

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur



Structure and Curriculum for First Year Bachelor of Technology

(To be Implemented from Academic Year 2021-2022)

UG Programmes in

- **Computer Science & Engineering**
- **Computer Science & Engineering
(Artificial Intelligence & Machine Learning)**
- **Computer Science & Engineering
(Data Science)**
- **Electronics & Telecommunication Engineering**
- **Electrical Engineering**

**Structure and Curriculum
for
(Computer Science & Engg. / Artificial Intelligence & Machine Learning / Data Science / Electronics
& Telecommunication Engg. / Electrical Engg.)
Teaching and Evaluation Scheme
Group 1 : (Division A, B, C & D) SEMESTER-I**

Course Code	Course Name	Curriculum Component	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
Induction program as per AICTE guidelines										
UHSC0101	Engineering Mathematics-I	BS	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0102	Communication Skills	HS	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0103	Optics and Modern Physics	BS	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0104	Computer Aided Engineering Drawing	ES	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0114	Introduction to Programming	ES	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0121	Communication Skills Lab	HS		-	2	1	ISE	50	20	
UHSC0122	Optics and Modern Physics Lab	BS	-	-	2	1	ISE	50	20	
UHSC0123	Computer Aided Engineering Drawing Lab	ES	-	-	2	1	ISE	50	20	
UHSC0124	Workshop Practice Lab (Electronics & Computer)	ES	-	-	2	1	ISE	50	20	
UHSC0137	Introduction to Programming Lab	ES	-	-	2	1	ISE	50	20	40
							ESE(POE)	50	20	
UHSA0151	Audit Course-I (Entrepreneurship Development)	AU	2	-	-	-	ISE	100	40	
	Total		15	1	10	19				
Total Contact hours – 26, Total Credits - 19										

Curriculum is distributed in 62% theory and 38% practical

BS	Basic Sciences	ISE	In Semester Evaluation	L	Theory	Cr	Credits
ES	Engineering Sciences	MSE	Mid Semester Examination	T	Tutorial	AU	Audit Course
HS	Humanities	ESE	End Semester Examination	P	Practical	POE	Practical & Oral Exam

SEMESTER-II

Course Code	Course Name	Curriculum Component	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
UHSC0201	Engineering Mathematics-II	BS	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0205	Modern Chemistry	BS	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0206	Smart and Sustainable Construction	ES	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0207	Basic Electrical and Electronics Engineering	ES	4	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0215	Problem Solving using C	ES	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0225	Modern Chemistry Lab	BS	-	-	2	1	ISE	50	20	
UHSC0226	Smart and Sustainable Construction Lab	ES	-	-	2	1	ISE	50	20	
UHSC0227	Basic Electrical and Electronics Engineering Lab	ES	-	-	2	1	ISE	50	20	
UHSC0228	Mechanical Engineering Lab	ES	-	-	2	1	ISE	50	20	
UHSC0238	Problem Solving using C Lab	ES	-	-	2	1	ISE	50	20	40
							ESE (POE)	50	20	
UHSA0252	Audit Course-II (Human Values and Professional Ethics)	AU	2	-	-	-	ISE	100	40	
	Total		17	1	10	21				
Total Contact hours – 28, Total Credits - 21										

Curriculum is distributed in 62% theory and 38% practical

BS	Basic Sciences	ISE	In Semester Evaluation	L	Theory	Cr	Credits
ES	Engineering Sciences	MSE	Mid Semester Examination	T	Tutorial	AU	Audit Course
HS	Humanities	ESE	End Semester Examination	P	Practical	POE	Practical & Oral Exam

Course Code	Course Name	Curriculum Component	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
Induction program as per AICTE guidelines										
UHSC0101	Engineering Mathematics-I	BS	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0105	Modern Chemistry	BS	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0106	Smart and Sustainable Construction	ES	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0107	Basic Electrical and Electronics Engineering	ES	4	-	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0114	Introduction to Programming	ES	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10		
							ESE	50	20	
UHSC0125	Modern Chemistry Lab	BS	-	-	2	1	ISE	50	20	
UHSC0126	Smart and Sustainable Construction Lab	ES	-	-	2	1	ISE	50	20	
UHSC0127	Basic Electrical and Electronics Engineering Lab	ES	-	-	2	1	ISE	50	20	
UHSC0128	Mechanical Engineering Lab	ES	-	-	2	1	ISE	50	20	
UHSC0137	Introduction to Programming Lab	ES	-	-	2	1	ISE	50	20	40
							ESE (POE)	50	20	
UHSA0152	Audit Course-II (Human Values and Professional Ethics)	AU	2	-	-	-	ISE	100	40	
	Total		16	1	10	20				
Total Contact hours – 27, Total Credits - 20										

Curriculum is distributed in 62% theory and 38% practical

BS	Basic Sciences	ISE	In Semester Evaluation	L	Theory	Cr	Credits
ES	Engineering Sciences	MSE	Mid Semester Examination	T	Tutorial	AU	Audit Course
HS	Humanities	ESE	End Semester Examination	P	Practical	POE	Practical & Oral Exam

SEMESTER-II

Course Code	Course Name	Curriculum Component	Teaching Scheme				Evaluation Scheme			
			L	T	P	Cr	Components	Max	Min for Passing	
UHSC0201	Engineering Mathematics-II	BS	3	1	-	4	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
UHSC0202	Communication Skills	HS	2	-	-	2	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
UHSC0203	Optics and Modern Physics	BS	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
UHSC0204	Computer Aided Engineering Drawing	ES	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
UHSC0215	Problem Solving using C	ES	3	-	-	3	ISE-I	10	20	40
							MSE	30		
							ISE-II	10	20	
							ESE	50		
UHSC0221	Communication Skills Lab	HS		-	2	1	ISE	50	20	
UHSC0222	Optics and Modern Physics Lab	BS	-	-	2	1	ISE	50	20	
UHSC0223	Computer Aided Engineering Drawing Lab	ES	-	-	2	1	ISE	50	20	
UHSC0224	Workshop Practice Lab (Electronics & Computer)	ES	-	-	2	1	ISE	50	20	
UHSC0238	Problem Solving using C Lab	ES	-	-	2	1	ISE	50	20	40
							ESE (POE)	50	20	
UHSA0251	Audit Course-I (Entrepreneurship Development)	AU	2	-	-	-	ISE	100	40	
	Total		16	1	10	20				
Total Contact hours – 27, Total Credits - 20										

Curriculum is distributed in 62% theory and 38% practical

BS	Basic Sciences	ISE	In Semester Evaluation	L	Theory	Cr	Credits
ES	Engineering Sciences	MSE	Mid Semester Examination	T	Tutorial	AU	Audit Course
HS	Humanities	ESE	End Semester Examination	P	Practical	POE	Practical & Oral Exam

-----:F.Y. B. Tech Syllabus: -----

(Computer Science & Engg. / Artificial Intelligence & Machine Learning / Data Science / Electronics & Telecommunication Engg. / Electrical Engg.)

Title of the Course: ENGINEERING MATHEMATICS-I								L	T	P	Credit			
Course Code: UHSC0101								3	1	-	4			
Course Pre-Requisite: Basics of matrix algebra, rules and formulae of derivative and preliminary concepts of vector algebra														
Course Description: In this course students will learn topics from linear algebra and single and multivariable differential calculus.														
Course Objectives:														
1. To learn mathematical methodologies and models since mathematics is the foundation of engineering and technology.														
2. To develop mathematical skills and enhance logical thinking power of students.														
3. To enhance student's skills in linear algebra, differential calculus of single and multivariable functions this would enable them to devise engineering solutions for given situations.														
Course Outcomes:														
CO		After the completion of the course the student should be able to												
CO1		Demonstrate an understanding of the concepts of linear algebra, single and multivariable calculus.												
CO2		Find the rank of matrix, series expansion of a function, partial derivatives, gradient of scalar function, divergence and curl of vector function.												
CO3		Solve the linear system equations, eigenvalue and eigenvector problems and test the convergence of series.												
CO4		Apply the knowledge of single and multivariable calculus and obtain solution of various mathematical problems.												
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1	-	-
CO2	3	2										1	-	-
CO3	3	2										1	-	-
CO4	3	2										1	-	-
Assessment Scheme:														
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.														
								Assessment Component		Marks				
								ISE 1		10				
								MSE		30				
								ISE 2		10				
								ESE		50				
ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.														
MSE is based on 50% of course content (first three units).														
ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.														
Course Contents														
Unit No.	Unit Title and Contents												Hours	
1	Matrices and Linear System Equations													
	➤ Revision of matrix and determinant operation.													
	➤ Rank of matrix: definition, echelon form													
	➤ Consistency of linear system equations													
	➤ System of linear homogeneous equations													
	➤ System of linear non-homogeneous equations												7	

2	Eigen Values and Eigen Vectors <ul style="list-style-type: none"> ➤ Linear dependence and independence of vectors ➤ Eigen values and their properties. ➤ Eigen vectors and their properties ➤ Cayley-Hamilton's theorem (without proof) ➤ Inverse and higher powers of matrix by using Cayley-Hamilton's theorem 	6
3	Differential Calculus <ul style="list-style-type: none"> ➤ Functions of single variable, continuity and differentiability. ➤ Fundamental theorems : Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem. ➤ Expansion of functions: Taylor's and Maclaurin's series. ➤ Methods of expansion: standard series, substitution, differentiation and integration. ➤ Indeterminate forms. 	8
4	Sequence and Series <ul style="list-style-type: none"> ➤ Sequences and convergence of sequence ➤ Convergence of series ➤ Comparison tests ➤ Integral test ➤ Comparison of ratios ➤ D'Alembert's ratio test ➤ Raabe's test ➤ Cauchy's root test 	8
5	Partial Differentiation <ul style="list-style-type: none"> ➤ Partial derivatives: definition and partial derivatives of higher orders ➤ Total derivatives and differentiation of implicit function ➤ Change of variables ➤ Euler's theorem on homogeneous function of two variables ➤ Jacobian, properties of jacobian, jacobian of implicit function ➤ Errors and approximations ➤ Maxima and minima of functions of two variables 	7
6	Vector Differential Calculus <ul style="list-style-type: none"> ➤ Differentiation of vectors ➤ Velocity and acceleration ➤ Gradient of scalar point function and directional derivative ➤ Divergence of vector point function ➤ Curl of a vector point function ➤ Solenoidal and irrotational vector fields 	6

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1.	Higher Engineering Mathematics	42	Dr. B. S. Grewal	Khanna Publishers, Delhi	2012
2.	A Text Book of Applied Mathematics Vol. I	6	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan, Pune	Reprint 2007

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1.	Advanced Engineering Mathematics	10	Erwin Kreyszig	John Wiley & Sons	2011
2.	Advanced Engineering Mathematics	21	H. K. Dass	S. Chand & Company Pvt. Ltd, New Delhi	2014
3.	A text book of Engineering Mathematics		N. P. Bali, Iyengar	Laxmi Publications (P) Ltd., New Delhi	

4.	Engineering Mathematics		Ravish R Singh and Mukul Bhatt	McGraw Hill Education (India) Private Limited, Chennai.	2017
5.	Engineering Mathematics-I		G. V. Kumbhojkar	C. Jamnadas & Co	
6.	Mathematics for Engineers Volume-I	1	Rakesh Dube	Narosa Publishing House, New Delhi	2009

Unit wise Measurable students Learning Outcomes:

1. Solve simultaneous linear system of equations arising in engineering problems by matrix method.
2. Illustrate the linear dependence and independence of vectors.
3. Find eigen values and corresponding eigen vectors of given square matrix.
4. State and verify Cayley Hamilton theorem and apply it to find various matrix expressions.
5. Use Taylor's and Maclaurin's series to expand the function and to find the approximate values.
6. Use L'Hospital's rule to evaluate limit.
7. Use appropriate test to determine convergence of series.
8. Find partial derivatives of first and higher orders of given multi variable functions.
9. Apply Euler's theorem on Homogeneous function.
10. State and verify properties of Jacobin.
11. Apply knowledge of partial derivatives to find approximate value, errors and the maximum and minimum values of functions of two variables. Understand concept of the differentiation of vectors.
12. Apply the knowledge of divergence and curl to describe the nature of vector field such as solenoidal and irrotational vector fields.

Title of the Course: ENGINEERING MATHEMATICS-II									L	T	P	Credit		
Course Code: UHSC0201									3	1	-	4		
Course Pre-Requisite: Algebra of complex numbers, basics of differential equations, rules and formulae of integration and conics														
Course Description: In this course students will learn topics from complex algebra, differential equations, special functions and integral calculus.														
Course Objectives:														
1. To learn mathematical methodologies and models since mathematics is the foundation of engineering and technology.														
2. To develop mathematical skills and enhance logical thinking power of students.														
3. To enhance student's skills in complex algebra, integral calculus and differential equations this would enable them to devise engineering solutions for given situations.														
Course Outcomes:														
CO	After the completion of the course the student should be able to													
CO1	Understand the concepts of complex algebra, improper integrals, multiple integrals and differential equations.													
CO2	Solve the first order differential equations, problems consisting complex numbers and hyperbolic functions and evaluate improper integrals using special functions.													
CO3	Apply the knowledge differential and integral calculus for curve tracing, rectification and evaluation of multiple integrals.													
CO4	Select the appropriate method or technique for solving problems in applications of differential equations, applications of multiple integrals and simplification of complex quantities in real and imaginary parts.													
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1	-	-
CO2	3	2										1	-	-
CO3	3	2										1	-	-
CO4	3	2										1	-	-
Assessment Scheme:														
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.														

