.
5. Why does the farmer's wife resolve to live?

III. GRAMMAR:

- 1. Identify the parts of speech of the underlined words:** **4 x 1= 4**
- All spoke in his favour.
 - Let us even the ground.
 - I can shift for myself.
 - She lives in luxury.
- 2. Fill in the blanks with suitable auxiliaries:** **3 x 1 =3**
- You _____ not use calculators in the exam hall.
 - _____ I come in sir?
 - _____ you lend me your scooter?
- 3. Fill in the blanks with suitable articles:** **3 x 1 = 3**
- Charlie is ___ European.
 - She is ___ untidy girl.
 - What is ___ matter?
- 4. Identify the tense of the verbs in the following sentences:** **4 x 1 = 4**
- I am writing a letter.
 - Sun rises in the east.
 - I have done my homework.
 - She has been learning western music.
- 5. Change the voice of the verb in the following sentences:** **4 x 1 = 4**
- Who did this?
 - The money was lost.
 - The cat is chasing the mouse.
 - He was made the king.
- 6. Fill in the blanks with appropriate prepositions:** **4 x 1= 4**
- Caesar was killed ___ Brutus ___ a dagger.
 - We arrived ___ Belagavi ___ 6 o' clock.
- 7. Add suitable question tag:** **3 x 1=3**
- You were late this morning, _____?
 - I did not hurt you, _____?
 - Your father is a doctor, _____?
- 8. Give short form answers for the following:** **2 x 1=2**
- Does your father smoke? (Negative)
 - Have you read today's newspaper? (Affirmative)
- 9. Add Suffix and Prefix to the following:** **2 x 1= 2**
- _____ nation _____
- 10. Frame sentences using each word to bring out the difference in meaning clearly:**

4 x 1 = 4

- a. (i) Sight (ii) Site
b. (i) Present (ii) Present

11. Give Synonyms to the following words: **2 x 1=2**

- a. Teach
b. Agree

12. Give Antonyms to the following words: **2 x 1 = 2**

- a. War
b. Happy

13. Fill in the blanks with verbs to agree with their subjects: **4 x 1 = 4**

- a. Twenty kilometers _____not a long distance.
b. Either you or I_____ mistake.
c. Gold and Silver_____ precious metals
d. The captain with his team _____arrived.

IV. COMPOSITION: (Answer any two in 80 -100 words each) **5 x 2 = 10**

1. Describe your favorite tourist place.
2. Describe the process of preparing tea.
3. Expand – Work is worship.

V. COMPREHENSION:

Read the following passage and answer the questions that follow:

She was all of one-and-a-half years old. Two nurses were holding her down while a third was trying to insert a syringe into a vein to get a blood sample. She was crying loudly, but I was crying even louder. We had no option. It was the fifth day and the fever had not broken; it was imperative that we run the test to rule out typhoid. They finally asked me to leave the room, not just because they were embarrassed at a grown-up crying, but because they thought it would be easier and quicker for the child if the mother was not in the room. They got her out within a few minutes. She jumped into my arms and gave a few more loud wails. Fresh tears streamed down my eyes as we made our way out of the wretched pathology lab. Her paediatrician was getting into the building just then. Between sobs I told him how my daughter had flung the syringe and the lab had to have three attendants on her to collect the sample. As I was talking, my voice broke. To my surprise, Dr. Patel handed me his briefcase and stethoscope, took my girl in his arms and went to the store just a few paces away. He bought her a Cadbury bar and my daughter's face lit up like a million bucks. Gone were the tears, the memory of the syringe, smell of antiseptic, cotton ... everything receded to the background as she unwrapped the big bar with her tiny fingers and dug into it with all her heart. I smiled as the angelic doctor handed me my princess.

Meanings of difficult words:

1. **Imperative:** absolutely essential
2. **Wretched:** miserable; unpleasant
3. **Pathology lab:** where the causes and effects of diseases are studied
4. **Receded:** moved back gradually
5. **Paediatrician:** children's doctor
6. **Flung:**(past tense of fling) an act of throwing violently
7. **Attendants:** one who attends

Questions:

- | | |
|---|---|
| 1. How old was the child? | 1 |
| 2. What did the nurses have to do to get a blood sample? | 2 |
| 3. Why was the mother asked to leave the room? | 2 |
| 4. Why does the mother called the pathology lab 'wretched'? | 2 |
| 5. How did Dr. Patel calm down the little girl? | 2 |
| 6. Suggest a suitable title for this passage. | 1 |

Model Question Bank:

Course Title : **COMMUNICATION SKILLS IN ENGLISH**

Course Code: **15CP01E**

I. ANSWER IN ONE OR TWO SENTENCES EACH:

1. What do you mean by career?
2. Define 'Career Planning'?
3. What should be the major focus of career planning?
4. List out the benefits of career planning?
5. Identify the guidelines for choosing a career?
6. What are the frequently asked questions about career fields?
7. How do connections help in searching for a suitable job?
8. What are the sample questions asked about a particular job title?
9. What is the role of a career counselor in charting out a career path?
10. List out the factors influencing career decisions?
11. What has startled global experts?
12. What are the questions often asked by the young?
13. What are the three traits as identified by the author?
14. How have the content of our films changed?
15. In what way have we been exposed to corruption from our childhood?

