Sanjay Ghodawat University Kolhapur



School of Engineering and Technology

Department of Aerospace Engineering

B. Tech. Aeronautical Engineering

Curriculum Structure and Syllabus (R25)

Semester: I - II

Programme Structure for B Tech.: First Year Aeronautical Engineering (R25)

Semester I: Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total credits
USTBS101	Linear Algebra	3	-	1	3	-	1	4
USTBS102	Engineering Physics	3	-	-	3	-	-	3
USTES101	Engineering Graphics	3	-	-	3	-	-	3
USTES103	Basic Electrical and Electronics for Aeronautical Engineers	2	-	-	2	-	-	2
USTBS103	Engineering Physics Lab	-	2	-	-	1	-	1
USTES102	Engineering Graphics Lab	-	2	-	-	1	-	1
USTES104	Basic Electrical and Electronics for Aeronautical Engineers	-	2	-	-	1	-	1
USTIK001	Indian Science, Engineering and Technology (Past, Present and Future)	2	-	-	2	-	-	2
USTVS102	C++ Programming	-	4	-	-	2	-	2
UHSVE001	Constitution of India	2	-	-	2	-	-	2
UISCC0XX	Co-curricular courses I	-	4	-	-	2	-	2
UHSVE005	Universal Human Values	-	-	-				Audit Course
	Total	**15**	**14**	**1**	**15**	**7**	**1**	**23**

- During the Induction Program, students would get an initial exposure to human values through Universal Human Values course
- C Programming course of 8 hours shall be conducted as bridge course before starting of C++ Programming in curriculum

Semester I: Evaluation Scheme

Course Code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work / Tutorial	Practical Oral/ POE	
		T1	T2	FET	Total				
USTBS101	Linear Algebra	10	10	5	25	50	25	-	100
USTBS102	Engineering Physics	10	10	5	25	50	-	-	75
USTES101	Engineering Graphics	10	10	5	25	50	-	-	75
USTES103	Basic Electrical and Electronics for Aeronautical Engineers	-	10	5	15	35	-	-	50
USTBS103	Engineering Physics Lab	-	-	-	-	-	25	-	25
USTES102	Engineering Graphics Lab	-	-	-	-	-	25	-	25
USTES104	Basic Electrical and Electronics for Aeronautical Engineers Lab	-	-	-	-	-	25	-	25
USTIK001	Indian Science, Engineering and Technology (Past, Present and Future)	-	10	5	15	35	-	-	50
USTVS102	C++ Programming	-	-	-	-	-	50	-	50
UHSVE001	Constitution of India	-	10	5	15	35	-	-	50
UISCC0XX	Co-curricular courses I	-	-	-	-	-	50	-	50
UHSVE005	Universal Human Values	-	-	-	-	-	-	-	Audit Course
								Total	**575**

Semester II: Teaching Scheme

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total Credits
USTBS202	Calculus and Transforms	3	-	1	3	-	1	4
USTBS204	Engineering Chemistry	3	-	-	3	-	-	3
USTES201	Engineering Mechanics	3	-	-	3	-	-	3
UAEPC201	Elements of Aeronautical Engineering	3	-	-	3	-	-	3
USTBS205	Engineering Chemistry Lab	-	2	-	-	1	-	1
USTES202	Engineering Mechanics Lab	-	2	-	-	1	-	1
UAEPC202	Elements of Aeronautical Engineering Lab	-	2	-	-	1	-	1
UHSAE001	Professional Communication	1	2	-	2	-	-	2
USTVS202	Basic Engineering Practices	-	4	-	-	2	-	2
UISCC0XX	Co-curricular courses II	-	4	-	-	2	-	2
	Total	**13**	**16**	**1**	**14**	**7**	**1**	**22**

Semester II: Evaluation Scheme

Course Code	Course Name	Theory Marks					Practical Marks		Total
		Internal Assessment				SEE	Term work/ Tutorial	Practical Oral/POE	
		T1	T2	FET	Total				
USTBS202	Calculus and Transforms	10	10	5	25	50	25	-	100
USTBS204	Engineering Chemistry	10	10	5	25	50	-	-	75
USTES201	Engineering Mechanics	10	10	5	25	50	-	-	75
UAEPC201	Elements of Aeronautical Engineering	10	10	5	25	50	-	-	75
USTBS205	Engineering Chemistry Lab	-	-	-	-	-	25	-	25
USTES202	Engineering Mechanics Lab	-	-	-	-	-	25	-	25
UAEPC202	Elements of Aeronautical Engineering Lab	-	-	-	-	-	25	-	25
UHSAE001	Professional Communication	-	10	5	15	35	-	-	50
USTVS202	Basic Engineering Practices	-	-	-	-	-	50	-	50
UISCC0XX	Co-curricular courses II	-	-	-	-	-	50	-	50
								Total	**550**

Exit Option:

- Students will have the flexibility to enter the programme in odd semesters and exit the programme after the successful completion of even semesters as per their future career needs. Students exiting the First-Year program after securing minimum 40 credits will be awarded UG Certificate in the relevant Discipline /Subject provided they secure 8 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 8 credits from skill-based courses earned during the first and second semester.

Co-curricular courses I & II	
Course Code	**Course Name**
UISCC011	Introduction to National Service Scheme
UISCC012	Regular & Special Camp Activity
UISCC021	Indian Music
UISCC022	Fine Arts
UISCC023	Indian Dance
UISCC031	Physical Fitness
UISCC032	Yoga & Meditation

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS101	Linear Algebra	03	-	01	03	-	01

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Practical/ Tutorial Marks		Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Term-work /Tutorial	Min. Passing %	Marks	Min pass	
USTBS101	Linear Algebra	10	10	5	25	40%	25	40%	50	40%	100

Course Description

This course provides a fundamental understanding of Linear Algebra, essential for various engineering and scientific applications. It covers determinants, matrices, and their role in solving systems of equations. The course introduces vector spaces, subspaces, and orthogonality concepts, along with their applications in engineering problems. Vector differentiation is explored to understand velocity, acceleration, and gradient-related concepts. Additionally, the course includes complex numbers and double integrals, equipping students with essential mathematical tools for problem-solving in advanced technical fields.

Pre-requisites: 11^{th} and 12^{th} standard Mathematics.

Course Objectives

- To introduce the fundamental concepts of determinants and matrices for solving linear equations.
- To develop an understanding of vector spaces, subspaces, and their applications.
- To explore vector differentiation and its role in physics and engineering.
- To familiarize students with complex numbers and double integrals for advanced mathematical applications

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Apply**^{2} determinant and matrix operations to solve systems of linear equations.
- **CO2** **Demonstrate**^{3} an understanding of vector spaces and their properties, including basis and dimension.
- **CO3** **Compute**^{2} derivatives of vectors and analyze motion in terms of velocity and acceleration.
- **CO4** **Utilize**^{2} complex numbers and double integration techniques in mathematical problem-solving.

Course Contents

Module	Unit	Description	Hours
1.0		**Determinant**	
1	1.1	Determinants, Minors and Cofactors, Laplace's expansion, Properties of determinant.	9
	1.2	Multiplication of determinant, Solution of a system of linear equations by Cramer's rule (three variables), Adjoint and Reciprocal determinant.	
2.0		**Matrix**	
2	2.1	Rank of matrix, Consistency of linear system of equations, solution of system of linear homogeneous and non-homogeneous equations.	9
	2.2	Eigen value, Eigen vectors, Cayley Hamilton's theorem (Without proof), Power and inverse of matrix by Cayley Hamilton theorem.	
3.0		**Vector Space**	
3	3.1	Vector spaces, subspaces, span, linear dependence and independence, basis and dimension,	9
	3.2	Orthogonality - Orthogonal vectors and subspaces, cosines and projections onto lines, orthogonal bases and Gram – Schmidt.	
4.0		**Vector Differentiation**	
4	4.1	Differentiation of vectors, normal, & tangential components of velocity and acceleration	9
	4.2	Gradient of scalar point function, directional derivative, divergence of vector point function, curl of a vector point function, Irrotational and solenoidal vector field.	
5.0		**Complex Number and Double Integral**	
5	1.1	Complex Number: Modules and arguments, types of complex number, DeMoiver's theorem (without proof), and roots of complex number.	9
	1.2	Double Integral: Double integral, Evaluation of double integration.	

Text Books

1. Bali N. P and Manish Goyal, A Textbook of Engineering Mathematics, Eighth Edition, Laxmi Publications Pvt Ltd., (2011)
2. Grewal. B. S "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, (2011).

References

1. Erwin Kreyszing and Edward J. Normintonerwin, Advanced Engineering Mathematics, 10th edition, John Willey & Sons, Inc. Publication.
2. Dass, H.K., and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Private Ltd., (2011).
3. Glyn James, Advanced Modern Engineering Mathematics, 3rd Edition, Pearson Education, (2012).
4. Peter V and O'Neil, Advanced Engineering Mathematics, 7th Edition, Cengage learning, (2012).

