

DEPARTMENT OF MECHANICAL ENGINEERING
FACULTY OF TECHNOLOGY AND ENGINEERING
THE M S UNIVERSITY OF BARODA

UG TEACHING SCHEME

BE - CRS AEROSPACE ENGINEERING

BE-I CRS (AEROSPACE ENGINEERING)											
Semester	Sub Code Theory	Sub Code TW/Viva	Subject Name	Teaching Scheme				Examination Scheme			
				L	T	P	Credit	Theory		Practical	
								IA	UA	IA	UA
FS BE-I	AMT1116CS	---	Calculus	3	1	0	4		100		
	MME1112CS	---	Material Science and Metallurgy	3	0	0	3		100		
	APH1113CS	APH1113LCS	Applied Physics	3	1	2	5		100		50
	MEC1125CS	---	Engineering Thermodynamics	4	0	0	4		100		
	CVL1117CS	CVL1117LCS	Fundamentals of Civil and Environmental Engineering	3	1	2	5		100		50
	ELE1102CS	ELE1102LCS	Basic Electrical and Electronics Engineering	3	0	2	4		100		50
	FTE1101CS	---	Universal Human Values I	1	0	0	0		50		
Total (Semester 1)				20	3	6	25				
SS BE-I	AMT1220CS	---	Linear Algebra and Vector Calculus	3	1	0	4		100		
	ENG1002CS	ENG1002LCS	Communication Skills	2	0	1	2.5		50		50
	APM1216CS	APM1216LCS	Applied Mechanics	3	1	2	5		100		50
	MEC1220CS	MEC1220LCS	Introduction to Aerospace Engineering	4	0	2	5		100		50
	MEC1219CS	MEC1219LCS	Engineering Drawing	3	0	4	5		100		50
Total (Semester 2)				15	2	9	21.5				
TOTAL (YEAR 1)							46.5				

L = Lecture in Hrs per week
T = Tutorial in Hrs per week
P = Practical/Lab Hrs per week
UA = University Assessment
IA = Internal Assessment

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.E.-Aerospace Engineering

PSO1 Apply fundamentals of design, thermo-fluids and production engineering knowledge for innovative and critical thinking, problem-solving and Experimental skills with integrity and inclusivity in professional engineering practice or business.

PSO2 Achieve further career development through graduate education, professional development courses and/or on-the-job training and experience.

PSO3 Develop leadership and collaborative roles in their careers.

Programme Outcome (PO)

PO1 Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO9 Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Applied Mathematics		Academic Year		2022-23					
BE-I Aerospace Engineering										
Year	I	Core / Elective / Foundation CALCULUS (AMT1116CS)	Credits / Hours per week				03(L) + 01(T)= 04			
Semester	I	Year of Introduction: 2021-2022	Maximum Marks / Grade				100			
Mode of Transaction		Lecture and Tutorial								
Course Outcome (CO) (AMT1114CS)										
CO1 Evaluate successive differentiation of given function and solve identities involving higher order derivatives, evaluate radius of curvature, obtain Taylor & McLaurin series expansion of function of single variable. Evaluate limits of indeterminate forms.										
CO2 Test for convergence series using various tests like comparison test, ratio test. Also find the convergence, absolute and conditional convergence for alternating series.										
CO3 Apply the concept of surfaces and level curves in solid geometry which helps in solving various application of engineering.										
CO4 Understand and implement the methods of curve tracing in two – dimensional space.										
CO5 Understand and apply the concept of multivariable functions, its differentiability concept and applications of partial derivatives in various engineering problems.										
CO6 Understand the requirement of complex numbers their various representations, De’Moivre’s theorem and its applications. Logarithm of complex numbers. Evaluate and use circular functions, hyperbolic functions.										
CO7 Understand a given complex valued function and determine whether it is differentiable, analytical, harmonic, and harmonic conjugate.										
Unit No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/	Relevance to Local (L)/ National (N)/ Regional	Relation to Gender (G), Environment and Sustainable

							Skill Develop ment (SD)	l(R)/Glo bal (G)	bility (ES), Human Values (HV)an d Professi onal Ethics (PE)
1	Functions of one variable Reorientation, Successive differentiation, Leibnitz rule for the nth order derivative of a function, Mean value theorems, Curvature, Indeterminate forms. Convergence and divergence of infinite series, Geometric series, P – Series, Necessary condition for convergence, Comparison test, ratio test, Absolute convergence and conditional convergence of alternating series, Taylor's expansion of functions.	14	29	1, 2, 3, 5	CO1 CO2	PO1 PO2	Emp, SD	G	PE
2	Analytical geometry: Reorientation of solid geometry, Surfaces and Conicoids, Curvilinear Coordinates (polar, cylindrical and spherical), Curve tracing: Cardioid, Cycloid, Lemniscates, Spirals and Four leaves rose. Level curves, Geometrical interpretation of function of two variables.	8	17	1, 2, 3, 4, 5	CO3 CO4	PO1 PO2			
3	Functions of Several Variables: Limit, Continuity and partial differentiation of function of two variables, Geometrical interpretation of partial derivatives, Higher order partial derivatives, Partial differentiations of composite functions, Euler's theorem on homogeneous functions. Applications of partial derivatives:	12	25	1, 2, 3, 4, 5	CO5	PO1 PO2			