		ISE 2	10		
		ESE	50		
ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc. MSE is based on 50% of course content (first three units). ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.					
Course Contents					
Unit No.	Unit Title and Contents	Hours			
1	Complex Numbers and Hyperbolic Functions ➤ Revision of algebra of complex number and De Moivre's theorem. ➤ Roots of complex numbers. ➤ Circular functions of a complex variable - definitions ➤ Hyperbolic functions, relation between circular & hyperbolic functions. ➤ Inverse hyperbolic functions. ➤ Separation into real and imaginary parts	7			
2	Ordinary Differential Equations of First Order and First Degree and Its Applications ➤ Linear differential equations (Revision) ➤ Exact differential equations ➤ Reducible to exact differential equations ➤ Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type. ➤ Applications to orthogonal trajectories (cartesian and polar equations) ➤ Applications to simple electrical circuits	6			
3	Special Functions ➤ Gamma function and its properties ➤ Beta function and its properties ➤ Differentiation under integral sign ➤ Error function and its properties	8			
4	Curve Tracing and Rectification ➤ Tracing of curves in Cartesian form a) Semi cubical parabola, b) Cissiod of Diocles, c) Strophoid, d) Astroid, e) Witch of Agnesi, f) Common Catenary, g) Folium of Descartes, ➤ Tracing of curves in polar form a) Cardioid, b) Pascal's Limacon, c) Lemniscate of Bernoulli, d) Parabola, e) Hyperbola, f) Rose curves ➤ Rectification of plane curves (Cartesian and Polar form)	8			
5	Multiple Integration ➤ Double integration ➤ Double integral evaluation in cartesian and polar. ➤ Change of order of integration ➤ Change of variable ➤ Change into polar ➤ Triple integral evaluation with given limits	7			
6	Applications of Multiple Integration ➤ Area enclosed by plane curves ➤ Mass of a plane lamina ➤ Center of gravity of plane lamina ➤ Moment of inertia of plane lamina ➤ Volume of solid of revolution.	6			
Textbooks:					
SN	Title	Edition	Author/s	Publisher	Year
1.	Higher Engineering Mathematics	42	Dr. B. S. Grewal	Khanna Publishers, Delhi	2012
2.	A Text Book of Applied Mathematics Vol. I & II	6	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan, Pune	Reprint 2007

Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1.	Advanced Engineering Mathematics	10	Erwin Kreyszig	John Wiley & Sons	2011
2.	Advanced Engineering Mathematics	21	H. K. Dass	S. Chand & Company Pvt. Ltd, New Delhi	2014
3.	A text book of Engineering Mathematics		N. P. Bali, Iyengar	Laxmi Publications (P) Ltd., New Delhi	
4.	Engineering Mathematics		Ravish R Singh and Mukul Bhatt	McGraw Hill Education (India) Private Limited, Chennai.	2017
5.	Engineering Mathematics-II		G. V. Kumbhojkar	C. Jamnadas & Co	
6.	Mathematics for Engineers Volume-I	1	Rakesh Dube	Narosa Publishing House, New Delhi	2009

Unit wise Measurable students Learning Outcomes:

1. Define the De Moivre's theorem and use it to find the roots of complex numbers.
2. Separate Complex quantity into Real and Imaginary Parts.
3. Define basic concepts and terminologies of differential equations.
4. Solve ODE of first order and first degree by using various methods.
5. Define special functions like Gamma and Beta function.
6. Evaluate improper integrals by using special functions.
7. Use the rule of differentiation under integral sign to evaluate the integrals.
8. Demonstrate the procedure of tracing curves in cartesian and polar form.
9. Trace the curves of given functions.
10. Find the length of given curves.
11. Evaluate double integrals in cartesian and polar form.
12. Find area, mass of lamina, center of gravity & moment of inertia of plane lamina using double integrals

Title of the Course: Communication Skills		L	T	P	Credit
Course Code: UHSC0102/ UHSC0202		2	-	-	2
Course Pre-Requisite: English subject at HSC					
Course Description: The course intends to make learners understand and develop various communication skills required in day today life as well as in professional contexts. As domain knowledge and skills have become equally important in today's technology driven world, the current course and the one being offered in Third Year will provide the learners a great opportunity to strengthen their English communication and soft skills. Keeping in mind the current competence of the learners, the course aims to provide them revision and ample practice in the skills essential for their professional life. It includes six modules which cover basic concepts and theory of communication, business communication, verbal aptitude (English grammar), language learning skills, letter writing and comprehension. In addition to LSRW, the course sees Thinking as an essential language learning skill.					
Course Objectives: <ol style="list-style-type: none"> 1 Making students understand the fundamentals of communication theory and its relevance in professional context 2 To make students better in English grammar to perform best in verbal aptitude assessment 3 To hone their listening and reading comprehension skills 4 To introduce them to techniques to improve their spoken English and to provide them a platform for practicing these skills 5 To enable them to write correct and effective business and official letters 					
Course Outcomes:					
CO	After the completion of the course the student should be able to				
CO1	Recall basic English grammar to strengthen their verbal aptitude				
CO2	Demonstrate communication process, methods of communication and flow of communication in business context				
CO3	Apply acquired LSRW skills into real life situations and in professional context				
CO4	Compose effective business letters using standard language, style and structure				

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								-	-	1		-		
CO2								2	2	3		1		
CO3								2	2	2		1		
CO4								1	-	2		-		
CO5														

Assessment Scheme:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and **ISE 2** are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.

MSE is based on 50% of course content (first three units).

ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Communication Theory <ul style="list-style-type: none"> Communication basics: Importance, process, levels Forms/methods: verbal and non-verbal Barriers and solutions 	6
2	Communication in Business Context <ul style="list-style-type: none"> Flow/channels of business communication (Internal, External, Vertical, Horizontal, Diagonal, Grapevine), Problems and Solutions Inter-cultural communication 	2
3	Verbal Aptitude <ul style="list-style-type: none"> Grammar: parts of speech-using articles, conjunctions and prepositions; using appropriate tenses, degree, voice Vocabulary: Affixation, synonyms and antonyms, idioms, confusables-homophones and homonyms Syntax: word order, types of sentences, spotting errors in sentences with justification, Punctuation marks 	6
4	Enhancing Language Learning Skills (LSRWT) <ul style="list-style-type: none"> Effective listening: Process and advantages of listening, poor listening habits, types of listening, strategies for effective listening, listening barriers Effective speaking: Importance, various oral business contexts/situations, group communication, preparing effective public speeches Effective reading: Importance, types, overcoming common obstacles, tips and strategies Effective writing: Importance, paragraph writing techniques, diary/blog writing Thinking as a learning skill 	6
5	Formal Business Correspondence <ul style="list-style-type: none"> Principles, structure (elements) Layout (complete block, modified block, semi-block), Types (Job application, enquiry and replies, claim and adjustment) 	6
6	Summarization and Comprehension <ul style="list-style-type: none"> Art of précis writing Techniques to comprehend and summarize a given technical, scientific, or industry-oriented text 	2

SN	Title	Edition	Author/s	Publisher	Year
1	<i>Communication Skills</i>	Third	Meenakshi Raman and Sangeeta Sharma	Oxford University Press (OUP)	2013
2	<i>Communication Skills</i>	Second	Sanjay Kumar and Pushpa Lata	Oxford University Press (OUP)	2015
3	<i>Business Communication</i>	Second	Urmila Rai and S.M. Rai	Himalaya	2014
4	<i>Communication skills for Engineers and Scientists</i>		S. Sharma and B. Mishra	PHI Learning	2015

Reference Books:						
SN	Title	Edition	Author/s	Publisher	Year	
1	<i>Business Communication</i>	Third	S. Kalia and S. Agarwal	Wiley	2015	
2	<i>Technical Communication</i>	Fourth	Meenakshi Raman and Sangeeta Sharma	OUP	2013	
3	<i>Business Communication</i>	Second	Meenakshi Raman and Prakash Singh	OUP	2013	
4	<i>Business Communication</i>	Second	Raymond Lesikar et al.	McGraw Hill	2015	
5	<i>Communication Skills for Professionals</i>	First	Nira Konar	PHI Learning	2011	
6	<i>High School English Grammar and Composition</i>	Latest	Wren and Martin	Blackie	2000	
7	<i>A University Grammar of English</i>	Latest	Randolph Quirk and S Greenbaum	Pearson	2007	

<p>Unit wise Measurable students Learning Outcomes:</p> <p>Unit 1. Students will understand definitions, process, and cycle of communication and will be able to select appropriate type and method of communication.</p> <p>Unit 2. They will understand communication process in business context</p> <p>Unit 3. They will strengthen their verbal aptitude</p> <p>Unit 4. They will be able to apply different strategies of LSRWT skills</p> <p>Unit 5. They will learn different types and formats of official letters and draft various types of letters applying the knowledge gained</p> <p>Unit 6. They will be able to comprehend and summarize given technical/ scientific passages</p>

Title of the Course: Communication Skills (Lab/Practical) Course Code: UHSC0121 / UHSC0221	L	T	P	Credit
	-	-	2	1
Course Pre/Co-Requisite: Communication Skills –Theory				
Course Description: This is a practice-oriented course, laying importance on application of various skills being learnt in the Communication Skills theory course such as grammar, techniques and strategies for improving English sub-skills and vocabulary, etc. In addition, this course focuses on English Phonology so that the learners will be able to use correct pronunciation, stress pattern and intonation.				
Course Objectives: <ol style="list-style-type: none"> 1. To acquaint students with English phonology and make them practice correct pronunciation 2. To provide them ample practice for developing their LSRW skills 3. To strengthen their grammatical competence through practice 				

CO	After the completion of the course the student should be able to
CO1	Comprehend English Sounds, stress patterns and intonation and English grammar to perform better professionally
CO2	Use listening and reading comprehension techniques to comprehend technical discourse
CO3	Construct effective speeches and technical paragraphs

[illegible]

Assessment Component	Marks
ISE: ISE is based on practical performance/ Quiz/ Presentation/ Group Discussion/Role plays/Assignments/Demonstration, etc. Distribution of Marks: <ul style="list-style-type: none"> ▪ Lab Manual ▪ Lab Tests and Practical Performance ▪ Public Speech (extempore and prepared) ▪ Attendance 	50
Total Marks	

Practical No.	Practical Title and Contents	Hours
1	Ice breaking: Introducing self and others Adjectives, phrases and clauses to describe oneself and others Introducing oneself and others-demonstration	2
2	Phonetics-1 Introduction to Phonetics-Consonants, Vowels and Diphthongs in English with videos samples	2
3	Phonetics-2 Identifying syllables and techniques of RP (received pronunciation)	2
4	Phonetics-3 Stress, tone and intonation, pronunciation practice with audio-video samples	2
5	Verbal Aptitude -1 Vocabulary building games, practicing affixation, confusables, homonyms, homophones, using idioms	2
6	Verbal Aptitude -2 Using proper tenses, correct use of articles, conjunctions and prepositions Types of sentences and conversion, active and passive voice, spotting errors in sentences with justification, word order, punctuation marks	2
7	Listening practice Listening comprehension, Strategies for effective listening with audio/video samples	2
8	Speaking practice-1 Video samples of effective and ineffective public speeches, Extempore (JAM), prepared speeches	2
9	Speaking practice-2 Prepared speeches	2
10	Situational Conversations Role play: practicing various situational conversations, telephonic conversations	2
11	Reading practice Aloud reading of novella/ technical news paper articles in turns with sequence	2
12	Writing practice Paragraph writing, creative writing – story building through pictures/ word triggers Practicing summarization and comprehension	2

Orell Talk Digital Language Software – Professional Version with 1+50 users subscription

Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1	<i>Better English Pronunciation</i>	Second	J.D. O'Connor	OUP	1980
2	<i>A Practical Course in Spoken English</i>	First	J.K. Gangaj	PHI Learning Pvt. Ltd	2014
3	<i>English Language Laboratories</i>	Second	Nira Konar	PHI Learning	2014
Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1	<i>Better English Pronunciation</i>	Second	J.D. O'Connor	OUP	1980
2	<i>A Practical Course in Spoken English</i>	First	J.K. Gangaj	PHI Learning Pvt. Ltd	2014
3	<i>English Language Laboratories</i>	Second	Nira Konar	PHI Learning	2014
Practical wise Measurable students Learning Outcomes:					
Practical 1: Students will understand how to introduce oneself and others in professional context					
Practical 2,3,4: They will be able to use proper pronunciation, tone and intonation					
Practical 5,6: Their verbal ability will be enhanced					
Practical 7,8,9: Along with improved listening comprehension, students will be able to prepare and deliver effective public speeches					
Practical 10: They will learn how to converse in different professional situations					
Practical 11,12: They will have improved their reading comprehension and writing skill					

Title of the Course: Optics and Modern Physics	L	T	P	Credit
Course Code: UHSC0103/ UHSC0203	03			03
Course Pre-Requisite: 1. To know different properties and nature of light 2. To have basic ideas of solid state physics and modern physics.				
Course Description: In this course, different properties and theory about nature of light, principles of solid state physics, quantum physics and their applications in different engineering branches are discussed at length.				
Course Objectives: 1. To study phenomena of light like interference, diffraction, polarization and their engineering applications. 2. To discuss various characteristics viz monochromaticity, coherence, directionality of laser and their applications in Medical, industrial field, 3 –D photography and to study concept of virtual reality. 3. To explain principle, structure of optical fibre and its advantages and applications in different fields. 4. To derive Maxwell’s equations and study electromagnetic wave nature of light. 5. To study principles of quantum mechanics, properties of matter wave, derive Schrodinger equation and discuss applications of quantum mechanics in modern technology. 6. To explain formation of bands in solids using Kronig Penny model and to study significance of Fermi level. 7. To discuss formation of P-N junction and study characteristics of different semiconductor devices.				
Course Outcomes:				
CO	After the completion of the course the student should be able to			
CO1	Define fundamental properties of light, concepts of solid state physics and principles of quantum physics.			
CO2	Demonstrate competency and understanding of the concepts of optical phenomena, electro-magnetic theory, quantum mechanics, band theory and semiconductor devices.			
CO3	Illustrate applications of different physical phenomena in engineering and technology.			
CO4	Compute required physical quantity from given data.			