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. Fifth module will be assessed for 5 marks separately.
3. Tutorial should be assessed based on accuracy, completeness, conceptual understanding, problem-solving approach, clarity of explanation, and presentation quality.
4. Term work assessment shall be based on the overall performance of the student with every tutorial graded from time to time.
5. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.

Semester End Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS102	Engineering Physics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTBS102	Engineering Physics	10	10	5	25	40%	50	40%	75

Course Description

This course is designed in such a way that it bridges the sciences and engineering, technology. The syllabus effectively focuses on the concepts needed for first year technology students for their further technological studies.

Pre-requisites

- Basic knowledge about Sound, Ultrasonic sound and their properties.
- Knowledge Electromagnetic spectrum
- Idea about interference, diffraction and polarization etc.
- Basic of magnetism and different phases of matter.

Course Objectives:

- To introduce students to the basic principles of Ultrasonics and acoustics and its application.
- To study in details the concepts of interference, diffraction and polarization and to study their applications.
- To provide students with the basic knowledge of quantum physics .
- To prepare students for further studies in related fields.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Understand**[2] the basic concept of oscillations apply relevant equations.
- **CO2** **Explain**[3] the nature of light and its theory
- **CO3** **Discuss**[2] The basic theory and principles of production of ultrasonic sound and acoustics.
- **CO4** **Understand**[2] and **Explain**[3] Particle nature of light and basic of quantum mechanics.
- **CO5** **Apply**[4] Knowledge of magnetism and crystallography in Engineering field.

Course Contents

Module	Unit	Description	Hours
1.0		**Oscillations and Waves**	**9**
1	1.1	Introduction, Oscillations, simple harmonic motion, free oscillations, damped oscillations, forced oscillations, resonance, coupled oscillations,	
	1.2	waves: types of waves, reflections and transmission of waves at boundary, principle of superposition, stationary waves, superposition of perpendicular shms, dispersions.	
2.0		**Light**	**9**
2	2.1	Introduction, nature of light ,the velocity of light, optical medium, homogenous isotropic medium, reflection and refraction, total internal reflection, absorption, wavefront and the ray, Mathematical representation of plane wave, light is an electromagnetic wave,	
	2.2	Interference of light waves, Young double slit experiment, wave Trans-light from common sources, coherence, Double slit experiment, dispersion, and scattering.	
3.0		**Ultrasonic and Acoustics**	**9**
3	3.1	Introduction, production of ultrasonic waves by Piezoelectric and Magnetostriction method (Using transistor circuit), properties of ultrasonic waves, determination of wavelength and velocity of ultrasonic waves, application of ultrasonic waves.	
	3.2	Acoustics: Introduction, Basic requirements for acoustically good hall, reverberation, time of reverberation, Sabine's formula (No derivation), absorption coefficient, factors affecting architectural acoustics and their remedies, Numerical.	
4.0		**Quantum Mechanics**	**9**
4	4.1	Development of Quantum theory, wave-particle duality, de-Broglie hypothesis, matter waves, different forms of matter wave.	
	4.2	Heisenberg"s Uncertainty principle, Photoelectric and Compton effect, Numerical.	

5.0		**Magnetic Materials and Crystal Physics**	**9**
5	5.1	Origin of magnetic moment, magnetic properties of materials, Magnetic susceptibility, Classification of diamagnetic, paramagnetic and ferromagnetic materials, Ferromagnetic domains, Hysteresis in ferromagnetic materials, Soft and Hard magnetic materials, applications of magnetic materials	
	5.2	**Crystal Physics:** Introduction to basic concepts, Bravais Lattices, Properties of Crystal symmetry elements of a cubic crystal, Miller Indices, X-ray diffraction: Bragg‟s law and powder method.	

Text Books

1. A Textbook of Applied Physics, Volume 1, A. K. Jha, I. K. International Pvt Ltd,2009
2. Applied Physics for Engineers, Mehta Neeraj, PHI Learning Pvt. Ltd.,2011
3. Applied physics, Paul E. Tippens, Gregg Division, McGraw-Hill Book Co.,1985

References

1. Mehta Neeraj, Applied Physics for Engineers, PHI Learning Pvt. Ltd.,2011.
2. Paul E. Tippens, Applied Physics, Gregg Division McGraw-Hill Book Co.,1985.

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

Semester End Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES101	Engineering Graphics	03	--	-	03	--	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTES101	Engineering Graphics	10	10	5	25	40%	50	40%	75

Course Description

This course aims to make students conversant with methods of engineering drawing and to learn CAD software so that they could draw and make best use of it in drawing of engineering graphics.

Pre-requisites: Knowledge of Steel Rule, Set-squares & Protractor.

Course Objectives

- To improve imagination skills.
- Increase ability to communicate with people through drawings.
- Train to interpret data and transform into graphical representation.
- Prepare the student for future Engineering positions.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Draw**[2] the technical drawing following all BIS conventions
- **CO2** **Apply**[3] orthographic projection method to obtain Multiview, auxiliary view and sectional views
- **CO3** **Draw**[2] Isometric view from the front views, top views and/or side views.
- **CO4** **Represent & Demonstrate**[1] technical drawings

Course Contents

Module	Unit	Description	Hours
1.0		**Fundamentals of Engineering Graphics**	**9**
1	1.1	Different types of lines and material conventions used in drawing practice.	
	1.2	Dimensioning system as per BIS (Theoretical treatment only)	
2.0		**Projections of Lines & Planes**	**9**
2	2.1	Introduction to First angle and third angle methods of projection.	
	2.2	Projection of points, Projections of lines on regular, horizontal and frontal planes.	
3.0		**Orthographic Projections**	**9**
3	3.1	Lines used, Selection of views, spacing of views, dimensioning.	
	3.2	Drawing required views from given pictorial views (Conversion of pictorial view into orthographic view)	
4.0		**Orthographic Sectional Views**	**9**
4	4.1	Drawing required views from given pictorial views including sectional orthographic view	
	4.2	Drawing required views from given pictorial views including sectional orthographic view	
5.0		**Isometric projections**	**9**
5	5.1	Introduction to isometric, Isometric scale.	
	5.2	Isometric projections and Isometric views / drawings.	
	5.3	Circles in isometric view. Isometric views of simple solids and objects	

Text Books

1. N. D. Bhatt, Engineering Drawing, Charotor Publication House, Bombay
2. W. J. Luzadder, Fundamentals of Engineering Drawing, Prentice Hall of India.

References

1. Jon M.Duff, William A. Ross, Engineering Design and Visualization, CENGAGE Learning.
2. N. D. Bhatt, Machine Drawing, Charotor Publication House, Bombay.
3. French and Vierck, Graphic Science, Mc-Graw Hill International.
4. K. Venugopal, Engineering Drawing and Graphics, New Age Publication.

Internal Assessment (T1, T2 and FET):

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each. T1 and T2 can be Test/ Presentation/Any other formative assessment .
2. FET shall be assessed for 5 marks separately.

Semester End Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES103	Basic Electrical and Electronics for Aeronautical Engineers	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTES103	Basic Electrical and Electronics for Aeronautical Engineers	-	10	5	15	40%	35	40%	50

Course Description

This course provides an introduction towards the fundamental principles and concepts of Electrical and Electronics engineering. It is designed to provide a solid foundation to the students who are pursuing Engineering degree in various disciplines as a beginner.

Pre-requisites: Knowledge of Physics and Mathematics in Secondary Education

Course Objectives:

- To impart the basic terminology and definitions of Electrical and Electronics engineering
- To study various laws to evaluate the performance of components in the circuits
- To acquire the basic knowledge of analog and digital devices and its functioning
- To study different number system conversions and logic gates
- To acquire the basic knowledge and operations of measuring instruments

Course Outcomes: After the Successful completion of the course students will able to:

- **CO1: Illustrate**[3]basic components in DC and AC circuits.
- **CO2:Describe**[2] construction and working of electrical machines.
- **CO3:Demonstrate**[2] basic electronic devices and their applications.
- **CO4:Illustrate**[2]number systems and logical operation for Electronics circuits.

Course Contents

Module	Unit	Description	Hours
1.0		**DC& AC Circuits**	**6**
1	1.1	Types of materials based on resistivity .Concepts of E.M.F., potential difference and current, resistance, effect of Electrical circuit elements (R, L and C), voltage and current sources, Faraday's Law Kirchhoff's current and voltage laws, DC response of RL & RC circuits.	
	1.2	Representation of sinusoidal waveforms, peak and RMS values, single phase and three phase supply , Phasor representation of AC quantities, real power, reactive power, apparent power, power factor.	
2.0		**Electrical Machines and Applications**	**6**
2	2.1	Static machines: Magnetic materials, BH characteristics, construction & working principle of single-phase and three-phase transformers.	
	2.2	Rotating machines: Generation of rotating magnetic fields, construction and working of DC machines, three-phase induction motor, single-phase induction motor. Synchronous motor and Servo motors.	
3.0		**Semiconductor Devices and Applications**	**6**
3	3.1	Junction Diode Characteristics and Special Semiconductor Devices – Zener, LED, Tunnel, Photodiode, Rectifiers ,Voltage regulations.	
	3.2	Transistor Operations, Configuration and Characteristics ;Operation and Characteristics of FET; Operational Amplifier – Introduction and Applications.	
4.0		**Number Systems and Logic Gates**	**6**
4	4.1	Introduction to number system: binary, octal, decimal, hexadecimal. Inter conversion between number systems, Binary coded decimal (BCD) number.	
	4.2	Basic gates-AND, OR, NOT, X-OR, X-NOR with truth table, Universal gates: NAND & NOR with truth table, Design of basic logic gates by using universal gates. Boolean Algebra – Half and Full Adders.	