	Tangent plane and normal line, Taylor's expansion, Error & approximation, Maxima and minima, Lagrange's multiplier method								
4	Function of complex variables: Reorientation of complex numbers, polar form of complex numbers, Curves and regions in complex plane, De'Moivre's theorem, Elementary functions. Limit, continuity and differentiability of functions of a complex variable, Cauchy-Riemann Equations, Necessary and sufficient conditions for differentiability, Analytic functions, Harmonic functions and applications to complex heat potential.	14	29	1,2,3,4,5	CO6 CO7	PO1 PO2			

Reference Books

1.	B. V. Ramana	Higher Engineering Mathematics, Tata Mc. Graw – Hill. (Core Engineering Series), 2006.
2.	C. R. Wylie	Advanced Engineering Mathematics, Mc. Graw – Hill Inc., 1986
3.	David V. Widder	Advanced Calculus, Prentice Hall of India Pvt. Ltd., 1986.
4.	Erwin Kreyszing:	Advanced Engineering Mathematics, (6th edition) Johnwiley&Sons.,1988
5.	G. B. Thomas, R. L. Finney	Calculus and Analytic Geometry, Addison-Wesley Publishing Co., 2010
6.	Gordon Fuller	Analytic Geometry, Addison-Wesley Pub.Com.Inc.1954
7.	J. W. Brown, R.V. Churchill	Complex variables and Applications, McGraw-Hill Higher Education, 2013.
8.	P. V. O'Neil	Advanced Engineering Mathematics, Cengage Learning (India edition), 1991.
9.	Shantinayakan	Differential Calculus, S. Chand & Co. New Delhi.

Bloom's Taxonomy Levels:

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Programme Name: BE (Aerospace Engineering)**Programme Specific Outcome (PSO)** Graduate will be able to,

- PSO1 Apply knowledge of material sciences, metallurgical engineering and material technology in identifying and providing appropriate solution for metallurgical and materials industries.
- PSO2 Design, optimize various metallurgical and materials engineering processes to develop quality and cost effective products
- PSO3 Build successful career in design, development, manufacturing and process control of metallurgical and materials engineering industries.
- PSO4 Acquire their knowledge in the domain of different metal and materials working and testing to undertake the challenges of the related industries
- PSO5 Manage proficiency and necessary skills to take up entrepreneurial Venture.
- PSO6 Serve to the needs of metallurgical and materials engineering Industry and the Nation.
- PSO7 Get platform to design and create prototypes with changing demands of the metallurgical and materials engineering fields through various research and development.
- PSO8 Develop the right attitude in the metallurgical and materials engineering field so that they become an employable or to pursue higher studies

Programme Outcome (PO) : Engineering Graduates will be able to:

- PO1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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Syllabus of Course: Materials Science and Metallurgy

		The Maharaja Sayajirao University of Baroda Faculty of Technology and Engineering Department of Metallurgical and Materials Engineering		Academic Year			2022-2023			
SS of BE-I Aerospace Engineering										
Year	I	Core / Elective / Foundation : Code: MME1112CS Subject Name : Materials Science and Metallurgy			Credits / Hours per Week			03 (Theory)		
Semester	I	Year of Introduction :			Maximum Marks / Grade			100 (Theory)		
Mode of Transactions				Lectures and Tutorials						
Course Outcome (CO) / MME1111CS CO-1: Understanding of materials, its Structure and their classification CO-2: Learning Mechanical, Electrical And Magnetic properties and behavior of these properties on engineering materials. CO-3: Study of phase, phase diagram and defects in materials. CO-4: Learning about various types of materials & advanced materials. CO-5: Understanding briefly about corrosion & its protection methods.										
Unit No.	Topic/Unit		Contact Hours	Weightage (%)	^[1]BT Level	CO	PSO	^[2]Elements of EMP/ENT/SD	^[3]Relevance to L/R/N/G	^[4]Relation to GN/ES/HV/PE
1	Introduction of Engineering Materials Metalica Materials, Ceramic Material, Polymers, Composite and Nano-materials.		02	10%	1/2/3/4	CO1	PSO8	SD	G	ES
2	Crystal Structure		06	20%	1/2/3/5	CO2	PSO2	SD	G	ES