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3												
CO2	3	3			2									
CO3	3	3	1		2									
CO4	3	3												
CO5	3	3												

Assessment Scheme:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and **ISE 2** are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.

MSE is based on 50% of course content (first three units).

ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Interference, Diffraction and Polarization Interference: Introduction, Interference from thin films (reflected light, uniform and wedge shaped film), Interference in sound, Applications of Interference – Testing of flatness, lens surface, Diffraction: Introduction, Diffraction Grating – theory, Resolving power of grating, Applications of Diffraction – Analysis of crystal structure using x-ray diffraction. Polarization: Introduction, Double refraction, Optical activity – Laurent's half shade polarimeter, Photoelasticity, Electro-optic effects, applications of polarization	8
2	Lasers & Optical Fibres LASER: Introduction, Interaction of radiation with matter (induced absorption, spontaneous emission and stimulated emission), condition for laser production, Ruby laser, Semiconductor laser, Characteristics of lasers, Modes in Laser (Longitudinal and Transverse), Applications of Laser, Holography, Holography and virtual reality Fibre Optics: Introduction – principle, construction, Propagation of light through an optical fibre – Acceptance angle – Numerical aperture –fractional Refractive Index change, Types of optical fibres, Advantages and applications of optical fibre.	7
3	Electromagnetic Theory Introduction, Derivation of Maxwell's equations in free space and dielectric medium, velocity of EM wave, EM wave propagation in free space and dielectric medium, Poynting Vector, Wave Propagation in bounded medium- Waveguide and Coaxial cables.	6
4	Quantum mechanics Introduction, de Broglie's hypothesis, Heisenberg's uncertainty principle and its applications, wave function and probability interpretation, Schrödinger time dependent and time independent wave equations, Eigen Function and Eigen values, applications of Schrödinger wave equation - infinite square well potential (particle in a box), Harmonic Oscillator, Quantum states, Superposition principle, Quantum entanglement (Conceptual Discussion), Applications of Quantum Mechanics – Tunneling, Quantum Computation (Conceptual Discussion).	8
5	Band Theory of Solids Introduction, Bloch Theorem, Kronig-Penny Model, Formation of bands in solids, law of mass action, Fermi level in intrinsic and extrinsic semiconductors.	7
6	Semiconductor Devices Formation of P-N junction, charge flow in P-N junction, Energy band diagram for junction, Schottky diode and its applications, JFET and MOSFET structure and characteristics.	6

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1.	A textbook of Engineering Physics -	11	M.N. Avadhanulu and P. G. Kshirsagar	S. Chand & Company Ltd., Delhi	2019
2.	Engineering Physics	1	Shailendra Sharma, Jyostna Sharma	Pearson Publications.	2018

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1.	Engineering Physics	1	Dattu R Joshi	Tata Mc. Graw Hills Pub. Co. Ltd.	2010
2.	A Text Book of Optics	22	Subramanyam & Brij Lal,	S. Chand & Company (P.) Ltd.	1995
3.	Introduction to Solid State Physics	7	Charles Kittel	Wiley India Pvt. Ltd	1996
4.	Basic Quantum Mechanics	1	Ajoy Ghatak,	Laxmi Publications	
5.	Electricity and Magnetism	1	A.S.Mahajan and A.A.Rangwala	Tata Mc. Graw Hills Pub. Co. Ltd.	1988
6.	Elements of Electromagnetics	4	Matthew N.O.Sadiku	Oxford University Press	2008
7.	'This Quantum World'			Wikibooks.org	
8.	Quantum Entanglement -Einstein's "Spooky Action At A Distance"			Franson University Of Maryland At Jim Baltimore County.	

Websites: (optional; but if given, must have been very carefully verified by ALL the course teachers.)

Unit wise Measurable students Learning Outcomes:

- 1 To illustrate** applications of interference to study surface characteristics, use of diffraction grating to measure wavelength of given source of light and analysis of crystal structure using x- ray diffraction.
- 2 To explain** phenomenon of polarization and applications of polarization in engineering.
- 3 To state** characteristics, applications of laser and optical fibre and **calculate** acceptance angle of optical fibre.
- 4 To derive** Maxwell's equations and explain electromagnetic nature of light.
- 5 To explain** wave particle duality, derive Schrodinger's equation and relation of principles of quantum mechanics with modern technology.
- 6 To explain** band theory of solids and **demonstrate** dependence of Fermi level on temperature and carrier concentration.
- 7 To explain** formation of P-N junction and characteristics and applications of semiconductor devices.

Title of the Course: Optics and Modern Physics (Lab Course) Course Code: UHSC0122/ UHSC0222	L	T	P	Credit
			02	01
Course Pre/Co-Requisite: 1. To calculate least count of measuring instrument 2. Requisite theory concepts related to that experiment.				
Course Description: This course includes experiments designed to verify the laws studied in 'Optics and Modern Physics' Theory course.				

Course Objectives:

1. To study phenomenon of light like interference, diffraction, polarization and their engineering applications.
2. To understand properties of laser.
3. To study Rayleigh's criteria and determine resolving power of telescope and diffraction grating.
4. To demonstrate use of optical bench and biprism in wavelength determination.
5. To analyze and obtain various crystal parameters from the XRD pattern.
6. To demonstrate electrical properties of semiconducting sample.
7. To study I – V characteristics of semiconducting devices.

Course Outcomes:

CO	After the completion of the course the student should be able to,
CO1	Demonstrate different phenomenon of light and their applications
CO2	Demonstrate working of optical fibre and determine its acceptance angle.
CO3	Analyze crystal structure and electrical properties semiconducting material and semiconducting devices.
CO4	Design, develop and demonstrate experimental set up and models for tools applicable in engineering.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	2												
CO3	3	2												
CO4	3	2			2			2	3	3		1		

Assessment Scheme

Assessment Component	Marks
Practical Performance	
Journal	
Group Presentation	
Total	50

Course Contents

Practical No.	Practical/Experiment Title and Contents	Hours
1	Title of the practical/Experiment 1: Inverse square law of intensity of light. Aim and Objectives: To verify inverse square law of intensity of light.	2
2	Title of the practical/Experiment 2: Divergence of LASER beam Aim and Objectives: To determine Divergence of LASER beam and study directionality of LASER.	2
3	Title of the practical/Experiment 3: Diameter of cylindrical obstacle Aim and Objectives: To study phenomenon of diffraction and determine thickness of given obstacle.	2
4	Title of the practical/Experiment 4: Diffraction grating using mercury vapour lamp Aim and Objectives: To study mercury spectrum and determine wavelength of different colours in light emitted by mercury vapour lamp using diffraction grating.	2
5	Title of the practical/Experiment 5: Resolving power of plane transmission grating. Aim and Objectives: To determine Resolving power of plane transmission grating.	2
6	Title of the practical/Experiment 6: Biprism experiment Aim and Objectives: To study phenomenon of interference and determine wavelength of light	2

	using biprism.	
7	Title of the practical/Experiment 7: Study of crystal structure. Aim and Objectives: To analyze crystal structure from X-ray diffraction pattern using Bragg's law.	2
8	Title of the practical/Experiment 8: Hall effect Aim and Objectives: To determine Hall coefficient of semiconducting sample and its charge density.	2
9	Title of the practical/Experiment 9: Numerical aperture of optical fibre Aim and Objectives: To calculate Numerical Aperture of optical fibre and its acceptance angle.	2
10	Title of the practical/Experiment 10: Four point probe method Aim and Objectives: To study electrical properties of given semiconducting sample using four point probe method.	2
11	Title of the practical/Experiment 11: Polarimeter Aim and Objectives: To calculate specific rotation of sugar solution.	2
12	Title of the practical/Experiment 12: Characteristics of Light Emitting Diode Aim and Objectives: To study I – V Characteristics of LED and find cut off voltage.	2
13	Title of the practical/Experiment 13: Characteristics of transistor in Common Emitter configuration Aim and Objectives: To study input, output Characteristics of transistor in Common Emitter configuration and find current gain.	2
14	Title of the practical/Experiment 14: Characteristics of transistor in Common Base configuration Aim and Objectives: To study input, output Characteristics of transistor in Common Base configuration and find current gain.	2

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1.	An Advanced Course In Practical Physics	8	D. Chattopadhyay, P.C. Rakshit	New Central Book Agency(P) Ltd	2007

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Experiments in Engineering Physics		M.N.Avadhanulu, A.A. Dani, P.M. Pokley.	S. Chand & Company Ltd., Delhi	

Practical wise Measurable students Learning Outcomes:

1. To relate the intensity of light and distance of detector from source and verify inverse square law.
2. To measure angle of divergence of Laser and study its directionality.
3. To demonstrate relation between size of obstacle and diffraction and use of diffraction in thickness measurement.
4. To demonstrate relation between wavelength and angle of diffraction and use of diffraction grating in determination of wavelength of light.
5. To define the resolving power and verify its dependency on order of diffraction and number of lines on grating.
6. To demonstrate interference fringes using biprism and to determine wavelength of beam of light.
7. To analyze crystal structure and obtain various crystal parameters from the XRD pattern using Bragg's law.
8. To determine Hall coefficient and calculate carrier concentration of semiconductor.
9. To calculate numerical aperture and acceptance angle of optical fibre.
10. To measure resistivity and calculate energy band gap of semiconductor and to demonstrate advantages of four point probe method over two probe method.
11. To explain phenomenon of optical activity and determine specific rotation of sugar solution.
12. To explain working and characteristics of LED.

13. To discuss working of transistor in common emitter configuration and its application in amplifier.
14. To discuss working of transistor in common base configuration and its application in amplifier.