5.0		**Measuring Instruments**	**6**
5	5.1	Introduction to Moving coil and moving iron meters, Ammeter, Voltmeter, Wattmeter, Energy meter.	
	5.2	Cathode Ray Oscilloscope- Block diagram, Measurement of voltage and frequency, Signal Generator, Digital Multimeter-Block diagram and its operation. DSO- Block diagram- Data acquisition	

Text Books

1. Nagrath I.J. and D. P. Kothari, "Basic Electrical Engineering", TMH Publication, 3rdEdition, 2010.
2. Ashfaq Husain, "Fundamentals of Electrical Engineering" Dhanpat Rai & Company, 4thEdition, 2011.
3. Anand Kumar, "Fundamentals of Digital Circuits" PHI Publication, 4th edition, 2017.
4. R. P. Jain, "Modern Digital Electronics", TMH Publication, 4th edition, 2010

References

1. B.L & A.K. Theraja, "Electrical Technology", Vol-II, S. Chand McGraw Hill Publication, 4thEdition, 2011.
2. N Salivanan & Sureshkumar, Electronic Devices & Circuits, Tata Mc-GrawHill.
3. Anil K. Maini, "Digital Electronics Principles and Integrated Circuits" Wiley Publications, 2007.

Internal Assessment (T1, T2 and FET)

1. T2 should be based on first to fourth modules for 10 marks.
2. Fifth module will be assessed for 5 marks separately.

Semester End Examination

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 7 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS103	Engineering Physics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTBS103	Engineering Physics Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Develop**[2] practical skills with proper handling and selection of instruments.
- **CO2** **Understand**[1] basic theoretical concepts and properties of light and LASER.
- **CO3** **Understand**[1] hysteresis and crystal structures.

List of Experiments

All the experiments will be based on the course content of **Engineering Physics – USTBS102**

1. Calculation of wavelength of light using diffraction grating
2. Determination of specific rotation using polarimeter
3. Compound pendulum
4. Study photoelectric effect using photometer
5. Determination of Plank's constant by LED
6. Study of B-H curve
7. Determination of Miller indices from given planes
8. Determination of crystal structure using XRD

References

1. Mehta Neeraj, Applied Physics for Engineers, PHI Learning Pvt. Ltd.,2011.
2. Paul E. Tippens, Applied Physics, Gregg Division McGraw-Hill Book Co.,1985.

Evaluation Scheme:

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES102	Engineering Graphics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTES102	Engineering Graphics Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Develop** [3] isometric drawings of simple objects reading the orthographic projections of those objects.
- **CO2** **Design** [4] 3D objects with isometric principles by using computer aided sketches
- **CO3** **Produce**[2] geometric construction, dimensioning and detail drawings.

List of Experiments

All the experiments will be based on the course content of **Engineering Graphics – USTES101**

References

1. Jon M.Duff,William, A. Ross, Engineering Design and Visualization , CENGAGE Learning
2. N. D. Bhatt, Machine Drawing , Charotor Publication House, Bombay.
3. French and Vierck, Graphic Science, Mc-Graw Hill International
4. K. Venugopal, Engineering Drawing and Graphics, New Age Publication

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment done on computer graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES104	Basic Electrical and Electronics for Aeronautical Engineers Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTES104	Basic Electrical and Electronics for Aeronautical Engineers Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1:Illustrate**[2] the different basic laws and types of circuits
- **CO2: Deomonstrate**[2] number systems and digital logic gates.
- **CO3: Explain**[2] the operation of basic semiconductor devices.

List of Experiments

All the experiments will be based on the course content of **Basic Electrical and Electronics for Aeronautical Engineers – USTES103**

References

1. B.L & A.K. Theraja, "Electrical Technology", Vol-II, S. Chand McGraw Hill Publication, 4thEdition, 2011.
2. N Salivanan & Sureshkumar, Electronic Devices & Circuits, Tata Mc-GrawHill.
3. Anil K. Maini, "Digital Electronics Principles and Integrated Circuits" Wiley Publications, 2007.

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTIK001	Indian Science, Engineering and Technology (Past, Present and Future)	02	-	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTIK001	Indian Science, Engineering and Technology (Past, Present and Future)	-	10	5	15	40%	35	40%	50

Course Description

The objective of this course is to provide an exposure to the development of Science and Technology in India, and is primarily meant for teachers and research scholars in various universities and colleges.

Pre-requisites: -

Course Objectives

- To familiarize learners with major sequential development in Indian science, engineering and technology.
- To review & strengthen the ancient discovery and rSEEarch in physics, chemistry, maths, metallurgy, astronomy, architecture, textile, transport, agriculture and Ayurveda etc.
- To help students to trace, identify and develop the ancient knowledge systems to make meaningful contribution to development of science today.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1: Create**[3] awareness amongst the youths about Indian Traditional Knowledge; Science and Practices
- **CO2: Review**[3] the Ancient Indian Science (Physics, Chemistry, Maths)
- **CO3: Explani**[3] Ancient Indian Science (metallurgy, Architecture)
- **CO4: Demonstrate**[3] Ancient Indian Science (Ayurveda & Yoga)

Course Contents

Module	Unit	Description	Hours
1.0		**Indian Traditional Knowledge; Science and Practices**	**6**
1	1.1	Introduction to the Science and way of doing science and research in India, Ancient Science in Intra & Inter Culture Dialogue & coevolution. Traditional agricultural practices, Traditional water-harvesting practices, Traditional Livestock and veterinary Sciences Traditional Houses & villages, Traditional Forecasting,	
	1.2	Traditional Ayurveda & plant-based medicine, Traditional writing Technology	
2.0		**Ancient Indian Science (Physics, Chemistry, Maths)**	**6**
2	2.1	Physics in India: Vaisheshika darshan Atomic theory & law of motion, theory of panchmahabhoota, Brihath Shathaka (divisions of the time, unit of distance), bhaskarachaya(theory of gravity, surya siddhanta & sidhanta shriomani), Lilavati (gurutvakashan Shakti).	
	2.2	Chemistry in India Vatsyayana, Nagarjuna,Khanda, Al-Biruni, Vagbhaṭa – building of theras-shala (laboratory), working arrangements of ras-shala, material and equipment, Yaśodhara Bhaṭṭa-process of distillation, apparatus, saranasamskara, saranataila	
	2.3	Mathematics in India: Baudhayana‟s Sulbasutras, Aryabhaṭa, Bhaskaracharya-I, Severus Sebokht, Syria, Brahmagupta, Bhaskaracharya-II, Jyeṣṭhadeva	
3.0		**Ancient Indian Science (metallurgy, Architecture)**	**6**
3	3.1	Metallurgy in India: Survarṇa(gold) and its different types, prosperities, Rajata(silver),Tamra(copper), Loha(iron), Vanga(tin), Naga / sisa(lead), Pittala(brass)	
	3.2	Architecture in India: Nagara (northern style), Vesara (mixed style), and Dravida (southern style), Indian vernacular architecture, Temple sytle, cave architecture, rock cut architecture, kalinga architecture, chandels architecture, rajput architecture, jain architecture, sikh architecture, Maratha architecture Indo-Islamic architectural, Indo-Saracenic revival architecture, Greco Buddhist style.	

4.0		**Ancient Indian Science (Textile, Agriculture)**	**6**
4	4.1	Textile Technology in India: Cotton (natural cellulose fiber), silk, wool (natural protein fibers), bast and leaf fibers, mridhudhautadhupitambaram (meaning a practice of fumigating the fabric with incence smoke before use as a part of the finishing process), sitadhautavasanayugala (bleached white–a finishing process); suchhastah, sutradharah (needle and thread – tools for stiching). dyeing, washing spinning and weaving technology,	
	4.2	Agriculture in India: krishisuktas, Krishiparashara, Brihatsamhita, Types of crops, Manures, Types of land- devamatruka, nadimatruka, use of animals in warfare, animal husbandry, Animals for medicines.	
5.0		**Ancient Indian Science (Ayurveda & Yoga)**	**6**
5	5.1	Ayurveda for Life, Health and Well-being: Introduction to Ayurveda: understandingHuman body and Pancha maha bhuta, the communication between body & mind, health regimen for wellbeing,	
	5.2	Introduction to yoga (raja yoga, astang yoga, gyan yoga), understanding of Indian psychological concept, consciousness, tridosha & triguna.	