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Text Books or Reference Books:	
1.	Askeland D.R., & P. P. Fullay (2007), The Science and Engineering of Materials –4th Cengage Learning Publishers
2.	William D. Callister, Jr (2008), Callister’s Materials Science and Engineering, (Adopted by R. Balasubramaniam) Wiley-Eastern
3.	A.S. Edelstein and R.C. Cammarata Ed.(1998), Nano Materials: Synthesis, Properties and Applications, Inst. Of Physics Publishing, UK

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	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Applied Physics		Academic Year		2022-23					
B.E. (Civil, Mechanical, Civil -Irrigation and Water Management, Aerospace Engineering): Regular Programme										
Year	I	Core / Elective /Foundation APH1113CS: Applied Physics	Credits / Hours per week		(credits (03 –Lecture, 01-Tutorial, 02 - Practical)					
Semester	I	Year of Introduction: 2022 Year of Syllabus Revision: 2022	Maximum Marks / Grade		100 (Theory) + 50 (Practical)					
Mode of Transaction		Lectures/ Tutorials/Practical:: 03:01:02								
Course Outcome (CO) APH1110CS CO1 Understand the basics of laws governing physical world CO2 Understanding the basics of solar photo voltaic system CO3 Understanding the basics of sound and electromagnetic waves CO4 Application of physical laws in various engineering applications										
UnitNo.	Topic/Unit		Contat Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)

1.	Electromagnetic Waves: Basic laws and equations. Application for devices and instrumentation, Microscopes, Telescopes and camera, Resolution and magnifications, Optical vibration and correction.	09	23	1,2	CO1 CO3 CO4	PSO1 PSO2	Emp. Ent	L, N, R, G	ES
2.	LASER and Matter Waves: Fundamentals, Generation, Spontaneous and stimulated emission, conditions for lasing action, population inversion, Types and Engineering applications – Laser and electron beam machining and other instruments	08	21	1,2	CO1 CO4	PS O1 PS O2	Emp. Ent	L, N, R, G	ES
3.	Sound Waves: Sound waves characteristic and properties, Velocity, frequency, wavelength, intensity, loudness (expression), timber, reflection, echo, reverberation. Sabine's formula, remedies over reverberation; Absorption of sound, absorbent materials; Criteria for good acoustics of a building; Ultrasonic: Production of ultrasonic waves, Detection of ultrasonics; Engineering applications of Ultrasonics (Non-destructive testing, Infrasound – Seismology (concept only))	09	23	1,2,3,4	CO1 CO3	PSO 1 PSO 2	Emp. Ent	L, N, R, G	ES
4	Solar cells Principle of working, conversion efficiency, Single, multi-junction solar cells, Photovoltaic system engineering, Thermo-photovoltaic generation in electricity, Concentration and storage of electrical energy, Photovoltaic – systems and applications	09	23	1,2,3,4	CO1 CO2	PS O1 PS O2	Emp, Ent	L, N, R, G,	ES
5.	Introduction to physics of Buildings Heat transfer and air circulation in buildings, effects of thermal expansion	04	10	1,2,3,4	CO1 CO3 CO4	PS O1 PS O2	Emo, Ent	L, N, R, G,	ES

Suggested Reference Books:

- | | |
|----|---|
| 1. | Engineering Physics: by R. K. Gaur and S. L. Gupta, Dhanpat Rai Publications (P) Ltd. 8 th Edition. |
| 2. | Modern Engineering Physics: by A. S. Vasudeva, S. Chand and Company Ltd. |
| 3. | Fundamentals of Physics: by D. Halliday, R Resnick and J. Walker, Asian Books Pvt. Ltd. 8 th Edition |
| 4. | Building Physics: Heat, Air and Moisture, 3 rd edition, Hugo S. L. Hens, Wiley |
| 5. | Stephen J. Fonash, “Solar Cell Device Physics”, 2 nd edition, Academic Press, 2003. |

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No.	Experiment							
1	Microscope: - To determine the average separation between consecutive wires of a given grid using travelling Microscope	02	1,2	CO1, CO2	PSO1, PSO2	SD	G	PE
2	Telescope: - To determine the resolving power of given Telescope using Raleigh Criteria of Resolution	02	2	CO1 CO2	PSO1, PSO2			
3	Frequency of AC Mains: To determine the frequency of A. C. Mains	02	2,3	CO3 CO4	PSO1, PSO2			
4	Sound Waves: To determine the velocity of sound wave in air using resonance tube	02	3,4	CO4	PSO1, PSO3			
5	Ultrasonic Waves: To determine the frequency of Ultrasonic waves and find out the velocity of Ultrasonic wave in air by using the interference theory of longitudinal wave.	02	2,3	CO1 CO2	PSO1, PSO4			
6	Solar Cell: Study of I-V characteristics and determine the various parameters of given solar cell	02	2,3	CO4	PSO1, PSO3			
7	Laser Parameters: To determine the full angular divergence of the given gas laser	02	3,4	CO4	PSO1, PSO3			
8	Wavelength of Laser: To determine the wavelength of the given laser source using diffraction	02	3,4	CO4	PSO1, PSO3			
9.	Temperature Sensor: To study the nature of different temperature (NTC/PTC/Pt-100)	02	4,5	CO1	PSO1, PSO3			
10.	Young's Modulus: To determine the Young's Modulus of a given object	02	4,6	CO1	PSO1, PSO3			
	References							
1.	Engineering Physics, R.K.Gaur and S.L.Gupta Dhanpatrai Publication Ltd. 8th Edition							
2.	Fundamentals of Physics, D.Haliday, R.Resnik and J.Walker Asisan Books Pvt Ltd, 8th Edition							
3.	Practical Physics, C.L.Arora S.Chand Publications							