Title of the Course: Computer Aided Engineering Drawing									L	T	P	Credit												
Course Code: UHSC0104/ UHSC0204									3	--	--	3												
Course Pre-Requisite: Knowledge of Geometry at SSC Level and Computer basic																								
Course Description: Course consists of engineering drawing of Projections of Lines, Planes and Solids, Orthographic Projections, Isometric projections along with introduction to computer aided sketching																								
Course Objectives:																								
1. To create awareness and emphasize the need of Engineering Drawing for an engineer.																								
2. To follow basic drawing standards and conventions.																								
3. To inculcate the habits of logical analysis of the problem using engineering drawing.																								
4. To develop skills in visualizing 3-Dimensional engineering components and documenting related information by using computer software.																								
Course Outcomes:																								
CO	After the completion of the course the student should be able to																							
CO1	Recall different types of lines, dimensioning method and BIS conventions																							
CO2	Demonstrate projection of points, lines and planes inclined to both reference planes																							
CO3	Construct projections of regular Solids like prism, cylinder, pyramid and cones																							
CO4	Develop and interpret the isometric and orthographic views of an object.																							
CO-PO Mapping:																								
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2										
CO1	2									2		1												
CO2	2	2	2							2														
CO3	2	2	2							2														
CO4	2	2	2							2														
Assessment Scheme:																								
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.																								
<table><tr><td>Assessment Component</td><td>Marks</td></tr><tr><td>ISE 1</td><td>10</td></tr><tr><td>MSE</td><td>30</td></tr><tr><td>ISE 2</td><td>10</td></tr><tr><td>ESE</td><td>50</td></tr></table>															Assessment Component	Marks	ISE 1	10	MSE	30	ISE 2	10	ESE	50
Assessment Component	Marks																							
ISE 1	10																							
MSE	30																							
ISE 2	10																							
ESE	50																							
ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.																								
MSE is based on 50% of course content (first three units).																								
ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.																								
Note- 1) attainment of CO1 should be achieved only through In semester evaluation(ISE).																								
2) MSE and ESE examinations must be conducted online using computer drafting software.																								
Course Contents																								
Unit No.	Unit Title and Contents													Hours										
1	Introduction to Engineering Drawing and Projection of Lines Introduction-Graphical user interface of the CAD software, standard tool bars/menus and description of most commonly used tool bars, navigational tools. Study and use of drawing and modify commands. Drawing instruments, Geometrical constructions, Lettering, Title block, Sheet sizes, Scale, Line types,													8										

	Dimensioning. Methods of projection- Projection concept, Orthographic Projection, Projection of points in all quadrants, first angle vs third angle method of projection. Projection of Oblique Lines (only Rotation method).	
2	Projection of Planes (only 1 st Angle method referred henceforth) Projection of planes (only regular polygons like Triangular, Square, Rectangular, Pentagonal, Hexagonal and circle) inclined to both HP and VP.	6
3	Projections of Solids- Projection of regular Solids such as Prisms, pyramids, cylinder and cone with their axis inclined to either HP or VP (only 2 stage problems).	6
4	Development of surfaces Development of plane and curved <u>lateral</u> surfaces of regular Prisms, Pyramids, Cylinders and Cones (cutting planes specified via figure).	6
5	Orthographic Projections- Conversion of pictorial view of a three dimensional object into orthographic views.	8
6	Isometric projections- Concept of isometric projection, Isometric scale and isometric drawing. Conversion of orthographic views of simple 3D objects into single isometric drawing.	6

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Engineering Graphics with AutoCAD	Revised Edition ISBN : 9788120337831	D. M.Kulkarni, A. P. Rastogi, A. K. Sarkar,	PHI	2010
2	Engineering Drawing	53 rd Edition	N.D.Bhatt	Charotar Publishing	2019

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Engineering Drawing & Design	7 th Edition	Cencil Jensen, Jay D.Helsel , Dennis R. Short, “	TATA McGRAWHILL	2012
2	Engineering Graphics	7th Edition,	Basant Agrawal and C M Agrawal	Tata McGraw Hill Education Pvt. Ltd.	2012

Websites: (optional; but if given, must have been very carefully verified by ALL the course teachers.)

Unit wise Measurable students Learning Outcomes:

1. To Understand fundamental of engineering drawing, instruments and use of computer software for engineering drawing as well as the projection of points, lines.
2. To trace projections of planes.
3. To understand elements of basic solids, their positions and it's projections.
4. To draw views of basic solids and develop the lateral surfaces of solids.
5. To understand method of orthographic projections and draw various views.
6. To visualize orthographic projections of component and draw its isometric drawing.

Title of the Course: Computer Aided Engineering Drawing Lab Course Code: UHSC0123/ UHSC0223	L	T	P	Credit
	---	--	2	1
Course Pre/Co-Requisite: Knowledge of Geometry at SSC Level and Computer basic				
Course Description: Course consists of engineering drawing of Projections of Planes and Solids, Sections of solids & Development of surfaces, Orthographic Projections, Isometric projections along with introduction to computer aided sketching				
Course Objectives: 1. To create awareness and emphasize the need of Engineering Drawing for an engineer.				

2. To follow basic drawing standards and conventions.
3. To inculcate the habits of logical analysis of the problem using engineering drawing.
4. To develop skills in visualizing 3-Dimensional engineering components and documenting related information by using computer software.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Recall different types of lines, dimensioning method and BIS conventions
CO2	Demonstrate projection of points, lines and planes inclined to both reference planes
CO3	Construct projections of regular Solids and Develop their lateral surfaces
CO4	Develop and interpret the isometric and orthographic views of an object.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2									2		1		
CO2	2	2	2							2				
CO3	2	2	2							2				
CO4	2	2	2							2				

Assessment Scheme:

Describe the nature of assessment neatly.

Assessment Component	Marks
ISE	25
ISE are based on creating SIX submission drawing sheets described in list of experiments.	

Course Contents

Practical No.	Practical/Experiment Title and Contents	Hours
1	Use and practice of basic CAD software commands (no ISE)	2
2	Advanced CAD commands, dimensioning, text, practice sketches (no ISE)	2
3 and 4	Draw the projections of lines (Minimum four problems)	4
5	Draw the projections of planes (Minimum two problems)	2
6	Draw the projections of solids (Cone, Cylinder, prism, Pyramid) in various conditions (Minimum two problems)	2
7 and 8	Draw the views of solid & development of the surfaces of the solids in given conditions of the planes (Minimum two problems)	4
9 and 10	Imagine and draw the orthographic views, (One simple orthographic & one complex Orthographic)	4
11 and 12	Imagine and draw the isometric view from the given orthographic views	4

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Engineering Graphics with AutoCAD	Revised Edition ISBN : 9788120337831	D. M.Kulkarni, A. P. Rastogi, A. K. Sarkar,	PHI	2010
2	Engineering Drawing	53 rd Edition	N.D.Bhatt	Charotar Publishing	2019

--

Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1	Engineering Drawing & Design	7 th Edition	Cencil Jensen, Jay D.Helsel , Dennis R. Short, “	TATA McGRAWHILL	2012
2	Engineering Graphics	7th Edition,	Basant Agrawal and C M Agrawal	Tata McGraw Hill Education Pvt. Ltd.	2012

Practical wise Measurable students Learning Outcomes:
 After the completion of the each unit the student should be able to
 1 Use and practice of basic drawing commands of CAD software like AutoCAD/Solid Edge (line, rectangle, polygon, point, arc, plane)
 2 Use and practice of modify commands
 3. and 4. To trace the projection of points, lines.
 5. To trace the projection of planes.
 6. To understand elements of basic solids and their position
 7 and 8.. To draw views of basic solids and develop the lateral surfaces of solids.
 9.and 10. To understand method of orthographic projections and draw various views.
 11.and 12. To visualize orthographic projections of component and draw its isometric drawing.

Title of the Course: Modern Chemistry				L	T	P	Credit
Course Code: UHSC0105/ UHSC0205				3			3

Course Pre-Requisite:
 Students should have knowledge about basic chemistry related to periodic table, properties of elements, electrochemistry, semiconducting materials, physical and chemical properties of nano materials and advanced materials, etc.

Course Description:
 This course aims to impart fundamentals knowledge of advanced materials (nano materials, semiconducting materials, advanced materials), and applied knowledge of instrumental methods, energy conversion and storage devices, prevention techniques of corrosion. Students will be expected to communicate knowledge to society and industry.

Course Objectives:

1. To develop confidence among students about the chemistry applications in technological field.
2. To develop an interest among students regarding applied and engineering chemistry.
3. To analyze quality parameters of nanomaterials and advanced materials.
4. To train students to effectively use knowledge of instrumental techniques.
5. To understand the concept of chemistry related to various branches of engineering.

Course Outcomes:

CO	After the completion of the course the student should be able to												
CO1	Define concepts and principles used in various modern chemical technologies.												
CO2	Illustrate the different techniques for analysis of chemical samples.												
CO3	Analyze engineering problems related to destruction of metallic materials and design practical solution.												
CO4	Illustrate the major role of chemistry that plays in various engineering fields and advanced materials.												
CO5	Calculate the quality parameters of advanced materials and efficiency of fuel from given data.												

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1		
CO2	3	2	1		2							1		
CO3	3	2	1									1		
CO4	3	2										1		
CO5	3	2					1					1		

Assessment Scheme:
 Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and One End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc. MSE is based on 50% of course content (first three units). ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.		
Course Contents		
Unit No.	Unit Title and Contents	Hours
1	Instrumental Techniques An introduction of various analytical techniques, advantages and disadvantages of instrumental methods and classical methods. A) pH-metry: Introduction, pH measurement using glass electrode, applications of pH-metry. B) UV-Vis. Spectrophotometer: Introduction of spectroscopy, UV-Vis. Spectrophotometer, (Lamberts and Beer-Lambert's law), Single beam spectrophotometer (schematic, working and applications), Numericals. C) Potentiometry: Principle, working and applications	07
2	Advanced Polymeric Materials Introduction, Classification of Polymers,- based on origin, based on polymer type, polymerisation mechanism, Characteristics of polymers, thermosoftening and thermosetting plastics, conducting polymers: Intrinsic conducting polymers, extrinsic conducting polymers, doped conducting polymers, factors responsible for conduction, examples and applications.	07
3	Corrosion and Its passivation Introduction, types- atmospheric corrosion (Dry corrosion) and electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), Electrochemical Series, factors affecting on the rate of corrosion; Cathodic protection- Impressed current, Sacrificial anode, Anodic protection; electroplating.	07
4	Fuel and Energy conversion devices A) Fuel: Introduction, classification, properties of ideal fuel, calorific value, Calculation of calorific value by Dulong's formula, Determination of calorific value by Bomb calorimeter and Boy's calorimeter. B) Fuel Cells: Fuel cell classification, H ₂ -O ₂ Fuel Cell (AFC), Phosphoric Acid Fuel Cell (PAFC), Polymer Electrolyte Membrane Fuel Cell (PEMFC), Molten Carbonate fuel cell (MCFC)	07
5	Nanomaterials and Its Characterization techniques Introduction of Nanomaterials, Synthesis of Nanomaterials (top down and bottom up approach), Characterization of Nanomaterials using X-Ray Diffraction spectroscopy (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Carbon Nanotubes, Graphene, Graphene Oxide, Applications of Nanotechnology: Memristic Device.	07
6	Semiconductor and Battery Technology Introduction, Insulators, Conductor, Semiconductor, Mechanism of Semiconductor, Intrinsic and extrinsic semiconductors, Metal-semiconductor defects (Frankel and Schottky defect), Sensors, Batteries, Batteries characteristics, Solar Cells, Li-Ion battery: Principle, working and applications.	07

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	A Textbook of Engineering Chemistry	5	S. S. Dara and S. S. Umare	S. Chand and Company Ltd., New Delhi	2014
2	A Textbook of Engineering Chemistry	5	Shashi Chawla	Dhanpat Rai & Co. (Pvt.) Ltd, Delhi	2013
3	Engineering Chemistry	3	Godbole, Pendse, Joshi	Nirali publication, Pune	2009
4	Engineering Chemistry	1	Jayshree Parikh	Tech-Max Publication, Pune	2013

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Instrumental Methods of Chemical Analysis	5	Chatwal and Anand	Himalaya Publishing House, New Delhi	2019
2	Engineering Chemistry	2	Renu Gupta	S K Kataria and Sons, New Delhi	2010

3	Engineering Chemistry	3	O. G. Palanna	Tata McGraw Hill Education Pvt. Ltd., New Delhi	2009
4	Fundamentals of Analytical Chemistry	9	D. A. Skoog, D. M. West	Cengage Learning	2013
5	Nanotechnology-Importance and Applications	1	M. H. Fulekar	Wiley	2019
6	Nanotechnology: Principles and Practices	3	S. K. Kulkarni	Springer International Publishing	2015

Unit wise Measurable students Learning Outcomes:

1. To demonstrate the working of different instrumental methods of chemical analysis.
2. To illustrate the methodology of synthesis of nanomaterials and its applications.
3. To describe different types of polymers and applications of advanced polymeric materials.
4. To illustrate the characteristics properties of an ideal fuel and fuel cells. Along with to calculate the calorific value of chemical fuels.
5. To demonstrate the mechanism of semiconducting materials and its applications w.r.t. batteries and sensors.
6. To analyze the degree of corrosion and study of its preventative techniques.