16. How can we contribute to India's progress?
17. What is global warming?
18. How does global warming occur?
19. What are the major causes for Global Warming?
20. What is the quantity of fossil fuel burnt each year?
21. How does the concentration of carbon dioxide in the air increase?
22. Define Greenhouse effect?
23. By burning forests around the world, how much carbon dioxide is added to the atmosphere?
24. What are the steps to be taken to save our environment?
25. What is the possible problem of global warming and its result?
26. What is the effect of global warming?
27. What was the usual talk when the parents of the children met?
28. What ambition did Nooyi's mother have for her daughter?
29. How did Nooyi's mother threaten Nooyi?
30. What good news did Indra Nooyi want to share with her mother?
31. What did Nooyi's mother say when she was told the good news?
32. What lesson did Nooyi learn from her mother?
33. Why does Nooyi's mother take full credit for Nooyi's success?
34. What does Indra Nooyi discover about the language of business in the U.S?
35. What does Indra Nooyi think about herself as a mother?
36. What is the secret of Indra Nooyi's success?
37. How does Indra Nooyi manage time?
38. What is Indra Nooyi's passion?
39. Describe the farmer who visited the dentist's clinic.
41. What was the curious act of the farmer?
42. What request did the farmer make?
43. Why did the doctor almost 'faint in shock'?
44. What did the farmer say when he came back to the clinic?
45. Who do 'you' and 'I' in the poem refer to?
46. Who is the sinner according to the poem?
47. Why did the farmer commit suicide?
48. Explain the meaning of the phrase 'you crossed over'.
49. What are the contrasts depicted by the writer between the farmer's wife and her husband?
50. What memories of her husband trouble her now?

II. ANSWER IN A PARAGRAPH OF NOT MORE THAN 100 WORDS EACH:

1. Write a short note on Guidelines for Choosing a Career.
2. How does career planning play a major role in making career choices?
3. Explain in your own words the first trait of our psyche.
4. How does our environment contribute to our numbness to injustice?
5. Describe the divisiveness that the author talks about.
6. What are the causes and effects of global warming?
7. How does deforestation affect our environment?

8. What information do you gather about Indra Nooyi after going through the interview with Nandan Nilekani?
9. How did Indra Nooyi's mother try to teach her the role of a woman in a family? Do you agree with her?
10. How do you think Indra Nooyi's mother and her husband contribute to her success?
11. What does Indra Nooyi mean when she says "I have to decide every moment in time whether I am going to be a mother or a wife or an executive"?
12. Explain in your own words the traditional and modern views of one or two facts expressed in the interview?
13. Explain in your own words the reason for the farmer's visit to the clinic.
14. Describe how the doctor fixed the bull's tooth.
15. Describe the lament of the farmer's wife on her husband's death?

III. GRAMMAR:

1. Fill in the blanks with suitable articles:

- a. Dr. Sanjay is ___ dentist.
- b. My friend is ___ MLA.
- c. Have you ever visited ___ Himalayas?
- d. Please bring me ___ cup of coffee.
- e. He is ___ untidy boy.
- f. She is ___ backbone of her organization.
- g. He is ___ honour to his profession.
- h. Raghu is going to ___ mall.
- i. ___ world is ___ happy place.
- j. I met ___ European at ___ party in ___ friend's house.

2. Fill in the blanks with suitable prepositions:

- a. She works ___ a big shop ___ Jayanagar.
- b. There is a book ___ the floor. Put it ___ the table.
- c. I often see Mrs. Dixit ___ the station, waiting ___ her train.
- d. Mangalore is ___ the coast ___ the south ___ India.
- e. My daughter isn't ___ work today because she isn't feeling well.
- f. There were several people ___ the bus stop.
- g. Mr. and Mrs. Sharma were ___ the shop talking ___ the assistant.
- h. Yesterday we spent the day ___ the country.
- i. We had lunch ___ a pretty little village.
- j. When I was ___ the bus stop this morning; I saw two boys ___ the church roof.

3. Add appropriate prefixes to form new words:

- | | | | | |
|---------|------------|-------------|-------------|-------------|
| a. form | b. regular | c. literate | d. accurate | e. operate |
| f. pure | g. fix | h. technic | i. tone | j. national |

4. Add appropriate suffixes to form new words:

- a. rich b. love c. start d. beauty e. differ
f. use g. cheer h. attract i. save j. slow

5. Give the synonyms of the following:

- a. release b. arrive c. trap d. happiness. e. large
f. teach g. change h. confusion i. discover j. charge

6. Give the antonyms for the following:

- a. rise b. increase c. smiled. d. strict. e. sadness
f. full g. host h. success i. discover j. charge

7. Add the correct question tags to the following statements:

- a. It is cold, _____?
b. But it isn't as cold as yesterday, _____?
c. It was very cold yesterday, _____?
d. It hasn't been so cold for a long time, _____?
e. It is snowing in the north, _____?
f. It often snows there, _____?

8. Give short form answers for the following:

- a. Does Renu work hard? _____.
b. Can you swim? _____.
c. Are you angry with me? _____.
d. Do you like watching movies? _____.
e. Have you met our Prime Minister? _____.

9. Fill in the blanks with appropriate words from the brackets:

- a. His father-in-law owns a _____ farm. (dairy/diary)
b. Diabetics must take extra care of their _____. (feet/feet)
c. Rekha is a popular _____ of Bollywood. (hero/heroine)
d. The _____ country was prosperous during the _____ of Krishnadevaraya. (reign/reign/rain)
e. You should be _____ in the class. (quite/quiet)

10. Differentiate between the following pairs of words by using each of them in a sentence of your own:

- a. Wrong, rung b. Principal, principle c. Hair, hare
d. Gate, gait. e. Sea, see f. Fair, fare
g. Some, sum. h. Sell, cell i. Weather, whether
j. Birth, berth k. Vacation, vocation l. Bear, bare

11. Fill in the blanks with verbs to agree with their subjects:

- a. Every seat in the bus _____ taken.
- b. All the seats in this bus _____ reserved.
- c. One of my friends _____ visiting me this week end.
- d. Neither Gopal nor Deepak _____ come today.
- e. The Captain of Indian team as well as his players _____ staying here.
- f. Intelligence and hard work _____ required to get good marks.
- g. Mathematics _____ my favourite subject.
- h. _____ your father and mother at home?