Text Books

1. Prof. B Mahadevan, Textbook on IKS, IIM Bengaluru.
2. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
3. SK Das, The education system of Ancient Hindus, Gyan publication house, India

References

1. A Gosh, History of Science in India (Volume-I Part-II Astronomy), the national academy of science, India & the ramkrishna mission institute of culture, 2014
2. Dharmpal, Indian science and technology in the eighteen century, rashtrottahana sahitya, 1983
3. S Biswal, B L ray, Vedic Science and technology, DK Print world, 2009
4. A.K Bag, History of technology in Indian (Set 3 vol), Indian Nation Science Academy, 1997.

Internal Assessment (T1, T2 and FET)

1. T2 should be based on first to fourth modules for 10 marks.
2. FET shall be assessed for 5 marks separately.

Semester End Examination

1. Question paper will be of 35 marks comprised of 5 questions, each carrying 7 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTVS102	C++ Programming	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTVS102	C++ Programming	50	40%	-	-	50

Course Description

This course introduces the C++ programming language, focusing on object-oriented programming concepts. Students will learn data types, control structures, functions, pointers, dynamic memory allocation, and object-oriented principles like inheritance and polymorphism, file handling and memory management. The course includes hands-on programming through assignments and projects, enabling students to design, implement, and debug C++ programs.

The prerequisite: The C programming course is a basic understanding of computer operations, mathematical skills, logical thinking, and familiarity with programming concepts.

Course objectives

- Understand and use the basic programming constructs of C/C++
- Utilize various C/C++ datatypes, such as arrays, strings, and pointers
- Use memory appropriately, including proper allocation/deallocation procedures
- Apply object-oriented approaches to software problems in C++.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Describe**[2] the history, evolution, and distinctions between C and C++ programming languages.
- **CO2** **Develop**[3] C++ programs utilizing data types, operators, control structures, and functions.
- **CO3** **Design**[5] and implement classes and objects to demonstrate OOP concept
- **CO4** **Demonstrate**[4] different types of inheritance and their execution flow in C++.
- **CO5** **Apply**[3] polymorphism concepts (function overloading, operator overloading, virtual functions.

Module	Unit	Description	Hours
1.0		**Introduction Object Oriented Programming**	**6**
	1.1	History and evolution of C++, Differences between C and C++, Basic structure of a C++ program, Input and output using cin and cout, Compiling and running C++ programs, Constants, Data-types, Variables, Operators. **Control Structures**: Decision-making statements, Looping statements	
2.0		**Arrays and Function**	**6**
	2.1	Single-dimensional and multi-dimensional arrays, Function declaration and definition, passing arguments to functions, Recursive functions.	
3.0		**Classes and Objects**	**6**
	3.1	OOP Principles, Class, Object, Access Specifies, Constructors, Destructors, inline function, static member.	
4.0		**Inheritance**	**6**
	4.1	Inheritance: Class hierarchy, Derived classes, Types of Inheritance, Virtual base class, constructor and destructor execution, base initialization using derived class constructors.	
5.0		**Polymorphism Static polymorphism**	**6**
	5.1	Polymorphism Static polymorphism: Early Binding, Function Overloading, Operator overloading, Dynamic polymorphism: Late binding, method overriding with virtual functions, pure virtual functions, abstract classes.	

List of Experiments

Sr.No **Name of the Experiment**

1. Develop a program to implementation of decision control statements
   a. If…… b. If ……. Else c. Nested If- else d. Switch
2. Develop a program to implementation of loop control statements
   a. For…. b. Do…while… c. While….
3. Develop a program to implementation of functions
   a. Call by value b. Call by reference
4. Develop a program to implementation of array
   a. One-dimensional array b. Multi-dimensional array

5. Develop a program to implementation of classes and Objects.
6. Develop a Program for implementation of types of constructor a. Default constructor b. Parameterized constructor c. Copy constructor
7. Develop a Program for implementation of polymorphism –
   a. Function Overloading b. Operator Overloading
8. Develop a Program for implementation of Friend Functions in Class
9. Develop a Program for implementation of types of inheritance
   a. Single level Inheritance
   b. Multilevel Inheritance
   c. Multiple Inheritance
   d. Hybrid Inheritance e.
   e. Hierarchical inheritance
10. Write an Application for implementation of Exception handling.

Text Books

1. Let Us 'C', Yashawant Kanitkar, BPB Publications
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw-Hill Education.
3. ANSI and Turbo C++,Ashoke N. Kamthane, Pearson Education.

References

1. C++ the Complete Reference, HSchildt, McGraw-Hill Education.
2. Programming with C++, D. Ravi Chandran Tata, Tata McGraw Hill

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UHSVE001	Constitution of India	02	-		02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UHSVE001	Constitution of India	-	10	5	15	40%	35	40%	50

Course Description

The objective of this course is to highlight key features of Indian Constitution, like directive principles of state policy, fundamental rights and duties, and the various organs of constitution.

Pre-requisites: -

Course Objectives

- To make students aware of the significance and basic concepts of constitution of India
- To acquaint them with the importance of fundamental rights and fundamental duties.
- To familiarize them with functioning of Union, State and Local Governments in Indian federal system.
- To make them aware of procedure and effects of emergency, composition and activities of election commission and amendment procedure.

Course Outcomes: After the successful completion of this course students will able to:

- **CO1** **Realise**[2] the significance of constitution of India in their everyday life.
- **CO2** **Identify**[2] the importance of fundamental rights as well as fundamental duties
- **CO3** **Describe**[1] the roles of Union and State Executives
- **CO4** **Explain**[2] procedure and effects of emergency, composition and activities of election commission and amendment procedure

Course Contents

Module	Unit	Description	Hours
1.0		**Introduction to Indian Constitution**	**6**
1	1.1	Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution.	
	1.2	Fundamental rights- meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.	
2.0		**Union Executive and Union Legislature**	**6**
2	2.1	Union Executive- President, Vice-president, Prime Minister, Council of Ministers.	
	2.2	Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India – composition and powers and functions.	
3.0		**State Executive and State Legislature**	**6**
3	3.1	State Executive- Governor, Chief Minister, Council of Ministers..	
	3.2	State Legislature-State Legislative Assembly and State Legislative Council	
	3.3	State Judiciary-High court.	
4.0		**Local Government**	**6**
4	4.1	Local Government-Panchayat raj system with special reference to 73rd Amendment	
	4.2	Urban Local Self Govt. with special reference to 74th Amendment	
5.0		**Election Commission and Human Rights**	**6**
5	5.1	Election Commission of India-composition, powers and functions and electoral process.	
	5.2	Human Rights –Meaning and Definitions, Working of National Human Rights Commission in India	

Text Books

1 Dr. Br Ambedkar, The Constitution of India.

2. Durga Das Basu, Introduction to the Constitution on India, (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn., 2002

3 M.V.Pylee, An Introduction to Constitution of India, Vikas Publishing,2002.

4. Brij Kishore Sharma,Introduction to the Constitution of India, PHI Learning Pvt. Ltd., New Delhi,2011

References

1. D D Basu, Introduction to the Constitution of India.

2. Subhash Kashyap, Concise Encylcopedia of Indian Constitution.

3. Pradeep Sharma and Jayal, Local Governance in India: Decentralization and Beyond.

Internal Assessment (T1, T2 and FET)

1. T2 should be based on first to fourth modules for 10 marks.
2. FET shall be assessed for 5 marks separately.

Semester End Examination

1. Question paper will be of 35 marks comprised of 5 questions, each carrying 7 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UHSVE005	Universal Human Values	-	-		Audit Course	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UHSVE005	Universal Human Values	-	-	50	50	40%	-	-	50

Course Description

This course provides self verification, on the basis of one's own Natural Acceptance, leading to self-confidence and self- evolution.

Pre-requisites: -

Course Objectives

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding to the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explore**[2] themselves: get comfortable with each other and with the teacher; they start appreciating the need and relevance for the course.
- **CO2** **Describe**[2] that the natural acceptance (intention) is always for living in harmony, only competence is lacking!
- **CO3** **Differentiate**[3] between the characteristics and activities of different orders and study the mutual fulfilment among them.
- **CO4** **PrSEEnt**[1] sustainable solutions to the problems in society and nature

Course Contents

Module	Unit	Description	Hours
1.0		**Introduction to Value Education**	**6**
1	1.1	Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)	
	1.2	Understanding Value Education	
	1.3	Self-exploration as the Process for Value Education	
	1.4	Continuous Happiness and Prosperity – the Basic Human Aspirations	
	1.5	Happiness and Prosperity – Current Scenario	
	1.6	Method to Fulfil the Basic Human Aspirations	
2.0		**Union Executive and Union Legislature**	**6**
2	2.1	Understanding Human being as the Co-existence of the Self and the Body	
	2.2	Distinguishing between the Needs of the Self and the Body	
	2.3	The Body as an Instrument of the Self	
	2.4	Understanding Harmony in the Self	
	2.5	Harmony of the Self with the Body	
	2.6	Programme to ensure self-regulation and Health	
3.0		**Harmony in the Family and Society**	**6**
3	3.1	Harmony in the Family – the Basic Unit of Human Interaction	
	3.2	Trust' – the Foundational Value in Relationship	
	3.3	'Respect' – as the Right Evaluation	
	3.4	Other Feelings, Justice in Human-to-Human Relationship	
	3.5	Understanding Harmony in the Society	
	3.6	Vision for the Universal Human Order	

4.0		**Harmony in the Nature/Existence**	**6**
4	4.1	Understanding Harmony in the Nature	
	4.2	Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature	
	4.3	Realizing Existence as Co-existence at All Levels	
	4.4	The Holistic Perception of Harmony in Existence	
5.0		**Implications of the Holistic Understanding – a Look at Professional Ethics**	**6**
5	5.1	Natural Acceptance of Human Values	
	5.2	Definitiveness of (Ethical) Human Conduct	
	5.3	A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order	
	5.4	Competence in Professional Ethics	
	5.5	Holistic Technologies, Production Systems and Management Models-Typical Case Studies	
	5.6	Strategies for Transition towards Value-based Life and Profession	

Text Books

1. R R Gaur, R Asthana, G P Bagaria ,A Foundation Course in Human Values and Professional Ethics, , 2nd Revised Edition, Excel Books, New Delhi, 2019.
2. R R Gaur, R Asthana, G P Bagaria , Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.