Title of the Course: Modern Chemistry Lab Course Code: UHSC0125/ UHSC0225						L	T	P	Credit					
								2	1					
Course Pre-Requisite: Students should have preliminary knowledge about the handling of glass wares, apparatus and preparation of chemicals.														
Course Description: This course aims to study synthesis of nano-materials and polymeric materials. Also course providing experience with instrumental techniques viz., pH meter, Spectrophotometer, Potentiometer, etc.														
Course Objectives:														
1. To understand properties and applications of nanomaterials and smart materials.														
2. To describe the importance of polymeric materials in domestic and industrial purposes.														
3. To analyze various analytical samples of by using instrumental methods.														
4. To study the mechanism and estimation of corrosion rate of metals as well as preventative techniques.														
Course Outcomes:														
CO	After the completion of the course the student should be able to													
CO1	State the theory of chemistry related to modern practicals.													
CO2	Synthesize advanced materials viz. nanomaterials and polymeric materials.													
CO3	Demonstrate the operation of different modern tools and its techniques for the analysis of different materials.													
CO4	Demonstrate the skill to solve societal problems using practical knowledge of chemistry.													
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1		
CO2	3	2				1	1					1		
CO3	3	2			2			1	1			1		
CO4	3							1	1	1		1		
Assessment Scheme:														
ISE are based on Practical Performance/Journal Submission/Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc.														
Assessment Component													Marks	
Component 1: Practical Performance and Journal Submission														
Component 2: Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral														
Total													50	

Course Contents		
Experiment No.	Experiment Title and Contents	Hours
1	Title of the Experiment: To determine the normality of Acid solution using NaOH solution by pH metry. Aims and Objectives, Theoretical Background, Materials, Experimental procedure: Standardization of pH meter, Procedure for pH metric titration, Observations and Calculations, Result and Conclusion	2
2	Title of the Experiment: To synthesize of silver nanoparticles by reducing method. Aims and Objectives, Theoretical Background, Experimental procedure, Chemical Reactions, Observations, Result and Conclusion	2
3	Title of the Experiment: To determine the normality of Acid solution using NaOH solution conductometrically. Aims and Objectives, Theoretical Background, Materials, Experimental procedure: Calibration of the instrument, Procedure for conductometric titration, Observations and Calculations, Result and Conclusion	2
4	Title of the Experiment: To determine the strength of given acidic solution by titrating against NaOH solution by using Quinhydrone as an indicator electrode. Aims and Objectives, Theoretical Background, Materials, Experimental procedure, Observations and Calculations, Result and Conclusion	2
5	Title of the Experiment: To prepare urea-formaldehyde resin from urea and formaldehyde. Aims and Objectives, Theoretical Background, Experimental procedure, Chemical Reactions, Observations, Result and Conclusion	2
6	Title of the Experiment: To prepare phenol-formaldehyde resin from phenol and formaldehyde. Aims and Objectives, Theoretical Background, Experimental procedure, Chemical Reactions, Observations, Result and Conclusion	2
7	Title of the Experiment: To determine the pH of industrial waste water using pH meter. Aims and Objectives, Theoretical Background, Standardization, Experimental procedure, Observations, Conclusion and Significance	2
8	Title of the Experiment: To synthesis of Molybdenum oxide nanoparticles using precipitation method. Aims and Objectives, Theoretical Background, Experimental procedure, Chemical Reactions, Observations, Result and Conclusion	2
9	Title of the Experiment: To determine the particle size of nanoparticles from SEM images. Aims and Objectives, Theoretical Background, Procedure for the determination of particle size of nanoparticles from SEM images, Observations, Result and Conclusion	2
10	Title of the Experiment: To determine the rate of corrosion of Aluminium metal. Aims and Objectives, Theoretical Background, Experimental procedure, Observations, Calculations, Result and Conclusion	2
11	Title of the Experiment: To determine the moisture, volatile and ash content in a given coal sample by proximate analysis. Aims and Objectives, Theoretical Background, Experimental procedure, Observations, Calculations, Result and Conclusion	2
12	Title of the Experiment: To demonstrate photo-colorimeter/spectrophotometer for analysis of water. Aims and Objectives, Theoretical Background, Working, Experimental procedure, Observations, Result and Conclusion	2

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Laboratory Manual on Engineering Chemistry	3 rd	S.K. Bhasin, Sudha Rani	Dhanpat Rai Publishing Company (P) Ltd. New Delhi.	2008
2	Nanotechnology: Principles and Practices	3 rd	Sulabha Kulkarni	Springer	2014
3	Engineering chemistry lab manual	2 nd	Suchi Tiwari	Scitech Publications (India) Pvt. Ltd.	2013
4	Practical Chemistry	2 nd	D.N. Pandey, D.N. Bajpai, S Chand	S Chand & Co Ltd	2010

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Vogels Qualitative Inorganic Analysis	7 th	A. I. Vogel, Revised by G. Svehla	Pearson India	2002
2	Instrumental Methods Of Chemical Analysis	5 th	Gurdeep R. Chatwal, Sham K. Anand	Himalaya Publications	2020
3	Environmental Chemistry	4 th	B. K. Sharma	Goel Publishing House	2014
4	Engineering Chemistry	1 st	Renu Bapna, Renu Gupta,	MacMillan Publishers Ltd, Delhi. (India)	2010

Practical wise Measurable students Learning Outcomes:

1. To define the characteristics of nanomaterials and its applications.
2. To state the particles size of nanomaterials from given data.
3. To synthesize nanomaterials for engineering applications.
4. To illustrate the operation of different instrumental methods for the analysis of analytical samples.
5. To demonstrate the modern techniques for the separation of components of mixtures.
6. To synthesize advanced polymeric materials viz. Novolac, Bakelite and Urea-Formaldehyde Polymer.
6. To evaluate the composition of metallic materials.
7. To demonstrate different techniques of corrosion control methods.

Title of the Course: Smart and Sustainable Construction**Course Code:****Course Pre-Requisite:**

L	T	P	Credit
2	-	-	3

Students must have fundamental knowledge about basic sciences. Students should be ethically socially aware about sustainable development.

Course Description:

Students will learn basics of raw materials, methods and technology for smart and sustainable construction; also they can identify interdisciplinary applications of smart and sustainable technologies.

Course Objectives:

1. To understand construction industry as relevant to building construction
2. To learn new building materials which are smart adaptive and have a low energy consumption
3. To learn the concept of Building Information Modeling
4. To perceive modern methods of measurements for mapping systems

Course Outcomes:

CO	After the completion of the course the student will be able	Bloom's Cognitive	
		Level	Descriptor
CO1	To distinguish traditional construction materials from new smart and sustainable materials	I	Knowledge
CO2	To label green buildings ratings based on merits and demerits	I	Knowledge
CO3	To differentiate digital instruments and systems for horizontal and vertical earth surface measurements	II	Comprehension
CO4	To correlate application of technology for gathering building information and transportation system	III	Application

Assessments:**Teacher Assessment:**

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks Weightage
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Unit Wise Content	No. of Hours
Unit 1: Construction Engineering Introduction, Elements of Sub structure & super-structures and their functions. Types of buildings- Load bearing & framed structure. Types and properties of materials- Stone, Brick, Cement, Sand, Aggregate, Steel, Aluminium, timber, etc. Roofing materials: Types Roofing Tiles, Aluminium- Galvanized Iron- Polycarbonate Sheets. Flooring materials: Types of Flooring Tiles- Kadappa, Shahabad, Marble, Granite etc.	5
Unit 2: Smart & Sustainable Building Materials Introduction, classification, types of smart materials, smart concrete, smart bricks, smart glass, smart composites, smart paints, smart green roofs. Concept of sustainable material, life cycle analysis, energy efficient materials; green cement, biodegradable materials, engineering evaluation of these materials.	5
Unit 3: Green Building Concepts Green building initiatives, its origin, characteristics of a green building, certification of green buildings rating systems (USGBC, LEED, BREEAM, IGBC, TERI-GRIHA) criteria for rating, sustainability. Energy efficient construction, practices for thermal efficiency and natural lighting. ECB codes building rating. Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort.	5
Unit 4: Concept of BIM Introduction, Basic Principle, Components, Uses. Advantages over conventional CAD, Need of BIM as Interdisciplinary approach, AR, VR & future of BIM.	4
Unit 5: Modern Mapping Systems Introduction, classification. Modern mapping instruments- Digital level, electronic theodolite, Total Station, GPS, DGPS, UAV principles, components and users. Basics of Remote Sensing and Geographic Information System.	5
Unit 6: Concept of Intelligent Transport System: Basic Principle, Components, Terms Used, Advanced transport management systems, Service in ITS, Critical issues, Application in Indian Context.	4

Textbooks:

1. Tropical housing and buildings climate design (1973). By Koenig's Berger Ltd, ingeesle, T-G Alan mayhew, s zokoloy S.v University press (India) pot-Ltd Hyderabad.
2. Surveying by S. K. Duggal, Tata Mc-Graw Hill Publication.
3. Basic Civil Engineering by G. K. Hiraskar, Dhanpat Rai Publication.

4. Smart Structure and Materials, Artech House – Brain Culshaw, Borton. London, 1996.

References:

1. Srinivasan, A.V and Michael McFarland. D, “Smart Structures – Analysis and Design” Cambridge University Press, 2001.
2. Addington, M., Shodek, D. Smart materials and new technologies (for architecture and design professions), Harvard University, U.S.A; 2005.
3. Yasser, A. F. Using Smart Materials to Reduce Energy Consumption, Third Ain Shams University International Conference on Environmental Engineering, Egypt; 2009.
4. Mohammad javad. M., et al. The Strategies of Outspreading Smart Materials in Building Construction Industry in Developing Countries; Case Study: Iran, International Conference on Intelligent Building and Management, Proc. of CSIT vol.5, IACSIT Press, Singapore; 2011

Unit wise Measurable students Learning Outcomes: At the end of course student will..

1. Understand construction industry and its variables
2. Understand conventional materials and their advancement into smart and green materials
3. Understand green buildings rating systems
4. Understand use of software simulation for building modeling
5. Understand use of digital surveying instruments and methods
6. Understand Intelligent Transport System

Title of the Course: Smart and Sustainable Construction (LAB) Course Code: UHSC0126/ UHSC0226	<table><tr><td>L</td><td>T</td><td>P</td><td>Credit</td></tr><tr><td>-</td><td>-</td><td>1</td><td>1</td></tr></table>	L	T	P	Credit	-	-	1	1
L	T	P	Credit						
-	-	1	1						
Course Pre-Requisite: Students must have fundamental knowledge about basic sciences. Theoretical learning of smart and sustainable construction.									
Course Description: Students will learn observe raw building materials, methods and technology for smart and sustainable construction. Student will learn applications in interdisciplinary applications of smart and sustainable technologies.									
Course Objectives: <ol style="list-style-type: none">1. To use ICT tools for searching information related to smart sustainable and intelligent building components.2. To visualize building materials which are smart adaptive and have a low energy consumption3. To learn Building Information Modeling as a software tool4. Learn to use modern methods of measurements for mapping systems									

Course outcomes:

COs	After the completion of the course the student will be able	Bloom's Cognitive	
		Level	Descriptor
CO1	To label green buildings ratings based on merits and demerits	I	Knowledge
CO2	To use ICT tools for case studies on green building, Intelligent Transportation System	III	Application
CO3	To use Google Earth and Mobile GPS tools for mapping	III	Application
CO4	To examine highway capacity using user friendly tools	III	Application
Assessments: Teacher Assessment: In Semester Evaluation (ISE) having 100% weightage.			

Assessment		Marks
ISE		100%
<ul style="list-style-type: none"> ISE is based on practical attendance / Practical performance / Quiz/ Journal submission/Group Discussion/ Internal oral etc. 		
Sr.No	Course Contents for Practical Work	Hrs.
1.	Green Building rating system: reference guides	2
2.	Theoretical case studies on Green Building	2
3.	Demonstration of BIM models with VR	2
4.	Mapping using Google Earth	2
5.	Mobile GPS field work	4
6.	Highway capacity evaluation using simple tools	4
7.	Theoretical case studies on Intelligent Transportation System	2
8.	Site Visit Textbooks: <ol style="list-style-type: none"> Tropical housing and buildings climate design (1973). By Koenig's Berger Ltd, ingeesle, T-G Alan mayhew, s zokoloy S.v University press (India) pot-Ltd Hyderabad. Surveying by S. K. Duggal, Tata Mc-Graw Hill Publication. Basic Civil Engineering by G. K. Hiraskar, Dhanpat Rai Publication. Smart Structure and Materials, Artech House – Brain Culshaw, Borton. London, 1996 	2

References:

- Srinivasan, A.V and Michael McFarland. D, "Smart Structures – Analysis and Design" Cambridge University Press, 2001.
- Addington, M., Shodek, D. Smart materials and new technologies (for architecture and design professions), Harvard University, U.S.A; 2005.
- Yasser, A. F. Using Smart Materials to Reduce Energy Consumption, Third Ain Shams University International Conference on Environmental Engineering, Egypt; 2009.
- Mohammad javad. M., et al. The Strategies of Outspreading Smart Materials in Building Construction Industry in Developing Countries; Case Study: Iran, International Conference on Intelligent Building and Management, Proc. of CSIT vol.5, IACSIT Press, Singapore; 2011

Unit wise Measurable students Learning Outcomes: At the end of course student will..

- Understand conventional materials and their advancement into smart and green materials
- Understand green buildings rating systems
- Understand use of software simulation for building modeling
- Understand Google earth and mobile mapping
- Understand use of digital surveying instruments and methods
- Understand Intelligent Transport System

Title of the Course: Basic Electrical & Electronics Engineering Course Code: UHSC0107/ UHSC0207	L	T	P	Credit
	4	-	-	4
Course Pre-Requisite: Modern Physics, Electro-magnetism, fundamental concepts of Electrical Engineering, Semiconductor Devices.				
Course Description: Basic knowledge of Electrical Engineering is very essential for all the Engineers. In this course the analysis of DC and AC Electric Circuits, and the fundamentals of magnetic circuits are dealt with. A comprehensive study of Electrical Machines such as DC Motor and Transformer is included. Also, this course has been designed to introduce students with construction, theory and characteristics of various electronics devices.				
Course Objectives: <ol style="list-style-type: none"> To learn the basics of DC Circuit with Magnetic Circuit and analyse typical circuits. To learn the AC circuits and analyse typical circuits. 				