12. Identify the tense of the verbs in the following in the sentences.

- a. He was listening to her attentively.
- b. Raghu denies stealing my purse.
- c. She has bought a flat near my house.
- d. Kiran fought bravely.
- e. The teachers are discussing the details of the annual day function.
- f. I am not trying to copy you.
- g. Sushma was cooking pasta.
- h. The students have been waiting eagerly for the results.
- i. Risheeba speaks Tamil very fluently.
- j. I have been waiting for her for over an hour.

13. Change the voice:

- | | |
|-------------------------------|--|
| a. Ramu was making a kite. | f. He was refused admission. |
| b. Close the door. | g. Do not insult the poor. |
| c. Cable wires have been cut. | h. Without effort nothing can be gained. |
| d. We prohibit smoking. | i. They made him captain. |
| e. Everyone loves him. | |
| e. My watch was lost. | |

Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Digital and Computer Fundamentals		
	Scheme (L:T:P) : 4:0:0	Total Contact Hours: 52	Course Code: 15CS21T
	Type of Course: Lectures & Student Activity.	Credit : 04	Core/ Elective: Core
CIE- 25 Marks		SEE- 100 Marks	

Prerequisites: Knowledge of Mathematics and Basic Electronics in secondary education.

Course Objectives:

1. To study the numbers systems and codes, combinational and sequential circuits
2. To know the fundamentals of computer and peripherals.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		CL	Linked PO	Teaching Hours
CO1	Describe various number system and codes.	R, U, A	1,2,3	10
CO2	Summarize different types of logic gates and apply Boolean laws and rules to simplify simple expressions.	R, U, A	1,2,3	08
CO3	Demonstrate different types of combinational logic circuits.	U, A	1,2,3,4,8,9,10	06
CO4	Construct different types of sequential logic circuits.	U, A	1,2,3,4,8,9,10	10
CO5	Identify and illustrate basic organization of computer.	R, U	1,2,5,9,10	06
CO6	Illustrate the memory concepts, I/O devices and peripherals.	R, U	1,2,5,9,10	12
			Total sessions	52

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Digital and Computer fundamentals	3	3	2	2	2	-	-	2	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks weightage (%)
			R	U	A		
I	Digital Principles	10	-	18	10	28	19.23
II	Boolean algebra & Logic gates	08	05	10	08	23	15.4
III	Combinational Circuits	06	-	07	10	17	11.52
IV	Sequential Circuits	10	-	10	18	28	19.23
V	Introduction to Computers & Computer software	06		12	05	17	11.52
VI	Peripherals & Memory	12	05	22	05	32	23.1
Total		52	10	79	56	145	100

Course Contents**Unit-I : Digital Principles****10 Hrs**

Number systems - Binary, octal, decimal and Hexa-decimal, Conversion from different number systems to others, 1's complement and 2's complement, Addition and Subtraction of 1's and 2's complement, BCD, EBCDIC, ASCII Code, Gray code, Excess-3 code.

Unit-II : Logic gates & Boolean algebra**8 Hrs**

Logic gates - OR, AND, NOT, NAND, NOR, XOR, XNOR, Boolean Algebra - Laws, Rules, De-Morgan's theorems, Boolean expressions- SOP, POS, Simple expressions to simplify.

Unit-III : Combinational Circuits**6 Hrs**

Half adder, Full adder, Encoder, Decimal-to-BCD encoder, Decoders, BCD-to-Seven Segment Decoder, Multiplexer, 4:1 mux and De Multiplexer, 1:4 Demux

Unit-IV : Sequential Circuits**10 Hrs**

Flip-flops : Introduction, Flip-flop types : RS, Clocked RS, JK, JK Master slave, D; Applications of flip-flops, Shift Registers, Types of shift register – SISO, SIPO, PISO, PIPO and Applications shift Register, Counters – Classification – Asynchronous counter, 4-bit asynchronous ripple counter, Synchronous counter, 4-bit Up/Down counter, Applications.

Unit-V Introduction to Computers & Computer Software **6 Hrs**

Introduction, Characteristics of Computers, Evolution of Computers (abstract only), Generations of Computers, Classification, Computer System, Applications. Software, Software categories, Machine language, Assembly Language, High level language, Software terminologies.

Unit-VI : Peripherals & Memory **12 Hrs**

Input devices: Keyboard and it's working principle, Mouse and it's working principle, Touch Screen, light Pen, Joystick, scanner, web camera. Output devices: Impact and Non-impact printers, Dot matrix printer, Inkjet printer, laser printer, basic principle of CRT. Primary memory- RAM, ROM, Types of ROM, Secondary memory- Hard disk and its working principle, Optical disk – DVD, Blue Ray.

Text Book:

Unit-I to Unit IV – Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483

Unit V & Unit-VI – Introduction to Computer Science, ITL Education Solutions Pvt. Ltd., Pearson Education.

Reference:

1. Fundamentals of Computers, V Rajaraman, PHI
2. Introduction to Computers and Data Processing, KOGENT Learning Solutions Inc, Dream Tech.