References

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Mohandas Karamchand Gandhi, The Story of My Experiments with Truth.
4. E. F Schumacher, Small is Beautiful.
5. Cecile Andrews, Slow is Beautiful.
6. Pandit Sunderlal, Bharat Mein Angreji Raj.
7. Mohandas K. Gandhi , Hind Swaraj or Indian Home Rule.
8. Maulana Abdul Kalam Azad , India Wins Freedom.
9. Vivekananda, Romain Rolland (English).

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS202	Calculus and Transforms	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Practical/ Tutorial Marks		Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Term-work /Tutorial	Min. Passing %	Marks	Min pass	
USTBS202	Calculus and Transforms	10	10	5	25	40%	25	40%	50	40%	100

Course Description

This course covers essential topics in Calculus and Transforms for first year Engineering students. It includes Partial Differentiation, First-Order Differential Equations, Laplace Transforms, Fourier series, and Fourier Transforms. Students will learn mathematical techniques for solving engineering problems, including function analysis, integral transforms, and differential equations.

Pre-requisites: Applied Mathematics I

Course Objectives

- To introduce the concepts of partial differentiation and its applications.
- To develop an understanding of differential equations and their solutions.
- To familiarize students with Laplace and Fourier transforms for solving engineering problems.
- To apply Fourier series in function approximation and signal analysis.

Course Outcomes: After the end of this course students will be able to

- **CO1** **Compute**[2] partial derivatives and apply them in real-world problems.
- **CO2** **Formulate**[2] and solve first-order differential equations.
- **CO3** **Demonstrate**[3] proficiency in Laplace and Fourier transforms for engineering applications.
- **CO4** **Apply**[2] Fourier series and transforms in solving periodic and non-periodic functions.

Course Contents

Module	Unit	Description	Hours
1.0		**Partial Differentiation**	
1	1.1	Partial derivatives, Partial derivatives of higher order, Partial derivatives of composite functions, partial derivatives of Implicit functions.	9
	1.2	Euler's theorem on homogeneous function (Without Proof), Application to maxima and minima.	
2.0		**Differential equation of first order and first degree**	
2	2.1	Definition, order and degree of differential equation, exact differential equations, Integrating factor, equation reducible to exact.	9
	2.2	Solution of differential equation of first order and first degree by linear equations, equation reducible to linear	
3.0		**Laplace Transform**	
3	3.1	Definition, Transform of elementary functions, properties of Laplace transforms, Periodic function, transforms of derivatives, transforms of integral,	9
	3.2	Inverse Laplace transforms inverse Laplace transform of elementary functions, Convolution theorem, Heaviside Unit step function, Dirac delta function.	
4.0		**Fourier Series**	
4	4.1	Dirchilt's Conditions, Euler's formulae, Function having points of discontinuity, Change of interval.	9
	4.2	Expansion of odd and even periodic function, half range series.	
5.0		**Fourier Transform**	
5	1.1	Fourier Transforms, Fourier sine and cosine transforms, Properties of Fourier transform.	9
	1.2	Complex form of Fourier integral, Convolution theorem, Finite Fourier sine and cosine transforms.	

Text Books

1. Grewal. B. S "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, (2011).
2. Bali N. P and Manish Goyal, A Textbook of Engineering Mathematics, Eighth Edition, Laxmi Publications Pvt Ltd., (2011)
3.

References

1. Erwin Kreyszing and Edward J. Normintonerwin, Advanced Engineering Mathematics, 10th edition, John Willey & Sons, Inc. Publication.
2. Dass, H.K., and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Private Ltd., (2011).
3. Glyn James, Advanced Modern Engineering Mathematics, 3rd Edition, Pearson Education, (2012).
4. Peter V and O'Neil, Advanced Engineering Mathematics, 7th Edition, Cengage learning, (2012).

Internal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. Fifth module will be assessed for 5 marks separately.
3. Tutorial should be assessed based on accuracy, completeness, conceptual understanding, problem-solving approach, clarity of explanation, and presentation quality.
4. Term work assessment shall be based on the overall performance of the student with every tutorial graded from time to time.
5. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.

Semester End Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS204	Engineering Chemistry	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTBS204	Engineering Chemistry	10	10	5	25	40%	50	40%	75

Course Description

This is foundation course in science and may be prerequisite course of other engineering courses. It covers quality parameters of water, corrosion of engineering materials, metallurgy, fuel, cell and green chemistry

Pre-requisites:

Course Objectives

- To understand the basic principles of chemistry.
- To study the applications of chemistry in various engineering disciplines
- To create an awareness of the environmental impact of engineering activities and the role of chemistry in addressing it.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Estimate**[3] water quality parameters for applications in water purification.
- **CO2** **Examine**[3] the mechanism of corrosion to prevent corrosion.
- **CO3** **Describe**[2] the significance of advanced material, process of metallurgy and alloy
- **CO4** **Explain**[2] the concepts of Fuel, cell, batteries and Electrochemistry.

Course Contents

Module	Unit	Description	Hours
1.0		**Water**	**9**
1	1.1	Introduction, impurities in natural water, water quality parameters total solids, acidity, alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of water (Causes, types, units of hardness),	
	1.2	Ill effects of hard water in steam generation in boilers (Scale, Sludge & caustic embrittlement), numerical on hardness, treatment of hard water (ion exchange and reverse osmosis).	
2.0		**Corrosion and its Prevention**	**9**
2	2.1	Introduction, basic concepts(electrochemistry), causes, classification, atmospheric corrosion (oxidation corrosion), Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection, hot dipping (galvanizing and tinning), Cathodic protection, metal spraying and electroplating.	
	2.2	Green Chemistry: Introduction, Need and Historical Background of Green Chemistry, Concept of Systems Thinking, Circular economy and Sustainability, Twelve principles of Green Chemistry.	
3.0		**Engineering Materials**	**9**
3	3.1	Nano materials: Graphene, CNT, nano wires, nano tubes, Nanoparticles Nano magnets, Generations of nanotechnology. Classification of nanomaterials:0D,1D,2D and 3D and types of nanomaterials (QDs, QW, CNT's, Bucky Balls, Nanocomposites etc). Polymers: Introduction, thermo softening and thermosetting plastics, industrially Important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, conducting Polymers (doping, conjugation, conductivity), examples and applications, biodegradable plastics.	

	3.2	Cement: Classification, Composition and manufacturing of Portland cement. Refractories: Classification and properties. Dyes and Pigment: Colour and chemical constitution, chromophore- auxochrome theory, valency bond theory, classification of dyes based upon structure & methods of application, synthesis and applications of malachite green, methyl orange, alizarine & phenolphthalein.	
4.0		**Metallurgy and Alloys**	**9**
4	4.1	Introduction, concepts of metals and nonmetals in periodic table, basic terms in metallurgy (mineral, ore, metallurgy). Process of extraction of metal: Concentration of ore, Ore to metaloxide, Metaloxide to metal, purification of metal.	
	4.2	Alloys: Definition, purposes of making alloys with examples. Classification of Alloys- Ferrous and nonferrous alloys	
5.0		**Fuels and Energy Source**	**9**
5	5.1	**Fuels:** Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific Value (higher and lower), Bomb calorimeter and Boy‟s calorimeter. Numerical on Bomb and Boy‟s calorimeter. Renewable and non-renewable sources. Fossil fuel and Global carbon emission, Chemistry Behind Climate Change (Carbon cycle) and misconceptions, Real world Case Studies of Climate Change, Green House Gas Effect due to gases other than CO2, Examples of ways to handle the problems associated with CO2. Introduction, Biofuels, Hydrogen generation, Batteries and Solar cells	
	5.2	**Energy Source:** Basic terms and types of batteries (a) Primary batteries – Lechalanche cell (dry cell) (b) Secondary batteries(Accumulators) Lead acid battery (c) Fuel cells- $H_2 – O_2$ fuel cell	

Text Books

1. S. S. Dara and S. S. Umare , A Textbook of Engineering Chemistry, S. Chand & CompanyLtd., New Delhi.
2. C. P. Murthy, C. V. Agarwal and A. Naidu, A Textbook of Engineering Chemistry, BS Publications, Hyderabad.