3. To study the construction and working of DC Motor & Single-Phase Transformer.
4. To impart knowledge of semiconductor diodes and their applications
5. To provide fundamental knowledge about transistor and their applications
6. To become Familiarize with transducers

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	State performance characteristics and working of DC Motor & Transformer
CO2	Analyse the DC circuits, AC circuit and Magnetic Circuit
CO3	Examine performance of electronic devices like diode, transistors etc
CO4	Illustrate the knowledge of transducers and selection of suitable transducer for application

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1			1	1					2		
CO2	3	3	1	1		1	1							
CO3	1	3		1										
CO4	3			2										

Assessment Scheme:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.

MSE is based on 50% of course content (first three units).

ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	<p>DC Electric Circuit & Magnetism</p> <p>DC Electric Circuit: Kirchhoff's laws, Concept of constant voltage source, Analysis of series and parallel DC circuit with resistances, Voltage rating, Power rating of resistive devices, DC circuit with R-C (Charging and discharging of capacitor, Time constant for RC circuit.) DC circuit with R-L (Rise and decay of current in inductive circuit, Time constant for RL circuit.)</p> <p>Magnetism: Concept of Magneto Motive Force (Mmf), Reluctance(S), Flux density(B), Magnetic circuits with DC excitation, Magnetic circuits with AC excitation, Series and parallel Magnetic circuits with dc excitation, BH curve, Hysteresis, Eddy current loss, Magnetic leakage & fringing, Numerical treatment on DC electric circuit & Magnetism.</p>	08
2	<p>Single Phase AC Fundamentals</p> <p>Generation of Sinusoidal Voltage, Representation of Sinusoidal Waveforms, RMS value, Average value, Form factor, Peak factor, Phasor representation, Impedance and Admittance of AC circuit, Powers- Active, Reactive & Apparent, Power Factor and its Significance, Power Factor Improvement by Capacitive bank, R-L, R-C, R-L-C series and parallel circuits, Numerical treatment on Single Phase AC Fundamentals.</p>	09
3	<p>DC Motor and Single-Phase Transformer</p> <p>DC Motor: Basic principle of any electric motor, Construction and Working of DC motor, Types of DC motors and their Speed Torque characteristics with Applications, HP rating of motors.</p> <p>Single Phase Transformer: Principle, Construction, Classifications, EMF equation, voltage ratio,</p>	09

	current ratio, working at No Load & with Load, Efficiency (power efficiency and all-day efficiency) and Voltage Regulation, Applications, Numerical treatment on Voltage Regulation & Efficiency.	
4	Diode Applications Review of PN junction diode; Specification and Testing of PN and Zener Diodes; Light-Emitting Diodes, Load-Line Analysis of diode, Types of Rectifiers, Rectifier DC Power Supply with Capacitor Filter, Power Supply Performance, Zener Diode Voltage Regulators, Clippers, Clampers, DC Voltage-Multipliers Circuits.	09
5	Transistors and Amplifier Types of Transistor (NPN & PNP), Transistor operation and amplifying action. Transistor Testing, DC Load Line, Need of Biasing, BJT as an amplifier- working and frequency response.	09
6	Transducers Introduction, Need of transducers, Classification of Transducers, Selection Factors and General Applications of Transducers Motion, Temperature, Force, Proximity Devices, optical Sensors, Piezo-electric sensors	09

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Electrical Technology	Vol-II	B. L. Theraja	S. Chand	
2	Basic Electrical Engineering	4 th	S. K. Sahadev	Peason	
3	Elements of Electrical Engineering	10 th	P. V. Prasad	Cengage Learning	
4	Electronic Devices and Circuits	4 th	David A. Bell	PHI	
5	Electronic Devices and Circuits	11th	Robert Boylestad ,Louis Nashelsky	Pearson	2015

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Basic Electrical Engineering	3 rd	D.P. Kothari, I.J. Nagrath	TMH Publishing Co. Ltd., New Delhi	
2	Basic Electrical Engineering	15 th	B.H. Deshmukh	Nirali Prakashan	2019
3	Basics of Electrical Engineering	2 nd	P. P. Kulkarni	Self	2018
4	Electronics Devices & Circuits		Allen Mottershead	PHI	
5	Electronic Instrumentation	3rd	H. S. Kalsi	MGH	

Unit wise Measurable students Learning Outcomes:

1. Analyze DC Electric & Magnetic Circuit
2. Analyze AC circuits and to explain effect of power factor on energy Saving
3. Explain construction & working of DC Motor and Transformer.
4. Compare and Contrast between the various types of diodes
5. Understand the working of transistors and its amplification process.
6. Understand principle of operation of transducers & Apply knowledge of transducer and sensor for various applications.

Title of the Course: Basic Electrical & Electronics Engineering (Lab)	L	T	P	Credit
Course Code: UHSC0127/ UHSC0227	-	-	2	1
Course Pre-Requisite: Modern Physics, Electro-magnetism, theoretical concepts & Semiconductor devices required for performing the experiments listed below.				
Course Description: This course gives hands on experience to operate and comprehend characteristic performance of various electrical devices. This course is designed for verification of basic theoretical concepts in Electrical Engineering and to introduce students with construction, theory and characteristics of various electronics devices.				
Course Objectives: <ol style="list-style-type: none"> 1. To verify practically the properties of typical Electrical Circuits (DC and AC). 2. To operate typical electric machines (dc motor and single-phase transformer) safely. 3. To wire and use safety devices (fuse, MCB, starter) in a typical electrical installation. 4. To explain the working principles and applications of diode, transistor and transducers 				

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Connect typical electrical circuits as a member of diverse group
CO2	Demonstrate use of safety electrical equipment.
CO3	Use dc motors and single-phase transformer safely in real life.
CO4	Analyze the performance of rectifiers, filters and voltage regulator.
CO5	Demonstrate the working of amplifier and traducers.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1						3	2		3		
CO2	1	2				3		2	3	2		2		
CO3	3					1		1	3			2		
CO4	1	3		1										
CO5	3			2										

Assessment Scheme:

Assessment Component	Marks
ISE (Journal Writing, Practical Performance, Oral)	
Journal Writing(10), Practical Performance(10), Oral(5)	50

ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc.

Course Contents

Practical No.	Practical/Experiment Title and Contents	Hours
1	Verification of Kirchhoff's Laws for DC Circuit by using MATLAB	2
2	Power Factor improvement by using Capacitor bank	2
3	Load test on single phase transformer for finding Efficiency & Voltage Regulation	2
4	Load test on DC motor.	2
5	Demonstration of use of fuse, MCB, starter, energy meter etc. in electrical installation.	2
6	Residential Electricity Energy bill verification	2
7	Study of Half wave rectifier (HWR) with & without filter	2
8	Study of Full wave rectifier (FWR) with & without filter	2
9	Study of Zener Diode as Voltage regulator	2
10	Study of frequency response of single stage RC coupled Amplifier	2
11	Study of temperature measurement using RTD	2
12	Study of speed measurement using proximity switch & photoelectric pick up	2

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Electrical Technology	Vol-II	B. L. Theraja	S. Chand	
2	Elements of Electrical Engineering	10 th	P. V. Prasad	Cengage Learning	

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Laboratory courses in Electrical Engineering	--	S G Tarnekar and P. K Kharbanda	S Chand	

2	Basic Electrical Engineering	3rd	D.P. Kothari, I.J. Nagrath	TMH Publishing Co. Ltd., New Delhi	
<p>Practical wise Measurable students Learning Outcomes:</p> <ol style="list-style-type: none"> 1. To verify Kirchhoff's laws. 2. To improve power factor of a circuit by using static condenser. 3. To explain effect of load on the efficiency, current and secondary terminal voltage of a single-phase transformer. 4. To explain effect of load on efficiency, current and speed of dc motor 5. To wire electric circuits using fuse, MCB, starter, energy meter. 6. To calculate energy bill from given data and verify with energy bill received from MSDDL 7. Students will be able to analyze the performance of rectifiers, filters and voltage regulator. 8. Students will be able to explain operation of RTD proximity switch & photoelectric pick up for measurement of speed. 					

Title of the Course: Introduction to Programming (Python) Course Code: UHSC0114									L	T	P	Credit		
									2	-	-	2		
Course Pre-Requisite: Basic Knowledge of computers														
Course Description: This subject covers basic principles of programming through the python programming language.														
Course Objectives: 1. Identify working principles of computers and programming languages. 2. Demonstrate use of decision and repetition structure in order to solve specific problem. 3. Model a given big problem statement in to smaller parts to provide modular approach. 4. Choose proper data structure like list, tuples, dictionaries etc. for solving given problem														
Course Outcomes:														
CO	After the completion of the course the student should be able to												Blooms Level	
CO1	Identify working principles of computers and programming languages												1	
CO2	Demonstrate use of decision and repetition structure in order to solve specific problem												2	
CO3	Model a given big problem statement in to smaller parts to provide modular approach.												3	
CO4	Choose proper data structure like list, tuples, dictionaries etc. for solving given problem												5	
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3											2	
CO3						3								
CO4			2					2						1
Assessment Scheme: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.														
									Assessment Component		Marks			
									ISE 1		10			
									MSE		30			

		ISE 2	10		
		ESE	50		
ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc. MSE is based on 50% of course content (first three units). ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.					
Course Contents					
Unit No.	Unit Title and Contents	Hours			
1	Background & Introduction: What is programming, Evolution of programming, How Computers Store Data, How a Program Works, Compilation, Interpretation, Input, Processing, and Output: Designing a Program Input, Processing, and Output, Displaying Output with the print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, More About Data Output	4			
2	Decision Structures and Boolean Logic: The if Statement, The if-else Statement, Comparing Strings, Nested Decision Structures and the if-elif-else Statement, Logical Operators, Boolean Variables	5			
3	Repetition Structures: Introduction to Repetition Structures, The while Loop: A Condition-Controlled Loop, The for Loop: A Count-Controlled Loop, Calculating a Running Total, Sentinels, Input Validation Loops, Nested Loops	4			
4	Functions: Introduction to Functions, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Introduction to Value-Returning Functions: Generating Random Numbers, Writing Your Own Value-Returning Functions, The math Module, Storing Functions in Modules	4			
5	Lists and Tuples: Sequences, Introduction to Lists, List Slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples, Dictionaries and Sets: Operations and use	4			
6	Strings, Files & Exceptions: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings, Introduction to File Input and Output Using Loops to Process Files, Processing Records, Exceptions.	5			
Textbooks:					
SN	Title	Edition	Author/s	Publisher	Year
1	Starting Out with Python	5 th	Tony Gaddis	Pearson	March 17th 2021
2	Core Python Programming	3 rd	R. Nageswara Rao	Dreamtech Press	1 Jan 2018
Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1	Python: The Complete Reference	Indian Edition	Martin C. Brown	MGH	March 2018

Title of the Course: Introduction to Programming (Lab) Course Code:UHSC0137							L	T	P	Credit				
							-	-	1	1				
Course Pre-Requisite: Introduction to programming theory														
Course Description: This course covers practical programming assignments need to be solved by students based on the theory course.														
Course Objectives: 1. Apply concepts of input and output streams for developing interactive programs. 2. Develop a solution using loops and conditional statements. 3. Build a program to process data efficiently using Touples and Dictionaries. 4. Develop a program with persistent data storage capability.														
Course Outcomes:														
CO	After the completion of the course the student should be able to													Bloom Level
CO1	Apply concepts of input and output streams for developing interactive programs.													3
CO2	Develop a solution using loops and conditional statements.													3
CO3	Build a program to process data efficiently using Touples and Dictionaries.													6
CO4	Develop a program with persistent data storage capability.													6
CO-PO Mapping:														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													2
CO2		2	2										2	
CO3				3	1									
CO4														
Assessment Scheme: ISE will be a quiz and assignment submission evaluation. ESE will be a practical and Oral examination.														
Assessment Component												Marks		
ISE (Quiz/Oral/Assignments/App Development)														
ESE (POE)												50		
Course Contents														
Practical No.	Practical Title and Contents													Hours
1	Writing hello world program in compiled and interpreted language & understanding the difference between compilation and interpretation													2
2	Program to perform demonstration of input and output operation													2
3	Program based on different types of operators													2
4	Program based on the decision structures and Boolean logic													2
5	Program to demonstrate use of different types of looping statements													2
6	Program to write and use different types of user defined function													2
7	Programs to demonstrate use of various built in functions in python													2
8	Program to create and use own module													2
9	Program demonstrating operations and use of List and Touple													2

10	Program to perform CURD operations in file using file handling	2
11	Program to demonstrate exception handling	2
12	Experiment for installing external modules through pip and building application (Music Player)	2

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Starting Out with Python	5 th	Tony Gaddis	Pearson	March 17th 2021
2	Core Python Programming	3 rd	R. Nageswara Rao	Dreamtech Press	1 Jan 2018

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	Python: The Complete Reference	Indian Edition	Martin C. Brown	MGH	March 2018

Websites:

- <https://docs.python.org/3/>

Title of the Course: Workshop Practices		L	T	P	Credit
Course Code: UHSC0124				2	1
Course Prerequisite: Basics of Computer and Electronics					
<p>Course Description: In this course students will learn the skills required for maintaining the personal computer, connecting to network and internet, operating system platforms and software management.</p> <p>The students will develop skill in selection and use of commonly used tools, equipment, components to implementing and testing circuits of simple electronic assembly</p>					
<p>Course Objectives: Students will be exposed to:</p> <ol style="list-style-type: none"> 1. Computer hardware maintenance and software management. 2. Basics of network configuration for internet connectivity. 3. To develop skill in selection and use of commonly used tools, equipment, components 4. To develop skill in implementing and testing circuits of simple electronic assembly. 					
Course Learning Outcomes:					
CO	After the completion of the course the student should be able to				
CO1	Build a personal computer by assembling hardware components and installing software.				
CO2	Make use of networking devices for connecting to the internet.				
CO3	Develop skill in selection and use of commonly used tools, equipment, components in a given situation.				
CO4	Develop skill in tracing, implementing and testing circuits of simple electronic assembly.				