Course Delivery:

The course will be delivered through lectures and presentations

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Assessment	CIE (Continuous Internal Evaluation)	IA	Students	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
		Student Activity		05	Assignment books	1 to 6	
Direct method	SEE (Semester End Examination)	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle of the course	-NA-	Feedback forms	1, 2,3 Delivery of course
	End of Course Survey			End of the course	-NA-	Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's Category	%
1	Remembrance	15
2	Understanding	45
3	Application	40

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM		20		
	Year:				
Name of Course coordinator : CO's:_____			Units:___		
Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks	
Ex: I test/6 th weak of sem 10-11 AM	II SEM	Digital & Computer Fundamentals	20	
	Year: 2015-16	Course code:15CS21T		
Name of Course coordinator : Units:1,2 Co: 1,2				
Note: Answer all questions				
Question no	Question	CL	CO	PO
1	What is binary number system and Explain. (5)	R, U	1	1,2
2	Convert the following (5) i. 11101 ₂ Binary to decimal number. ii. 146 ₈ Octal to decimal number. OR What is the purpose of binary coding system? Explain any two terms 1) BCD 2) EBCDIC 3) ASCII CODE 4) GRAY CODE	R, U	1	1,2
3	Realize NAND gate using NOR gate. (10) OR Write the Laws and Rules of Boolean Algebra. OR Simplify the expression $Y = \overline{(A + C)} \cdot (B + D)$	R, U	2	1,2

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.25

**All student activities should be done in a group of 4-5 students with a team leader.*

**II Semester Diploma in Computer Science & Engineering
Course: Digital and Computer Fundamentals****PART-A****I. Answer any six questions.****5X6=30 marks**

1. What do you mean by number system? Explain types of number system.
2. List any 5 Boolean algebra functions.
3. Write the truth table and logical symbol of OR gate.
4. List the applications of multiplexer.
5. What is a Flip-flop? Write the logical symbol of Flip-flop.
6. Define computer. List the characteristics of computers.
7. List the hierarchy of memory.
8. With a neat diagram explain the working of Keyboard.
9. Write a short note on laser printer.

PART- B**II. Answer any seven full questions.****10X7=70 Marks**

1. Explain the terms BCD, EBCDIC, ASCII CODE, GRAY CODE, and EXCESS-3 CODE.
2. Convert the following
 - iii. 11101_2 Binary to decimal number.
 - iv. 456 Decimal to binary number.
 - v. 146_8 Octal to decimal number.
 - vi. $5BC_{16}$ Hexadecimal to decimal number.
3. Construct the AND gate using NAND & NOR.
4. Explain the working of Half adder with logic diagram and truth table.
5. Explain the working of 4-bit serial in serial out(SISO) with logical circuit and truth table.
6. Explain Asynchronous counter. Give it advantages and disadvantages.
7. Draw a block diagram of computer system and explain.
8. List and explain the software categories.
9. a) What is Machine Language? write its advantages and disadvantages. (5marks)
b) List the hierarchy of memory. (5 marks)
10. a) Define computer software. Write any 2 relationship between software and hardware. (4 marks)
b) Write difference between Primary memory and Secondary memory. (6marks)



Model Question Bank

Course Title: Digital and Computer Fundamentals	Course Code: 15CS21T
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CO	Question	CL	Marks
I	What do you mean by number system? Explain types of number system.	U	05
	What is binary number system and Explain.	U	
	What is BCD and Explain.	U	
	Explain the concepts of 1's complement and 2's complement.	U	
	Addition of 1000 and 1010 using 1' complement.	U	
	Addition of 1111 and 1010 using 2' complement.	U	
	Subtraction of 1000 from 1010 using 1' complement.	U	
	Subtraction of 1010 from 1111 using 2' complement.	U	
	How do you subtract a number in 1' complement?	U	
	How do you subtract a number in 2' complement?	U	
	Convert the following any 2 b. Binary to decimal i) 11101 ₂ c. Decimal to binary i) 456 d. Binary to octal i) 10001 ₂ e. Binary to hexadecimal i) 1100 ₂ f. Octal to decimal i) 146 ₈ g. Decimal to octal i) 567 h. Decimal to hexadecimal i) 928 i. Hexadecimal to decimal i) 5BC ₁₆ j. Hexadecimal to Binary i) 7AC ₁₆	U	
	What is Decimal number system and Explain?	U	
	What is octal number system and Explain?	U	
	What is hexadecimal number system and Explain?	U	
	What is ASCII code? Mention its applications.	U	
Compare ASCII and EBCDIC.	U		
II	What is the purpose of binary coding system? Explain the terms BCD, EBCDIC, ASCII CODE, GRAY CODE, EXCESS-3 CODE.	A	10
	How do you represent the number in excess-3 code and gray code?	A	
	What is the radix or base of the system? With the help of these systems, explain the various types of number system.	A	
II	Write the Laws of Boolean Algebra.	R	05
	Write the Rules of Boolean Algebra.	R	
	List any 5 Boolean algebra functions.	U	
	Write the truth table and logical symbol of OR gate.	U	
	Write the truth table and logical symbol of AND gate.	U	
	Write the truth table and logical symbol of NOT gate.	U	