References

1. Jain and Jain, Engineering Chemistry, Dhanpat Rai Publishing Company Ltd., New Delhi.
2. Pendse M H, Joshi S S, Bhavsar C M, Kulkarni S D, Nirali Prakashan, Engineering Chemistry.
3. V. K. Ahluwalia, Green Chemistry, Environmentally benign Reaction ,Ane Books Pvt Ltd
4. Dr. A. K. Pahari and Dr. B. S. Chauhan, Engineering Chemistry, Laxmi Publications (P) Ltd, New Delhi.
5. B. K. Sharma, Industrial Chemistry (Including Chemical Engineering), GOEL Publishing House.

nternal Assessment (T1, T2 and FET)

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately..

Semester End Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES201	Engineering Mechanics	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
USTES201	Engineering Mechanics	10	10	5	25	40%	50	40%	75

Course Description

Engineering Mechanics is a subject that deals with the principles, calculations, and laws of Forces; along with their applications to Mechanical Engineering problems. Engineering Mechanics is used to solving real-life designing, analyzing, and constructing things.

Pre-requisites: -

Course Objectives

- Understand the force systems and draw free body diagram to analyze rigid body equilibrium
- Compute the centroid, first moment and second moment of an area
- Understand the concept of motion of particles and rigid bodies.
- Explain different energy principles of mechanics

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Determine**[1] the Resultant of Concurrent and Non-Concurrent Force System
- **CO2** **Analysis**[3] of Structures for a given force system to determine Moment of Inertia
- **CO3** **Demonstrate**[3] the concept of Kinetics and Kinematics of a particle
- **CO4** **Illustrate**[3] Principles of Work and Energy and Principle of Impulse and Momentum

Course Contents

Module	Unit	Description	Hours
1.0		**Fundamental Concepts and Principles of Mechanics**	**9**
1	1.1	Newton‟s Laws of Motion, Forces on Particle, Systems of 2D forces**,** Resolution, Composition and Resultant of Concurrent Forces	
	1.2	Law of Parallelogram of Forces, Equilibrium of a Particle, Lami‟s Theorem, Free-Body Diagrams	
2.0		**Moment of a Force**	**9**
2	2.1	Moment, Couple, Equilibrium of 2D Rigid Bodies, Resultant of Non-Concurrent Force System	
	2.2	Analysis of truss, classification of truss, two force member, method of joint, method of section	
3.0		**Centroids and Moment of Inertia and Non-liner motion**	**9**
3	3.1	Centre of Gravity of a 2D Body, 2.Centroids of Areas and Lines, Composite Plates	
	3.2	Moment of Inertia, of an Areas, Polar Moment of Inertia, Radius of Gyration of an AreaParallel-Axis Theorem, Perpendicular Axis Theorem, Moments of Inertia of Composite Areas	
4.0		**Kinematics and Dynamics of Motion**	**9**
4	4.1	Introduction to Kinematics of Linear motion (no numerical on kinematics), Kinetics of linear motion, Newton‟s Laws, D‟Alembert‟s Principle, Work- Energy Principle, Impulse Momentum Principle.	
	4.2	Rectilinear Motion of Particles, Dependent Motion of Particles, Curvilinear Motion of Particles Relative Motion, Projectile Motion, Linear Momentum of a Particle, Dynamic Equilibrium, Equations of Motion in Terms of Radial and Transverse Components, Kepler‟s Laws of Planetary Motion. Work of a Force, Kinetic Energy of a Particle.	

5.0		**Principle of Work and Energy**	**9**
5	5.1	Applications of the Principle of Work and Energy, Power and Efficiency, Potential Energy Conservative Forces, Conservation of Energy Motion under a Conservative Central Force.	
	5.2	Principle of Impulse and Momentum, Impulsive Motion, Impact, Direct Central Impact, Oblique Central Impact.	

Text Books

1. Beer &Johnston, Engineering Mechanics, Tata McGraw Hill.

References

1. Timoshenko and Young, Engineering Mechanics, Third Edition, McGraw Hill Publishers,2006.
2. J.L.Meriam and L.G. Kraige, Engineering Mechanics, Seventh Edition, John Wiley & Sons, 2012.
3. Gere and Timoshenko, Mechanics of Materials, Second Edition, CBS Publishers, 2011.

Internal Assessment (T1, T2 and FET):

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each. T1 and T2 can be Test/ Presentation/Any other formative assessment .
2. FET shall be assessed for 5 marks separately.

Semester End Examination:

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UAEPC201	Elements of Aeronautical Engineering	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Semester End Exam (SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Marks	Min pass	
UAEPC201	Elements of Aeronautical Engineering	10	10	5	25	40%	50	40%	75

Course Description

This course is at third semester of second year Aeronautical Engineering. It is a foundation course in Aeronautics and may be pre-requisites for other courses and next semester aeronautical/aerospace subjects. It covers History, Classifications of Aircrafts, International Standard Atmosphere, and Basics of Aerodynamics, Structures, Propulsion and Flight Dynamics.

Pre-requisites: 11^{th} and 12^{th} physics.

Course Objectives

- To acquire the knowledge on the historical evaluation of airplanes and standard atmosphere
- To learn the different component systems and functions
- To know the concepts of basic properties and principles behind the flight
- To learn the basics of different structures & construction
- To learn the various types of power plants used in aircrafts

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explain**^{2} the history of human Flight and developments over the years
- **CO2** **Explain**^{2} the types & classifications of components and control systems
- **CO3** **Describe**^{2} the basic concepts of flight & Physical properties of Atmosphere
- **CO4** **Write**^{2} the types of fuselage and constructions.
- **CO5** **Discuss**^{2} the types of Engines and explain the principles of Rocket

Course Contents

Module	Unit	Description	Hours
1.0		**History of Flight**	**9**
1	1.1	Introduction to Airplanes and Space Vehicles, Balloon Flight, Ornithopter, Early Airplanes By Wright Brothers, Biplanes and Monoplanes	
	1.2	Developments in Aerodynamics, Materials, Structures and Propulsion over the Years.	
2.0		**Aircraft Configurations and its Controls**	**9**
2	2.1	Different types of flight vehicles, Classifications	
	2.2	Components of an airplane and their functions	
	2.3	Conventional control, Powered control	
	2.4	Basic instruments for Flying	
	2.5	Typical systems for control actuation	
3.0		**Basics of Aerodynamics**	**9**
3	3.1	Physical Properties and structures of the Atmosphere	
	3.2	Temperature, pressure and altitude relationships, available and required power and effect of altitude on both	
	3.3	Newton's Law of Motions applied to Aeronautics	
	3.4	Evolution of lift, drag and moment	
	3.5	Aerofoils, Mach number, Manoeuvres	
4.0		**Basics of Aircraft Structures**	**9**
4	4.1	General types of construction	
	4.2	Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure	
	4.3	Metallic and non-metallic materials, Use of Aluminium alloy, titanium, stainless steel and composite materials	
	4.4	Stresses and Strains, Hooke's law, stress-strain diagrams	
	4.5	Elastic Constants, Factor of Safety	
5.0		**Basics of Propulsion**	9
5	5.1	Basic ideas about piston engines, turboprop engines and jet engines	
	5.2	Use of propeller and jets for thrust Production, Comparative merits	
	5.3	Principle of operation of rocket, types of rocket and typical applications, Exploration into space.	

Text Books

1. Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition, 2015
2. E Rathakrishnan, "Introduction to Aerospace Engineering: Basic Principles of Flight", John Wiley, NJ, 2021
3. Kermode, A.C., "Mechanics of Flight", Himalayan Books, New Delhi, 2004

References

1. Sadhu Singh, "Internal Combustion Engines and Gas Turbine", SS Kataraia & Sons, 2015
2. Kermode, A.C., "Flight without Formulae", Pearson Education Ltd, 5th Edition, 2007
3. Stephen. A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004

Internal Assessment (T1, T2 and FET)

1. T1 (Test 1) should be based on first two modules and T2 (Test 2) should be based on next two modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

Semester End Examination

1. Question paper will be of 50 marks comprise of 5 questions, each carrying 10 marks.
2. The duration of Semester End Examination shall be Two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTBS205	Engineering Chemistry Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term work	Min pass	Marks	Min pass	
USTBS205	Engineering Chemistry Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Estimate**[3] the parameters and mechanism of material used in engineering applications.
- **CO2** **Prepare**[3] the basic material used in engineering applications.

List of Experiments

All the experiments will be based on the course content of **Engineering Chemistry USTBS204**

References

1. Jain and Jain, Engineering Chemistry, Dhanpat Rai Publishing Company Ltd., New Delhi.
2. Pendse M H, Joshi S S, Bhavsar C M, Kulkarni S D, Nirali Prakashan, Engineering Chemistry.
3. V. K. Ahluwalia, Green Chemistry, Environmentally benign Reaction ,Ane Books Pvt Ltd
4. Dr. A. K. Pahari and Dr. B. S. Chauhan, Engineering Chemistry, Laxmi Publications (P) Ltd, New Delhi.