CO-PO Mapping:

O	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1		1		1	2	1						1		
CO 2		1		1	2	1						1		
CO 3	1	1		1										
CO 4	1	1		1					1					

Assessments :**Teacher Assessment:**

Assessment	Marks
	50

Course Contents:

Assignment No 1:- Introduction to Personal Computer Hardware Components and there importance - RAM, Cache memory, Motherboard, Hard Drive/SSD, Processor, other peripheral devices	2hrs
Assignment No 2:- Demonstration of assembling Personal Computer and Operating System installations- Linux and Windows.	2hrs
Assignment No 3:- Network connectivity devices-(hub, unmanaged switch, managed L2 & L3 switches), configuration of different devices-IP address, mask, gateway, DNS	2hrs
Assignment No 4:- Types of Network cables - Twisted Pair, Fiber, Connectors, preparing network patch cords and testing of patch cord.	2hrs
Assignment No 5:- Application software management in Windows platform.	2hrs
Assignment No 6:- Introduction to AR/VR technology.	2hrs
Assignment No 7:-Introduction to IoT and its devices	2hrs
Assignment No 8:- Familiarization with testing and measuring instruments (Multi-meter, CRO/DSO, Power Supply), etc.	2hrs
Assignment No 8:- Understanding the electrical specifications of Semiconductor devices/ components using datasheet.	2hrs
Assignment No 9:- Testing of various passive and active electronics components.	2hrs
Assignment No 10:- Assembling circuit on breadboard.	2hrs
Assignment No 11:- Implementation and testing of electronic circuit on Printed Circuit Board by various process like interconnection, components assembling, soldering, de-soldering etc	2hrs

References:

PC Hardware: The Complete Reference, Author- Craig Zacker, Publication House- McGraw Hill Education; 1st edition (For Units Assignment No 1 to 6)

National Semiconductor Datasheet

Manuals of Lab Instruments

Printed Circuit Boards: Design and Technology, Walter C Bosshart, TMH publications, 1983.

Printed Circuit Boards: Design, Fabrication, Assembly & Testing, R S Khandpur, TMH publications, 2005

Title of the Course: Mechanical Engineering Lab		L	T	P	Credit							
		-	-	2	1							
Course Code: USHC0128/0228												
Course Pre-Requisite: Chemistry, Mathematics												
Course Description: This course aims to impart preliminary knowledge of various mechanical systems like heat engines, refrigeration and air conditioning systems, power plants, energy conversion devices, power transmission devices, automotive systems and manufacturing processes.												
Course Objectives: 1. Acquire basic knowledge of mechanical engineering 2. Understand principle of energy conversion system. 3. Understand and identify power transmission devices with their functions 4. Learn and understand manufacturing process.												
Course Outcomes:												
CO	After the completion of the course the student should be able to											
CO1	Show the components of various work producing, absorbing devices and power plants with their functions.											
CO2	Demonstrate the components of energy conversion and mechanical power transmission devices with their functions.											
CO3	Show the main elements of an automobile with their function.											
CO4	Demonstrate the components of machine tools and state their functions.											
CO5	Develop a Prototype/ Seminar presentation on identified problem using knowledge of mechanical engineering.											
CO-PO Mapping:												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2											
CO3	2											
CO4	2											
CO5	2	2	2	2		2			2	2	2	2
Assessment Scheme:												
Assessment Component					Marks							
ISE (Detailed components)												
1. Lab experiments					30							
2. Seminar/ Project based learning activity					20							
Total					50							
Course Contents												
Practical No.	Practical/Experiment Title and Contents										Hours	
1	Study of steam thermal power plant										2	
2	Demonstration and identification of components of internal combustion engine (four stroke and two-stroke engine) with their functions.										2	
3	Identification of main elements of an automobile and understanding their functions										2	
4	Identification of functions and components of domestic refrigerator and window air conditioner.										2	
5	Demonstration of pumps, air compressor and hydraulic turbines.										2	
6	Performing basic hydraulic circuit for obtaining liner and rotary motion of actuator.										2	
7	Demonstration of mechanical power transmission devices.										2	

8	Identification and demonstration of elements of machine tools and CNC turning with Industry 4.0 facility	2
9	Presentation and report preparation on Seminar/ problem based learning activities.	4
10	Performing electro-hydraulics circuit for obtaining linear and rotary motion of actuator.	2
11	Identification of main components of additive manufacturing system with their functions	2
12	Report preparation on general specifications of given type of an automobile.	2
Textbooks: <ol style="list-style-type: none"> 1. Basic Mechanical Engineering, 2nd edition, Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S, Scitech Publications, Chennai, 2000. 2. Elements of Mechanical Engineering, 2nd edition, Sadhu Singh, S. Chand Publications, New Delhi, 2010. 3. Basic Mechanical Engineering, 1st Edition, Basant Agarwal and C. M. Agarwal, Wiley India Pvt. Ltd, 2008. 4. Basic Mechanical Engineering, 2nd Edition, Pearson India Education Services Ltd., 2018. 		
Reference Books: <ol style="list-style-type: none"> 1. Thermal Engineering, 5th Edition, R K Rajput, Laxmi Publishers, New Delhi, 2006. 2. Automobile Engineering Volume I and II, 7th Edition, Kripal Singh, Standard Publishers, 2007. 3. Manufacturing Technology, Volume I, 5th Edition, P N Rao, McGraw Hill Education (India) Pvt. Ltd. Chennai, 2019. 4. Theory of Machines, 14th Edition, R S Kurmi and J K Gupta, S. Chand Publications, 2007. 		
Practical wise Measurable students Learning Outcomes: <ol style="list-style-type: none"> 1. Explain construction and working of steam thermal power plant. 2. Explain and demonstrate the constructional details of I.C.Engine. 3. Identify various components of an automobile and state their functions. 4. Identify various components of domestic refrigerator and window air conditioner and state their functions. 5. Explain and demonstrate the construction and working of energy conversion devices 6. Identify various components of fluid power system and state their functions. 7. Demonstrate types of gears, gear trains, couplings and bearings. 8. Identify various parts of centre lathe, drilling machine and milling machine and CNC turning with industry 4.0 with their functions 9. Create a prototype/ model for identified problem using knowledge of mechanical engineering and present it in front of experts. 10. Identify main elements of electro-hydraulic system and perform circuit to obtain desirable motion of actuator. 11. Identify the main components of additive manufacturing system. 12. Prepare a report on general specifications of selected automobile. 		

Title of the Course: Problem Solving using C		L	T	P	Credit
Course Code: UHSC0215		3	-	-	3
Course Pre-Requisite: Fundamental knowledge of Computers & Number Systems.					
Course Description: The main emphasis of the course will be on problem solving aspects through C programming. The students will understand programming language, concepts of loops, reading a set of data, step wise refinements, functions, control structures, arrays, dynamic memory allocations, structures, unions, and file handling. This course provides adequate knowledge to solve problems in their respective domains.					
Course Learning Objectives: <ol style="list-style-type: none"> 1. To understand C programming environment. 2. To write, compile and debug programs in C language. 3. Implement C programs for various problem statements. 					
Course Outcomes:					
CO	After the completion of the course the student should be able to				
CO1	Define fundamental concepts of C Programming.				
CO2	Make use of C programming constructs in solving mathematical and logical problems.				
CO3	Construct a modular solution for real life problems using programming language concepts.				

CO-PO Mapping:

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

Assessment Scheme:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and **ISE 2** are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, etc.

MSE is based on 50% of course content (first three units).

ESE is based on 100% course content with 60-70% weightage for course content (last three units) covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Introduction to C language C Programming development environment, IDEs used for programming- CodeBlocks, Dev C++ and Mobile IDEs. History of C, Importance of C Language, Sample C Program, Structure of C Program, Constants, variables and data types, Operators and expressions, managing input / output operations, Decision making: branching and loop statements.	08 Hrs.
2	Functions Functions, need for user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, methods of parameter passing.	05 Hrs.
3	Arrays and Strings Declaration and initialization of arrays, one dimensional and two-dimensional arrays, reading, writing and manipulation of above types of arrays, multidimensional arrays. Declaring and initializing string variables, reading string from terminal, writing string to screen, string handling functions, Passing array and string to function.	06 Hrs.
4	Structures Defining and declaring structure, accessing structure members, structure initialization, array of structures, nesting of structure, structures and functions, union and enumeration.	07 Hrs.
5	Pointers Defining and declaring pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer as a function argument, pointer expressions, pointers to arrays, strings and structure, Dynamic memory allocation: malloc(),calloc() and free().	08 Hrs.
6	File Handling Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, command line arguments.	05 Hrs.

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1	Programming in ANSI C	6 th	E. Balguruswami	Tata McGraw Hill	2012
2	Let us C	14 th	Yashavant Kanetkar	BPB Publisher	2016

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1	The "C" Programming Language	2 nd	B.W. Kernighan and D. M. Ritchie	Pearson Education.	2015

2	Programming And Problem Solving Using C Language	1 st	ISRD Group	McGraw-Hill Publications	2017	
3	Schaum's Outline of Programming with C	1 st	Byron Gottfried	McGraw-Hill	2017	
Unit wise Measurable students Learning Outcomes: <ol style="list-style-type: none"> Students will be able to illustrate the fundamentals of C language and Branching, Looping constructs in C programming Language. Students will be able to make use of user defined functions & Parameter passing mechanisms in C. Students will be able to perform different operations on arrays & make use of different String handling functions. Students will be able to illustrate concepts of Structure, union & enumeration. Students will be able to explain fundamentals of pointers & Dynamic memory allocation. Students will be able to use file handling functions to write programs for different file operations. 						