	Write the truth table and logical symbol of NOR gate.	U	
	Write the truth table and logical symbol of NAND gate.	U	
	Write the truth table and logical symbol of XOR gate.	U	
	Write the Laws and Rules of Boolean Algebra	R	
	Explain Boolean algebra functions with an example.	U	
	Explain Logic gates - OR, AND, NOT, NAND, NOR, XOR, and EX-NOR	U	
	Write the truth table of basic gates. (OR, AND, NOT)	U	
	Construct the OR gate using NAND & NOR.	A	
	Construct the AND gate using NAND & NOR.	A	
	Realize NAND gate using NOR gate.	A	
	With expressions state the Boolean laws a. Commutative law b. Associative law c. Distributive law	U	10
	Simplify the expression $Y = \overline{A}BD + A\overline{B}D$	A	
	Simplify the expression $Y = (\overline{A} + B)(A + B)$	A	
	Simplify the expression $Y = \overline{A}CD + \overline{A}BCD$	A	
	Simplify the expression $Y = \overline{A\overline{B} + C}$	A	
	Simplify the expression $Y = \overline{(\overline{A} + C) \cdot (B + D)}$	A	
	Simplify the expression $Y = \overline{A + B} \cdot C$	A	
	What is the difference between a full-adder and a half-adder?	U	05
	List the applications of multiplexer.	A	
	Define encoder and decoder	U	
III	Explain the working of half adder with logic diagram and truth table.	U	10
	Explain the working of full adder with logic diagram and truth table.	U	
	Explain with a neat circuit and truth table the working of BCD to Decimal encoder.	A	
	Explain with a neat circuit and truth table the working of BCD to Decimal decoder.	A	
	Explain with a neat circuit and truth table the working of decimal to BCD decoder.	A	
	Explain the working of 1:4 demultiplexer with logical circuit and truth table.	A	
	Explain the functioning of 4:1 multiplexer. With a block diagram and truth table	A	
IV	What is a Flip-flop? Write the logical symbol of Flip-flop.	U	05
	List the different types of Flip-flops.	U	
	What is race around condition? In which Flip-flop it is overcome.	U	
	List the applications of Flip-flop.	A	
	What is Shift Registers? List its applications.	A	
	Write the functions of Shift Registers and List its types.	A	

	Define Counter. Write its applications.	A	10
	Compare Asynchronous and Synchronous counter.	U	
	List and explain the different types of Flip-flops.	U	
	Explain RS Flip-flop with truth table, logic symbol and logical circuit.	U	
	Explain JK Flip-flop with truth table, logic symbol and logical circuit.	U	
	Explain JK Master Slave Flip-flop with truth table, log symbol and logical circuit.	U	
	Explain D-Flip-flop with truth table, logic symbol and logical circuit.	U	
	Explain the working of 4-bit parallel in serial out (PISO) with logical circuit and truth table.	A	
	Explain the working of 4-bit serial in parallel out (SIPO) with logical circuit and truth table.	A	
	Explain the working of 4-bit serial in serial out (SISO) with logical circuit and truth table.	A	
	Explain the working of 4-bit parallel in parallel out (PIPO) with logical circuit and truth table.	A	
	Explain 4-bit asynchronous ripple counter.	A	
	Explain 4-bit synchronous up/down counter.	A	
	V	Define computer. List the characteristics of computers.	
List the classification of computers.		A	
Explain the First Generations of Computers.		U	
Explain the second Generations of Computers.		U	
Explain the third Generations of Computers.		U	
Explain the Fourth Generations of Computers.		U	
Explain the Fifth Generations of Computers.		U	
List various applications of computers.		A	
Draw a block diagram of computer system and explain. (Components of computer)	U	10	
VI	Define computer software. What is the relationship between software and hardware.	R	05
	What is Machine Language? Write its advantages and disadvantages.	U	
	What is Assembly Language? Write its advantages and disadvantages.	U	
	What is High level Language? Write its advantages and disadvantages.	U	
	List the Software terminologies.	R	
	List input devices of computer.	R	
	List output devices of computer.	R	
	With a neat diagram explain the working of keyboard.	U	
	What is the use of joystick and light pen?	A	
	What is the use of scanner and web camera?	A	
	What is the use of mouse and touch screen?	A	
	Compare Impact and Non-impact printer?	U	
	Write a short note on dot-matrix printer.	U	
	Write a short note on laser printer.	U	

Write a short note on inkjet printer.	U	
What is memory? What are the different types of memory?	U	
Mention the various units, which are used for measuring the computer memory.	U	
List the hierarchy of memory.	U	
Compare RAM and ROM.	U	
What is ROM? What are the types of ROM?	U	
What is Primary memory? Give examples.	U	
What is Secondary memory? Give examples	U	
List and explain the software categories.	U	10
Explain any four Software terminologies.	U	
Explain the working principles of keyboard.	U	
Explain the keyboard layout.	U	
Explain the working principles of mouse.	U	
Draw the block diagram and explain the working principles of CRT	U	
List and Explain the hierarchy of memory	U	
Explain the working principle of hard disk.	U	
What is Optical disk? Give examples.	U	
Write difference between Primary memory and Secondary memory.	U	
List the advantages and disadvantages of Optical disk?	U	
What are the benefits of Secondary memory?	U	



Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Digital Electronics Lab		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15EC03P
	Type of Course: Tutorial & Practical's	Credit : 03	Core/ Elective: Core
CIE- 25 Marks		SEE- 50 Marks	

Prerequisites:

Knowledge of Basic Electronics Engineering in I – semester.

Course Objectives:

Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Identify the various digital ICs and understand their operation.	<i>1,2,3,4</i>	<i>R, U</i>	1,2,3,4,8,10	18
CO2	Apply Boolean laws to simplify the digital circuits.	<i>5,6</i>	<i>U, A</i>	1,2,3,4,8,10	15
CO3	Illustrate combinational logic circuits	<i>7,8,9</i>	<i>U, A</i>	1,2,3,4,8,10	21
CO4	Illustrate Sequential logic circuits	<i>10,11,12,13,14</i>	<i>U, A</i>	1,2,3,4,8,10	24
			Total sessions		78

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Digital and Computer fundamentals	3	3	3	3	-	-	-	3	-	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