Evaluation Scheme

1. TERM WORK assessment shall be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTES202	Engineering Mechanics Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTES202	Engineering Mechanics Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Perform**[2] experiment related to the Resultant of Concurrent and Non-Concurrent Force System
- **CO2** **Determine**[3] resultant of given force system to determine Moment of Inertia
- **CO3** **Illustrate**[3] Principles of Work and Energy and Principle of Impulse and Momentum

List of Experiments

All the experiments will be based on the course content of **Engineering Mechanics – USTES201**

References

1. Timoshenko and Young, Engineering Mechanics, Third Edition, McGraw Hill Publishers,2006.
2. J.L.Meriam and L.G. Kraige, Engineering Mechanics, Seventh Edition, John Wiley & Sons, 2012.
3. Gere and Timoshenko, Mechanics of Materials, Second Edition, CBS Publishers, 2011.

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment done on computer graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UAEPC202	Elements of Aeronautical Engineering Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term work	Min pass	Marks	Min pass	
UAEPC202	Elements of Aeronautical Engineering Lab	25	40%	-	-	25

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Explain**[2] the fundamental principles and characteristics of different aircraft components and systems.
- **CO2** **Discuss**[3] the design considerations and performance implications of various aircraft configurations and systems

List of Experiments

All the experiments will be based on the course content of **Elements of Aeronautical Engineering, UAEPC201**

Ex.No	Experiment Name
1	Study about aircraft fuselage configurations
2	Study about aircraft wing configurations
3	Study of the aircraft Instruments
4	Detail study about aircraft Landing Gear
5	Study about the aircraft control surfaces
6	Study about aircraft tail configurations
7	Study the components of aircraft Piston engine
8	Study the components of aircraft Jet engine

References

1. Daniel P. Raymer, Aircraft Design: A Conceptual Approach, AIAA (American Institute of Aeronautics and Astronautics), 2012
2. Brian L. Stevens and Frank L. Lewis, Aircraft Control and Simulation, Wiley, 2003
3. Irwin E. Treager, Aircraft Gas Turbine Engine Technology, McGraw-Hill, 2000

Evaluation Scheme

1. TERM WORK assessment shall be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per ‘credit and grading system’ manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UHSAE001	Professional Communication	01	02	-	02	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					Practical/ Tutorial Marks		Semester End Exam(SEE)		Total Marks
		T1	T2	FET	Total	Min pass	Term-work /Tutorial	Min. Passing %	Marks	Min pass	
UHSAE001	Professional Communication	-	10	5	15	40%	-	40%	35	40%	50

1 hour theory shall be taught to entire class followed by 2hrs, Practical in batches Course

- **Description**

This course is designed to develop the English Communicative capacity required in social and professional life. The students will excel in professional communication that will help them in the academia and the world of practical affairs.

Pre-requisites: - Basic LSRW skills acquaintance.

Course Objectives

- To acquaint learners with the process of communication.
- To train learners to effectively apply LSRW skills in professional life.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1: Identify** importance of communication in formal situations.
- **CO2: Analyze** the process and forms of communication.
- **CO3: Apply** LSRW skills for effective communication in professional life.

Course Contents

Module	Unit	Description	Hours
1.0		**Communication Theory**	**3**
1	1.1	Communication: Concept and Its Meaning, Process, Types: Verbal and Non-verbal Communication,	
	1.2	Use of Body Language in Communication and Grooming,	
	1.3	Levels and Networks of Communication: Formal and Informal,	
	1.4	Flows of Communication, Barriers to Communication, ways to overcome different barriers, and Technology in Communication.	
2.0		**Listening Skills**	**3**
2	2.1	Importance of Listening, Listening and Hearing	
	2.2	Process of Listening, Barriers to Effective Listening	
	2.3	Types of Listening, Techniques of effective Listening	
3.0		**Speaking Skills**	**3**
3	3.1	Public Speaking styles: ceremonial, persuasive, demonstrative and informative speaking.	
	3.2	Public Speaking Techniques, Elements of Public Speaking	
	3.3	Extempore and Prepared Speech, Group Discussion: GD Types, Skills, Do's Don'ts. Roles in GD, Debate	
4.0		**Reading Skills**	**3**
4	4.1	Types of reading	
	4.2	Techniques for effective Reading	
	4.3	SQ3R Technique	
5.0		**Writing Skills**	**3**
5	5.1	Seven C's of Communication	
	5.2	Business Letters, Types of Business Letters	
	5.3	Cover Letter & Résumé	

Text Books

1. Chadha, R.K., Communication Techniques and Skills, Dhanpat Rai Publications, New Delhi. 2014
2. Raymond Murphy, Essential English Grammar: A Self-Study Reference and Practice Book for Elementary Students of English with Answers, Cambridge University Press
3. Green, David. Contemporary English Grammar–Structures and Composition. Macmillan India. 2014 (Print)
4. Fitikides, T. J. Common Mistakes in English. London: Orient Longman, 1984

References

1. Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill.
2. Thomas N. Huckin& Leslie A. Olsen, Technical Writing & Professional Communication for non-native speakers of English, McGraw –Hill.
3. Nicky Stanton, Mastering Communication by, Palgrave Master Series
4. Meenakshi Raman & Sangita Sharma, Technical Communication; Principles and Practice, Oxford University Press.
5. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw-Hill Education
6. Martin Hewings, Advanced Grammar in Use, Cambridge University Press, 2013

Internal Assessment (T1, T2 and FET)

3. T2 should be based on first to fourth modules for 10 marks.
4. Fifth module will be assessed for 5 marks separately.

Semester End Examination

6. Question paper will be of 35 marks comprise of 5 questions, each carrying 7 marks.
7. The duration of Semester End Examination shall be Two hours.
8. The students need to solve all 5 questions.
9. Question No.1 will be compulsory and based on entire syllabus.
10. Remaining question (Q.2 to Q.5) will be selected from all the modules.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
USTVS202	Basic Engineering Practices	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
USTVS202	Basic Engineering Practices	50	40%	-	-	50

Course Description

This is a mainly practical course aimed to improve your career prospects within mechanical, manufacture or systems related areas within engineering.

Course objectives

- Understand the basic principles of mechanical engineering
- Demonstrate the techniques of smithy, carpentry in workshop.
- Demonstrate different techniques of welding and other processes in workshop.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** **Acquire**[2] skills in basic engineering practices (Use of different types of machines, tools and equipment)
- **CO2** **Develop**[2] sheet metal, carpentry model, smithy, plumbing for specific applications.
- **CO3** **Practice**[3] fitting operation and able to produce assembly of two work pieces
- **CO4** **Perform**[2] different joining operations on metal.

List of Experiments

- Demonstration of different operation performed in smithy to make model like Hook.
- Demonstration of different sheet metal operations useful for sheet metal objects like tray etc and to make one simple job of sheet metal like tray, cover etc.
- Demonstration of different fitting operations and to make one job of fitting like marking, cutting, drilling, tapping, filing, fitting operations.
- Demonstration of different joining process (Spot, arc welding) for metals and to make one job of Arc welding like lap joint, butt joint and tee joint, corner joint in flat position.
- Demonstration of different carpentry operations with the help of hand tools and power tools.
- Site visit and its report.

Text Books

1. B. S. Raghuvanshi, A Course in Workshop Technology, Vol – I, Dhanapat Rai and Sons.
2. Hajara Chaudhari, Elements of Workshop Technology, Vol –I, Media Promoters.
3. Gupta and Kaushik, Workshop Technology, Vol – I, New Heights.

References

1. Chapman, Workshop Technology, Vol – I, The English Language Book Society.
2. H.S. Bawa Workshop Technology, Vol.-I by, TMH Publications, New Delhi.
3. P. M. Agrawal, Dr. V. J. Patel**,** CNC Fundamentals and Programming

Evaluation Scheme

1. TERM WORK assessment must be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per „credit and grading system" manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.

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Course code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UISCC012	Regular & Special Camp Activity	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
UISCC012	Regular & Special Camp Activity	50	40%	-	-	50

Course Description

This course provides an extension dimension to the higher education system to orient the student youth to community service while they are studying in educational institutions.

Pre-requisites:

- To study this course, a student must be medically fit.
- It is open for all.

Course Objectives

- Develop among them a sense of social and civic responsibility.
- Utilize their knowledge in finding practical solutions to individual and community problems.
- Develop competence required for group-living and sharing of responsibilities.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1:** **Identify**[1] and solve the major social and environmental issues/challenges and equip the classroom learning to face those challenges.
- **CO2:** **Develop**[2] teacher competence, sensitivity and teacher motivation.
- **CO3:** **Perform**[1] NSS regular activities

List of Activities

- Introduction to National Service Scheme
- Introduction to National Integration
- Special Programme
  - Legal awareness
  - Health awareness
  - First-aid
  - Career guidance
  - Leadership training - cum - Cultural Programme
  - Globalization and its Economic Social Political and Cultural impacts.
- Special Camping programme
  - Nature and its objectives
  - Selection of camp site and physical arrangement
  - Organization of N.S.S. camp through various committees and discipline in the camp.
  - Activities to be undertaken during the N.S.S. camp.
  - Use of the mass media in the N.S.S. activities.
- N.S.S. Regular Activities
  - Traffic regulation
  - Working with Police Commissioner's Office
  - Working with Corporation of Chennai
  - Working with Health Department
  - Blind assistance
  - Garments collection
  - Non-formal education
  - 'Environmental Education, Awareness and Training (EEAT)‟
  - Blood donation

Text Books

1. Nirmalya Kumar Sinha and Dr. Surajit Majumder , Text Book of National Service Scheme (Volume –I), Vidya Kutir Publications 2021.
2. Nirmalya Kumar Sinha and Dr. Surajit Majumder , Text Book of National Service Scheme (Volume –II), Vidya Kutir Publications 2021.