Title of the Course: Problem Solving using C (Lab)									L	T	P	Credit			
Course Code: UHSC0238									-	-	2	1			
Course Pre-Requisite: Fundamental knowledge of Computers & Number Systems															
Course Description: The main emphasis of the course will be on problem solving aspects through C programming. The students will understand programming language, concepts of loops, reading a set of data, step wise refinements, functions, control structures, arrays, dynamic memory allocations, structures, unions, and file handling. This course provides adequate knowledge to solve problems in their respective domains.															
Course Learning Objectives: 1. To understand C programming environment. 2. To write, compile and debug programs in C language. 3. Implement C programs for various problem statements.															
CO-PO Mapping:															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	-	-	-	3	-	-	-	-	-	-	-	-	-	
CO2	-	3	3	-	3	-	-	-	-	-	-	-	-	-	
CO3	-	-	2	-	3	-	-	-	-	-	-	-	-	-	
Assessment Scheme:															
Assessment											Marks				
ISE (Assignments) (Quiz) (Internal Oral)															
ESE															
											50				
Course Contents															
Practical No.		Practical/Experiment Title and Contents												Hours	
1		Title of the practical/Experiment: To Study basic Linux commands and different IDEs used for programming. Practical/Experimentation: • Hands on Basic Linux Commands & Different IDEs.												2	
2		Title of the practical/Experiment: To study the fundamentals of C programming language and expression evaluation using C programming. Practical/Experimentation: • Write a C program to read the values of x and y and print the results of the following expressions in one line: i. (x + y) / (x - y) ii. (x + y)(x - y)												2	

3	Title of the practical/Experiment: To Study concepts of Decision Making & Branching Practical/Experimentation: <ul style="list-style-type: none">An electric power distribution company charges its domestic consumers as follows. <table><tr><td>Consumption Units</td><td>Rate of Charge</td></tr><tr><td>001 – 200</td><td>Rs.0.50 per unit</td></tr><tr><td>201 – 400</td><td>Rs.100 plus Rs.0.65 per unit excess of 200</td></tr><tr><td>401 – 600</td><td>Rs.230 plus Rs.0.80 per unit excess of 400</td></tr><tr><td>601 and above</td><td>Rs.390 plus Rs.1.00 per unit excess of 600</td></tr></table> <p>Write a C Program that reads the customer number and power consumed and prints the amount to be paid by the customer.</p>	Consumption Units	Rate of Charge	001 – 200	Rs.0.50 per unit	201 – 400	Rs.100 plus Rs.0.65 per unit excess of 200	401 – 600	Rs.230 plus Rs.0.80 per unit excess of 400	601 and above	Rs.390 plus Rs.1.00 per unit excess of 600	2
Consumption Units	Rate of Charge											
001 – 200	Rs.0.50 per unit											
201 – 400	Rs.100 plus Rs.0.65 per unit excess of 200											
401 – 600	Rs.230 plus Rs.0.80 per unit excess of 400											
601 and above	Rs.390 plus Rs.1.00 per unit excess of 600											
4	Title of the practical/Experiment: To Study concepts of Decision Making & Looping Practical/Experimentation: <ul style="list-style-type: none">Write a C program to find the factorial of given number.Write a C program to find the roots of a quadratic equation.Write a C program to list all the prime numbers between 1 and n, where n is a value supplied by the user.	2										
5	Title of the practical/Experiment: To Study User Defined functions. Practical/Experimentation: <ul style="list-style-type: none">Write C program that uses recursive function to print Fibonacci series.Write C program that convert a lowercase character to uppercase using a user defined function.	2										
6	Title of the practical/Experiment: To Study Concept of Arrays. Practical/Experimentation: <ul style="list-style-type: none">Write C program for finding smallest and largest numbers from given numbers from elements of an array.Write C program for performing matrix addition, subtraction and multiplication operations using arrays.	2										
7	Title of the practical/Experiment: To Study Concept of Arrays. Practical/Experimentation: <ul style="list-style-type: none">An election is contested by five candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and counts the votes cast for each candidates using an array variable count. In case, a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballots.	2										
8	Title of the practical/Experiment: To Study Dynamic Array Creation. Practical/Experimentation: <ul style="list-style-type: none">Write a program for dynamic array creation using malloc()/calloc() functions.	2										
9	Title of the practical/Experiment: To Study String Operations. Practical/Experimentation: <ul style="list-style-type: none">Write a program to carry out following operations on string: a) Find the length of a given string. b) Replace a specified character from a string with another alphabet	2										
10	Title of the practical/Experiment: To Study Concept of Structures. Practical/Experimentation: <ul style="list-style-type: none">Write C program to store and display the name, runs scored and wickets taken by a cricket player using structure.	2										
11	Title of the practical/Experiment: To Study Concept of Pointers. Practical/Experimentation: <ul style="list-style-type: none">Write C program for Swapping of two numbers using call by reference	2										
12	Title of the practical/Experiment: To Study Concept of File Handling. Practical/Experimentation: <ul style="list-style-type: none">Write C program for performing different file handling operations.	2										
Textbooks:												
SN	Title	Edition	Author/s	Publisher	Year							
1	Programming in ANSI C	6 th	E. Balguruswami	Tata McGraw Hill	2012							

2	Let us C	14 th	Yashavant Kanetkar	BPB Publisher	2016
Reference Books:					
SN	Title	Edition	Author/s	Publisher	Year
1	The "C" Programming Language	2 nd	B.W. Kernigghan and D. M. Ritchie	Pearson Education.	2015
2	Programming And Problem Solving Using C Language	1 st	ISRD Group	McGraw-Hill Publications	2017
3	Schaum's Outline of Programming with C	1 st	Byron Gottfried	McGraw-Hill	2017
Practical wise Measurable students Learning Outcomes:					
<ol style="list-style-type: none"> Students will be able to use basic Linux commands and become familiar with different IDEs. Students will be able to implement the fundamentals of C programming language and expression evaluation using C programming. Students will be able to translate text described problems into C programs language using conditional statements in C. Students will be able to evaluate mathematical expressions by using C programming language and looping statements used in C. Students will be able to evaluate mathematical expressions by using C programming language and user defined functions used in C. Students will be able to perform different operations on arrays. Students will be able to translate text described problems into C programs language using concepts of arrays in C. Students will be able to write dynamic array program by using malloc()/calloc() functions. Students will be able to execute different string handling functions by using C programming language. Students will be able to implement structure and its array by using C programming language. Students will be able to implement pointers and pass pointer variable as an argument to a function by using C programming language. Students will be able to use file handling functions to implement different operations on file. 					

Title of the Course: Entrepreneurship Development (Audit Course)		L	T	P	Credit							
Course Code: UHSA0151/ UHSA0251		2	--	--	--							
Course Pre-Requisite: General Awareness												
Course Description: This course introduces students to the nature of business and entrepreneurship as the vehicle for making money by creating wealth and producing goods and services for a profit in a free enterprise economy. Emphasis is on different forms of business organizations including sole proprietorships, partnerships, corporations, joint ventures and not-for-profit enterprises.												
Course Objectives:												
1. To develop conceptual understanding of the topic among the students and comprehend the environment of making of an Entrepreneur.												
2. To develop the ability of analyzing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities.												
Course Learning Outcomes:												
CO	After the completion of the course the student should be able to				Bloom's Cognitive							
					level							
					Descriptor							
CO1	Relate the concept of Entrepreneurship & describe the role of entrepreneurship within society.				I Remembering							
CO2	Classify businesses by type of sector & Explain the process and nature of entrepreneurship.				II Understanding							
CO3	Explain institutional & government funding & support policies				II Understanding							
CO4	Demonstrate the meaning and triggers of idea generation				II Understanding							
CO-PO Mapping:												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2		2	2	2		2
CO2										1	1	
CO3											2	
CO4		2	2	1	1	1	1		2	2	1	1

Assessments :

In Semester Examination (ISE) will be for 100 Marks

Assessment	Marks
ISE1	50
ISE2	50
	100

ISE: Assessment is based on presentation of Innovative Idea/ Business Case presentation through PPT/ Assignments/Prototype Model etc.

Course Contents:**Unit 1:---Introduction to Entrepreneurship**

Understanding the Meaning of Business and Business Environment, Business strategy & Entrepreneurship; Types of Entrepreneurship, Characteristics and Qualities of an Entrepreneur; Entrepreneurs Vs. Intrapreneurs and Managers; Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.

5 Hrs.

Unit 2:--- Types of Enterprises and Ownership Structure:

Introduction to various forms of business organizations Small scale, medium scale and large scale enterprises; proprietorship, partnership, Limited Liability companies and Co-operatives: their formation, capital structure and source of finance, udyog adhar, licenses, certifications & registration process etc., Micro, Small and Medium Enterprises, MSME rules, schemes and programs, DPIIT and Its Functions (Department for Promotion of Industry and Internal Trade, Govt. of India), Meaning of Start-up, Start-up India initiative, registration process, Incubators & Accelerators in India, Investors & Start-ups.

6 Hrs.

Unit 3:--- E-Cell & Institutional Support and Policies:

Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell on creativity & innovativeness, incentives & rewards, Interdisciplinary collaboration, Start-ups & mentorship, Institutional support towards the development of entrepreneurship in India, technical consultancy organizations, government policies for small scale enterprises.

5 Hrs.

Unit 4:-- Exploring Business Opportunity

Idea generation: Sources of business ideas, how to find & assess ideas? Where to find data for ideation? What is a good problem? Opportunity recognition. Idea validation & Evaluation: Design thinking for finding solutions, prototyping, idea evaluation, entrepreneurial Outlook, overview of bankable project report, new venture planning & venture creation, funding, value proposition design, ideas development, Markets & customer insight, capstone project presentation.

8 Hrs.

Textbooks:

1. Ram Chandran, 'Entrepreneurial Development', Tata McGraw Hill, New Delhi
2. Saini, J. S., 'Entrepreneurial Development Programmes and Practices', Deep & Deep Publications (P)
3. Khanka, S S. 'Entrepreneurial Development', S Chand & Company Ltd. New Delhi
4. Poornima M Charantimath, "Entrepreneurship development small business enterprises", Pearson, 2013

References:

1. Badhai, B 'Entrepreneurship for Engineers', Dhanpat Rai & co. (p) Ltd.
2. Desai, Vasant, 'Project Management and Entrepreneurship', Himalayan Publishing House, Mumbai, 2002.
3. Gupta and Srinivasan, 'Entrepreneurial Development', S Chand & Sons, New Delhi.
4. Drucker, F, Peter, "Innovation and Entrepreneurship, Harper business, 2006.

Learning Outcomes: After learning the course the students should be able to

1. Develop awareness about entrepreneurship and successful entrepreneurs.
2. Develop an entrepreneurial mind-set by learning key skills such as design, personal selling, and communication.
3. Develop idea generation, creative and innovative skills
4. Aware of different opportunities and successful growth stories
5. Understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship.

Title of the Course: Human Values and Professional Ethics (Audit course)									L	T	P	Credit												
									02	-	-	-												
Course Code: UASA0152/UHSA0252																								
Course Pre-Requisite: Basic ideas about human values, fundamental duties and rights.																								
Course Description: In this course concept and need for value based education are discussed and it includes information about engineering profession, fundamental duties and ethics in this professions and sustainable development.																								
Course Objectives: 1. To understand human values and its implications in life. 2. To be aware of fundamental right, responsibilities of engineer and concept of professional ethics. 3. To develop awareness about sustainable development.																								
Course Outcomes:																								
CO	After the completion of the course the student should be able to																							
CO1	State system human values, sub values & concepts related to professional ethics.																							
CO2	Demonstrate understanding of harmony at various levels and core qualities of professional engineer.																							
CO3	Demonstrate Professional responsibilities of engineering towards sustainable development.																							
CO4	Analyze the social problems using Ethical theories.																							
CO-PO Mapping:																								
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2										
CO1								3				1												
CO2								3	2	2		1												
CO3		1						3				1												
CO4			1					3				1												
Assessment Scheme: Two components of In Semester Evaluation (ISE),																								
<table><tr><th>Assessment Component</th><th>Marks</th></tr><tr><td>ISE 1</td><td>10</td></tr><tr><td></td><td></td></tr><tr><td>ISE 2</td><td>10</td></tr><tr><td></td><td></td></tr></table>															Assessment Component	Marks	ISE 1	10			ISE 2	10		
Assessment Component	Marks																							
ISE 1	10																							
ISE 2	10																							
ISE 1 and ISE 2 are based on Assignment/Declared test/Quiz/Seminar/Group discussions/presentation, Group activities etc.																								
Course Contents																								
Unit No.	Unit Title and Contents													Hours										
1	Value Based Education Objective of Education, Four pillars of Education (Delors Report), Education as a medium to transform society, Role of teacher, System values & sub values, Understanding happiness, prosperity, Right understanding, relationship, service learning, civic virtues.													8										
2	Harmony at various levels Coexistence of self & body – self development, harmony in the family and society, harmony in the nature and existence, social heredity, Rectitude of conduct, social values – Democracy, secularism, oneness of humankind.													6										
3	Professional Ethics Personal Vs Professional ethics, Work ethics, factors that lead to moral issues, profession and professionalism, core qualities of professional practitioners – Ability to utilize the professional competence for augmenting universal human order, ability to identify people friendly and eco-friendly production system, ability to identify and develop appropriate technologies and management pattern for													8										

	above production system, code of ethics, Ethical theories & uses of ethical theory to solve the problems, Rights of engineer.	
4	Sustainable Development: - Globalization, intercultural work ethics, Environment and Engineering, invisible hand and tragedy of commons, goals defined by UNESCO, Role of Engineering in sustainable development.	6

Textbooks:

SN	Title	Edition	Author/s	Publisher	Year
1.	Engineering Ethics includes Human Values	11	M. Govindarajan, S.Natarajan and V.S.Senthil Kumar,	PHI Learning Pvt. Ltd.	2018
2.	Human Values and Professional Ethics	1	R.R.Gaur, R. Sangal, G.P. Bagaria	Excel Books Private Limited	2010

Reference Books:

SN	Title	Edition	Author/s	Publisher	Year
1.	Ethics in Engineering	1	M.W.Martin & R.Schinzinger	Tata Mc. Graw Hills Pub. Co. Ltd.	
2.	Professional Ethics and Morals,	22	Prof.A.R.Aryasri	Dharanikota Suyodhana-Maruthi Publications	
3.	Moral Capabilities – Unit 1 - Fundamentals			FUNDAEC	2003

Unit wise Measurable students Learning Outcomes:

1. To **list** various human values and explain significance of human values.
2. To **Demonstrate** understanding of harmony at various levels
3. To **discuss** rights and responsibilities of engineers towards society.
4. To **discuss** changing perspective of environmental issues and sustainable development.