List of Graded Exercises

1. Compare analog and digital electronics systems (Tutorial)
2. Realization of basic and universal logic gates using ICS 7400, 7432, 7402, 7408, 7486, 7404.
3. Realization of NOT, OR, AND, NOR, XOR, XNOR using NAND.
4. Realization of NOT, OR, AND, NAND, XOR, XNOR using NOR.
5. Verification of Demorgan's theorem.
6. Simplify the Boolean expression using Boolean algebra and verify.
7. Realization of half adder and full adder.
8. Verification of TT of 4:1 mux & 1:4 demux using IC's.
9. Interfacing 7-segment display system with IC 7447 to display 0-9
10. Verification of TT of flip flops
 - (i) Clocked RS FF using NAND gate
 - (ii) JK FF using IC 7476
 - (iii) D- FF
 - (iv) T-FF using JK Flip-flop
11. Verification of TT of shift registers (7495)
 - (i) SISO
 - (ii) SIPO
 - (iii) PISO
 - (iv) PIPO
12. Verification of 4-bit Asynchronous mod-10 (decade) counter (IC 7490)
13. Verification of 4-bit synchronous up/down counter (IC 74193)
14. 4-bit Ring counter (Tutorial followed by experiment)

Course Delivery

The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

Reference

1. Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483
2. Digital Principles and Applications, Malvino and Leach, TMH

e-Resources

1. <http://www.vlab.co.in/>
2. <http://www.asic-world.com/>
3. <http://electrical4u.com/>
4. <http://www.electronics-tutorials.ws>

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two IA Tests (Average of two tests will be computed)	10	Blue books	1,2,3,4
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4
				Student Activity	05	Log of record	1,2,3,4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2,3,4 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

- I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
- Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	20
3	Application	70

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information ; some relate to the topic	Collects some basic information ; refer to the topic	Collects relevant information ; concerned to the topic	Collects a great deal of information ; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.2=4

**All student activities should be done in a group of 4-5 students with a team leader.*

Scheme of Evaluation for End Exam

SN	Scheme	Max. Marks
1	Writing Circuit and Procedure of one Experiment	20
2	Conduction	15
3	Result	05
4	Viva voce	10
Total		50
Note: 1. Candidate shall submit Lab Record for the Examination. 2. Student shall be allowed to execute directly even if he / she unable to write the procedure 3. In case of change in experiment or no write up, marks will not be awarded for writing procedure/steps.		

Resource requirements for Digital Electronics Lab

(for an Intake of 60 Students [3 Batches])

Hardware requirement

Sl. No.	Equipment	Quantity
1	IC tester	01
2	Digital trainers	10
3	ICS-7400,7402,7404,7408,7432,7486,7483,7485,7427	25 each
4	Patch cards(different lengths)	250


Model Question Bank

Course Title: **Digital Electronics Lab**

Course Code: **15EC03P**

1. Construct a circuit to realize basic and universal logic gates.
2. Construct a circuit to realize NOT, OR, AND, NOR, XOR, XNOR using NAND.
3. Construct a circuit to realize NOT, OR, AND, NAND, XOR, XNOR using NOR.
4. Construct a circuit to realize half adder and full adder.
5. Construct a circuit to verify Demorgan's Theorems.
6. Construct a circuit for a given simple Boolean expression using Boolean algebra.
7. Construct a circuit to verify TT of 4:1 mux
8. Construct a circuit to verify TT 1:4 demux.
9. Construct a circuit to interface 7-segment display system with IC 7447 to display 0-9
10. Construct a circuit to verify TT of Clocked RS FF using NAND gate
11. Construct a circuit to verify TT of JK FF using IC 7476
12. Construct a circuit to verify TT of Master slave JK FF
13. Construct a circuit to verify TT of D FF
14. Construct a circuit to verify TT of Serial-in Serial-out shift register
15. Construct a circuit to verify TT of Serial-in Parallel-out shift register
16. Construct a circuit to verify TT of Parallel-in Serial-out shift register
17. Construct a circuit to verify TT of Parallel-in Parallel-out shift register
18. Construct a circuit to verify TT of 4-bit Asynchronous mod-10 (decade) counter.
19. Construct a circuit to verify TT of 4-bit synchronous up/down counter

Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Basic Web Design Lab		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15CS22P
	Type of Course: Tutorial and Practical's	Credit : 03	Core/ Elective: Core
CIE- 25 Marks		SEE- 50 Marks	

Pre-requisites:

Knowledge of Text Editor and Internet Basics.

Course Objectives:

Create HTML Documents with formatting, images, tables, frames, embed multi-media objects and develop a static website using Hyper Text Mark-up Language.

Course Outcome

On successful completion of the course, the students will be able to attain CO:

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Understand the concepts of website development	<i>Unit-I</i>	<i>U</i>	1,2,4,8,10	6
CO2	Demonstrate knowledge and skills utilizing various HTML tags for designing a static web page.	<i>1,2,3,4</i>	<i>U/A</i>	1,2,3,4,8,9,10	27
CO3	Apply screen-based user interfaces, with graphics, textual components, and navigation systems to achieve a unified, functional environment that results in static web pages.	<i>5,6,7,8,9,10,11,12</i>	<i>U/A</i>	1,2,3,4,8,9,10	24
CO4	Illustrate Table, Frames and relate the Cascading Style Sheets (CSS) features to specify various aspects of style, such as colours and text fonts and sizes, in their HTML documents and to understand the difference between linked, embedded and inline style specifications and how they operate in a “cascade”.	<i>13,14,15,16</i>	<i>U/A</i>	1,2,3,4,8,9,10	21
			Total sessions		78

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom’s revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Basic Web Design Lab	3	3	3	3	-	-	-	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Content

UNIT – I

Tutorials

1. Introduction to HTML: Web site, Web Page, Types of Web Pages, Browsers and their types, Client –Server Model, Web –Server, Working of different types of Web Pages, General structure of a Web Page, Scripting languages, URL, Popular Search Engines, WWW

UNIT-II

Note: All attributes pertaining to respective tags to be practiced.