References

1. Gurmeet Hans ,Case material as Training Aid for field workers.
2. Kapil K.Krishan, Social service opportunities in Hospitals.
3. Ram Ahuja, Social Problems in India,..
4. Government of India, National Service Scheme Manual.
5. TISS Training Programme on National Programme scheme,.
6. TISS, Orientation Courses for N.S.S. Programme officers,.

Evaluation Scheme

1. Participation in Regular Activities 40 Marks out of 50.

$$\frac{\text{Number of Activites Attended x Total Attendance Points}}{\text{Total number of Activities}} = \text{Attendance Marks}$$

$$Example: \frac{5 \text{ x } 40}{5} = 40$$

2. Participation in various Activities 10 Marks out of 50.
   - Participation in RD, SRD, NIC or any National Level Camp -10 Marks out of 10.
   - Participation in State Level Camp (Avhan, Utkartsh, Prearana Etc.) 08 marks out of 10.
   - Participation in Regional, University, district Level Camp/ Workshop 07 Marks out of 10.
   - Participation in Annual Special camp 06 Marks out of 10.

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UISCC022	Fine Arts	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
UISCC022	Fine Arts	50	40%	-	-	50

Course Description

This course aims at providing students with basic understanding of fine arts skills and knowledge. The main purpose of the subject is to help the students in understanding the basic concept of Art, origin, history, drawing & painting, etc. and how creativity if fostered professionally can result in beautiful designs for today‟s scenario.

Pre-requisites: Basic Drawing & Coloring

Course Objectives

- The knowledge gained with this course will help students to foster creativity and self-expression (basic understanding of color concept and application in relation to different use cases)
- Techniques studied from Visual arts should be used by the students in their respective field to make a more impactful presentation overall. Students will learn to appreciate art in a more critically artistic way.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1: Appreciate**[1] Traditional Indian Art
- **CO2: Understand**[1]fundamentals of Visual Arts.
- **CO3: Implement**[2]creative skills in Drawing & Painting
- **CO4: Create**[3] Various day to day articles in a creative format.

List of Activities

- Performing Secondary RSEEarch on Indian Art forms
- Performing Secondary RSEEarch on Traditional Painting Techniques of India
- Assignment on Elements of Design
- Assignment on Principles of Design
- Assignment on Basics of Drawing
- Assignment on Basics of Painting
- Prepare Commercial Art article

Text Books

1. Ncert ,An Introduction To Indian Fine Arts Part 1 ,National Council of Education Research and Training,2019.
2. Ncert ,An Introduction To Indian Fine Arts Part 2 ,National Council of Education Research and Training,2021.

References

1. Dasgupta, S.N.: Fundamentals of Indian Art
2. Dr. Kurt Herbert ,Artists Technique,

Evaluation Scheme

2. The 50 marks would be evaluate based on the scheme:

Sr.No	Developing Skills at Grade Level	Excellent	Very Good	Good	Satisfactory	Developing
1.	Understanding of Art	10	8	6	4	2
2.	Creativity	10	8	6	4	2
3.	Understanding of Elements	10	8	6	4	2
4.	Understanding of Principles	10	8	6	4	2
5.	The Hand	10	8	6	4	2

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Course Code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UISCC031	Physical Fitness	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
UISCC031	Physical Fitness	50	40%	-	-	50

Course Description

This course provides a execute daily activities with optimal performance, endurance, and strength with the management of disease, fatigue, and stress and reduced sedentary behaviour.

Pre-requisites:

Course Objectives

- The main objectives of physical education are to: develop motor abilities like strength, speed, endurance, coordination, flexibility, agility and balance, as they are important aspects for good performance in different games and sports.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1:** **Reduce**[1] your risk of a heart attacks.
- **CO2:** **Manage**[1] your weight better.
- **CO3:** **Manage**[1] a lower blood cholesterol level and lower the risk of type 2 diabetes and some cancers.

List of Activities

- Endurance
  - 5 Minute run
  - 12Min.RunWalk
- Speed
  - 40 Metre Sprint Test
  - Shuttle Run Test
  - Flying 30 Metre Test
  - Rope Skipping
- Agility
  - Zig-Zag Run
  - „T‟ Drill Test
  - Burpee Test
- Strength
  - Sit-ups
  - Push-up
  - Standing Long
  - Jump Test
  - Bench Press Test
- Flexibility
  - Sit & rich
  - Modified Sit & Reach Test
  - Static Flexibility Test – Shoulder

Text Books

1.Kansal, D. K. Textbook of Applied Measurement Evaluation & Sports Selection, Sports and Spiritual Science Publication, NewDelhi 2008.

2.Lipman, H. A., Measurement and Evaluation in Physical Education, Friends Publication, NewDelhi 2009.

3.Miller,T. NSCA"s Guide to Testand Assessment, Human Kinetics,USA 2012.

References

1.Morrow, J., Jackson, A., Disch, J., & Mood, D. Measurement and Evaluation In human Performance, Human Kinetics.USA 2005.

2.Scott, M. G. & French, E. (2009). Measurement and Evaluation in Physical Education, Sports Educational Technologies, New Delhi 2009.

3.Yobu, A., Test Measurement and Evaluation in Physical Education and Sports.Friends Publication. NewDelhi 2010.

Evaluation Scheme

1. The 50 marks would be evaluate based on the scheme:

Sr. No.	Activity	Marks
1.	Practice and Performance	10
2.	Regularity	10
3.	Discipline	05
4.	Endurance :**Any one activity**	05
5.	Speed : **Any two activity**	05
6.	Agility :**Any two activity**	05
7.	Strength :**Any two activity**	05
8.	Flexibility :**Any two activity**	05
	Total	**50**

Course code	Course Name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
UISCC032	Yoga and Meditation	-	04	-	-	02	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		Semester End Exam (OE/POE)		Total Marks
		Term Work	Min pass	Marks	Min pass	
UISCC032	Yoga and Meditation	50	40%	-	-	50

Course Description

This course provides a form of exercise that uses specific body postures to achieve physical and mental health benefits, while meditation is a practice that can be done with or without movement in order to focus and calm the mind

Pre-requisites:

Course Objectives

- Stilling the mind and gaining insight, resting in detached awareness, and liberation (Moksha) from saṃsāra and duḥkha
- Sense of calm, peace and balance

Course Outcomes: After the successful completion of the course students will able to:

- **CO1:** **Demonstrate**[2] basic skills associated with yoga activities including strength and flexibility, balance and coordination.
- **CO2:** **Demonstrate**[2] the ability to perform yoga movements in various combination and forms.
- **CO3:** **Identify**[1] a new perspective on stressful situations NSS regular activities

List of Activities

- Suryanamaskar
- Standing Asanas
  - Tadasana
  - Trikonasan
  - Padhamasan
  - Ardhachakrasan
  - Vrukashsan
- Sitting Asanas
  - Bhadrasan
  - Vajrasan
  - Utanmandukasan
  - Vakrasana
- Supine Asanas
  - Pawanmuktasan
  - Setubandhasana
  - Ardhahalasan
  - Shavasan
- Prone Asanas
  - Navakasana
  - Bhujangasan
  - Dhanurasana
  - Makrasana
  - Shalbhasana
- Pranayama
  - Bhastrika
  - Kapal Bharti
  - Ujjai
  - Anulom-Vilom
  - Sheetali
  - Bhramari
- Meditation

Text Books

1.Iyengar,B.K.(2008).Light on Yoga.Orient Long man Pvt.Ltd.Mumbai.

2.Iyengar,B.K.(2008).Light on Pranayama. Orient Long man Pvt. Ltd. Mumbai.

3.Iyengar,B.K.(2008).Light on Astanga Yoga.Alchemy Publishers. NewDelhi.

References

1.Iyengar, B.K.(2008).Yoga the Path to Holistic Health. Dorling Kinders ley.London.

2.Gharote, M. L. (2013). Guidelines for Yogic Practices. The Lonavla Yoga Institute. India.

Evaluation Scheme

2. The 50 marks would be evaluate based on the scheme:

Sr. No.	Activity	Marks
1.	Practice and Performance	10
2.	Regularity	10
3.	Discipline	05
4.	Suryanamskar : **Compulsory**	05
5.	Standing & Siting asanas: **Any two**	05
6.	Supine & Prone asanas : **Any two**	05
7.	Pranayama :**Any two**	05
8.	Mediation	05
	Total	**50**

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