2. Structure of HTML web page:
<Head>, <title>, <body>, comments, <div>, <h1>.....<h6>, <hr>,

3. Basic HTML physical character tags:
, <i>, <u>, <big>, <small>, <sup>, <sub>, <strike>
4. Logical character tags:
, , , <insert>, <cite>, <code>, <dfn>, <ins>, <kbd>, <samp>,
5. Other HTML tags:
<p>, , <abbr>, <acronym>, <address>, <blockquote>, <quote>, <q>
6. List tags: all tags pertaining to Lists
7. Table tags.
8. Hyper link tag (both Internal & External).
9. Working with Frame and Form tags.
10. Image tags & embedding a multimedia on to a web page(video, audio, zip)
11. Working with CSS (Cascading Style Sheet).
12. Develop a web page using the above tags.

List of Graded Exercises

1. Design a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag.

2. Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.
3. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
4. Create a page to show different character formatting (B, I, U, SUB, SUP) tags.

$$\text{viz : } \log_b m^p = p \log_b m$$
5. Write HTML code to create a Web Page that contains an Image at its centre.
6. Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.
7. Create web Pages using Anchor tag with its attributes for external links.
8. Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.
9. Write a HTML code to create a web page with pink colour background and display moving message in red colour.
10. Create a web page, showing an ordered list of all second semester courses (Subjects).
11. Create a web page, showing an unordered list of names of all the Diploma Programmes (Branches) in your institution.
12. Create a HTML document containing a nested list showing a content page of any book.
13. Create the following table in HTML with Dummy Data:

Reg. Number	Student Name	Year/Semester	Date of Admission

14. Create a web page which divides the page in two equal frames and place the audio and video clips in frame-1 and frame-2 respectively.

FRAME-1	FRAME-2
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15. Create a web page which should generate following output:

FRAME-1	FRAME-2
	FRAME-3

16. Create a web page using Embedded CSS and multimedia

Mini Project (CIE -05 Marks):

Develop a static website consisting of minimum five web pages using any open source Editor like Bluefish, etc.

References:

1. <http://www.w3schools.com/html/default.asp>
2. <http://sourceforge.net/projects/bluefish/>
3. <http://bluefish.openoffice.nl/index.html>
4. <http://bluefish.openoffice.nl/features.html>
5. HTML Black Book, Kogent Learning Solutions Inc. ISBN-13 9789350040959
6. "World Wide Web design with HTML" by Xavier. ISBN 0-07-463971-4, Tata McGraw-Hill Publishing company Limited.

Course Delivery:

The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two Tests; (Average of two Tests will be computed.)	10	Blue Books	1,2,3,4
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3,4
				Mini Project	05	Report	1,2,3,4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2 Delivery of course
	End of Course Survey			End of the course		Questionnaire	1,2,3,4 Effectiveness of Delivery of instructions and Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	30
3	Application	60

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information ; some relate to the topic	Collects some basic information ; refer to the topic	Collects relevant information ; concerned to the topic	Collects a great deal of information ; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.2=4

**All student activities should be done in a group of 4-5 students with a team leader.*

Scheme of Evaluation

S.NO.	SCHEME	Max. Marks
1	Writing Steps / Procedure for one Question from Graded Exercises	15
2	Execution	15
3	Presentation Skills	10
4	Viva voce	10
Total		50
Note: <ol style="list-style-type: none">1. Candidate shall submit Lab Record for the Examination.2. Student shall be allowed to execute directly even if she / he unable to write the procedure3. In case of change in experiment or no write up, marks will not be awarded for writing procedure/steps.		

Resource requirements for Basic Web Design Lab

(for an intake of 60 Students [3 Batches])

Hardware Requirement:

Sl. No.	Equipment	Quantity
1	PC systems (latest configurations with speakers)	20
2	Laser Printers	03
3	Networking (Structured) with CAT 6e / wireless 24 Port switches / Wireless Router I/O Boxes for networking(as required)	03
4	Broad Band Connection	01

Software Requirement: Linux / equivalent Operating System, Editor, Web Browsers.

Note:

Students: Computers ratio in the Lab should be strictly **1:1** for a batch of twenty Students.

Model Question Bank

Course Title: **BASIC WEB DESIGN LAB**

Course Code: **15CS22P**

Note: One Question to be given from the following.

1. Illustrate a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag.
2. Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.
3. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.
4. Create a page to show different character formatting (B, I, U, SUB, SUP) tags.
viz: $\log_b m^p = p \log_b m$
5. Write HTML code to create a Web Page that contains an Image at its centre.
6. Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.
7. Create web Pages using Anchor tag with its attributes for external links.
8. Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.
9. Write a HTML code to create a web page with pink colour background and display moving message in red colour.
10. Create a web page, showing an ordered list of all second semester courses (Subjects).
11. Create a web page, showing an unordered list of names of all the Diploma Programmes (Branches) in your institution.
12. Create a HTML document containing a nested list showing a content page of any book.
13. Create the following table in HTML with Dummy Data:

Reg. Number	Student Name	Year/Semester	Date of Admission

14. Create a web page which divides the page in two equal frames and place the audio and video clips in frame-1 and frame-2 respectively.


FRAME-1	FRAME-2
---------	---------

15. Create a web page which should generate following output:

FRAME-1	FRAME-2
	FRAME-3

16. Create a web page using Embedded CSS and multimedia

Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Multimedia Lab		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15CS23P
	Type of Course: Tutorial and Practical's	Credit : 03	Core/ Elective: Core
CIE- 25 Marks		SEE-50 Marks	

Prerequisites:

Basic Computer Operations and Creative ideas.

Course Objectives:

Learn the various photo editing features and animation techniques and demonstrate proficiency in developing the multimedia presentations.

Course Outcome

On successful completion of the course, the students will be able to attain CO:

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Apply basic elements and principles of photo editing software to achieve a great photo effect by applying effects like color, shadows, alteration of backgrounds, cropping and collage making.	1-6	A	1,2,3,4,5,8,9,10	36
CO2	Create simple shapes using animation editing software and design simple animation by applying shape tweens and motion tweens.	7-12	A	1,2,3,4,5,8,9,10	42
			Total sessions		78

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Multimedia Lab	3	3	3	3	3	-	-	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

List of Graded Exercises

Unit I

Using suitable Photo Editing Software, perform the following exercises:

1. Design a Visiting Card containing at least one graphic and text information.
2. You are given a picture of a garden as background. Extract the image of a butterfly from another picture and organize it on the background.
3. Given a picture, make three copies of this picture. On one of these pictures, adjust the brightness and contrast, so that it gives an elegant look. On the second picture, change it to grayscale and the third is the original one.
4. Convert the given image to a pencil sketch.
5. Mask the background image given through your name.
6. Import two pictures, one that of sea and another of clouds. Morph, Merge and Overlap the images.

Unit II

Using suitable animation software, solve the following projects:

7. **Shape Distortion:** Create a square and gradually convert it into a circle.
8. **Spotlight:** Create a text on one layer; format the text with suitable size, color and style. With the help of another layer, position a spotlight on the text and move the spotlight from left to right.
9. **Virtual Drumbeat:** Draw a circle to represent a drum and edit as required on one layer. Insert another layer, draw suitable drum sticks and position them appropriately. Give visual effects. Also provide audio effect by selecting the sound item from Flash library Sounds fla, so as to integrate audio and video clips.
10. **Simulation of a Raindrop:** In the first layer, draw a raindrop that falls on the ground. Show the splash effect, when it touches the ground on another layer.
11. **Sunset:** Create a suitable background with clouds and mountains on one layer. Draw the Sun on another layer. On the third layer draw birds. Provide animation to show the birds flying across the Sun that keeps fading.
12. **Stickman Walk:** Draw a walking track on one layer. On another layer draw a stickman, with animation show the man walking over the track from left to right.

Mini-project [CIE- 05 Marks]

Prepare a mini project of a minimum of 5 pages of report, using the above concepts of Unit-I and/or Unit-II.

References:

1. Practical Photoshop® CS6, Level 1 by Barbara Zukin Heiman, Donald Laird, Corrine Haverinen, Windsor Green, & Marilyn P. Kelly Practical Photoshop.
2. Project Flash MX by Nat Gertler, Thomson Delmar Learning Publication.
3. Comdex Multimedia and Web Design Course Kit, DreamTech, Vikas Gupta, ISBN 13: 788177229196
4. <http://www.coursestuff.co.uk/DESI1182/docs/Flash%20tutorials.pdf>
5. http://w3.id.tue.nl/fileadmin/id/objects/E-telier/Phidgets/Software/Flash/fl8_tutorials.pdf
6. <http://design.tutsplus.com/articles/50-great-photoshop-tutorials-for-clever-beginners--psd-785>

Course Delivery:

The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment method	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two IA Tests (Average of Two Tests will be computed)	10	Blue books	1,2
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2
				Mini Project	05	Report	1,2
	TOTAL				25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2
Indirect Assessment method	Student Feedback on course		Students	Middle of the course		Feedback forms	1 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities/Mini Project.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	20
3	Application	70

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.25=4

**All student activities should be done in a group of 4-5 students with a team leader.*

**

Scheme of Evaluation for End Exam

SN	Content	Max. Marks
1	Writing steps one each from Unit I and Unit -II	05+05=10
2	Testing the psychomotor skills (Quickness in choosing appropriate tools and performing) of Unit I and Unit II to achieve the task	10+10=20
3	Application of Final effects	05+05=10
4	Viva voce	10
	Total	50
	Note: 1. Candidate shall submit Lab Record for the Examination. 2. Student should be allowed to execute directly even if she / he unable to write the procedure 3. In case of change in experiment or no write up, marks will not be awarded for writing procedure/steps.	

Resource requirements for Multimedia Lab

(for an intake of 60 Students [3 Batches])

Hardware Requirement:

Sl. No.	Equipment	Quantity
1	PC systems (latest configurations with speakers)	20
2	Laser Printers	03
3	Networking (Structured) with CAT 6e / wireless 24 Port switches / Wireless Router I/O Boxes for networking(as required)	03
4	Broad Band Connection	01

Software Requirement: FOSS Photo Editor/Animation Tools/any other

Note:

Students: Computers ratio in the Lab should be strictly **1:1** for a batch of twenty Students.

MODEL QUESTION BANK

Course Title:

MULTIMEDIA LAB

Course Code: **15CS23P**

Note: One Question to be given from each of the Units I and II.

Unit I

1. Using photo editing software, design a visiting card containing at least one graphic and text information.
2. You are given a picture of a garden as background. Extract the image of a butterfly from another picture and organize it on the background. Use photo editing software,
3. Using photo editing software, make three copies of .jpeg picture. On one of these pictures, adjust the brightness and contrast, so that it gives an elegant look. On the second picture, change it to grayscale and the third is the original one.
4. Using photo editing software convert an image imported from My Pictures, to a pencil sketch.
5. Using photo editing software, Mask the background image given through your name.
6. Using photo editing software, import two pictures, one that of sea and another of clouds. Morph, merge and overlap these images.

Unit II

7. Using animation software show the gradual conversion of a square to a circle.
8. Using animation software, highlight a neatly formatted text by a spotlight from left to right.
9. Using animation software, show the effect of a Virtual Drumbeat with suitable audio and visual effects.
10. Using animation software, Simulate a Raindrop with a splash effect.
11. Using animation software, show the sunset event with a bird flying across while the sun keeps fading.
12. Using animation software, design a stickman walking over a track from left to right.