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Mechanical Engineering.		Academic Year	2022-2023						
B. E. (Aerospace Engineering): Regular Programme										
Year	I	Core / Elective / Foundation MEC1125CS : Engineering Thermodynamics	Credits / Hours per week				Lectures: 04 Practical/Lab: NIL			
Semester	I	Year of Introduction: Year of Syllabus Revision: 2021	Maximum Marks / Grade				Theory: 100 PR/TW/VIVA: NIL			
Mode of Transaction: Lectures										
Course Outcome (CO) MEC1110CS CO1 Understand basic terms used in thermodynamics. CO2 Relate the laws of thermodynamics to engineering systems and its applications. CO3 Concepts of improving the performance of a system by reducing the irreversibility. CO4 Understand the relation between different thermodynamic properties and mathematical equations CO5 Comparison of real cycles with ideal cycle										
Unit No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/	Relevance to Local (L)/ National (N)/ Regional	Relation to Gender (G), Environment and Sustainable

							Skill Develop ment (SD)	l(R)/Glo bal (G)	bility (ES), Human Values (HV)an d Professi onal Ethics (PE)
1	Basic Concepts and definitions Systems and surroundings, control mass and control volume, thermal equilibrium, energy, various forms of energy, work and heat, Process and cycles, point function and path function, thermodynamic properties, Pure substance, P-V-T surfaces for pure substances, Ideal gas and real gas behavior and equations of state, ideal gas mixtures	04	8	1, 2	CO1	PO1			
2	Thermodynamic Laws Zeroth law of thermodynamics and measurement of temperature First law analysis of closed systems, first law applied to flow processes, steady flow energy equation (SFEE)., application of steady flow energy equation, Heat engine and efficiency, Heat pump and COP, Kelvin-Plank and Clausius statement of second law of thermodynamics, equivalence of the two statements	10	21	1,3,4	CO2	PO2			
3	Irreversibility, Entropy and Availability: Reversibility and Irreversibility, Carnot cycle and theorem, Clausius Inequality, Entropy, law of increase of entropy of the universe, entropy change for closed and open systems, Exergy and exergetic (second law) efficiency	10	21	2, 3, 5	CO3	PO3			
4	Thermodynamic Relations Equations of state, Maxwell relations, thermodynamic relations involving internal energy, enthalpy and entropy, Clausius-Clapeyron equation, Joule-Thompson coefficient.	10	21	1, 2, 6	CO4	PO3, PO4			
5	Steam Generators Basics of fire tube and water tube boilers, properties of steam, use of steam tables	04	8	2, 3	CO1	PO5			

6	Gas and Vapor power cycle Basics of Rankine cycle, otto cycle, diesel cycle, Brayton Cycle, Vapour compression refrigeration cycle, Absorption refrigeration cycle.	10	21	2, 3, 4	CO1, CO5	PO6			
Reference Books									
1.	Moran and Shapiro, Fundamentals of Engineering Thermodynamics, 5th Ed., Jhon Wiley & Sons, 2006								
2.	Sonntag, Borgnakke and Van Wylen, Fundamentals of Thermodynamics, 6th Ed, Jhon Wiley & Sons, 2003								
3.	P.K Nag, Engineering Thermodynamics, McGraw Hill Education Private Limited, 2013.								
4.	Y. A, Cengel and M. A Boles, Engineering Thermodynamics, TATA McGraw Hill, 2004.								
5.	C, P, Kothandaraman, P. R. Khajuria and S. Domkundwar, A Course in Thermal Engineering, Dhanpat rai & Sons, 2004.								

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Civil Engineering	Academic Year	2022-23							
B. E. ((Civil, Mech., Elec., Chem., Met. & Mat Sci., Electronics, IWM, Comp. Sc. & Engg., Text.Engg., Text.Tech, Text. Processing, Aerospace Engineering)										
: Regular Program										
Year	I	Core / Elective / Foundation CVL1117CS : FUNDAMENTALS OF CIVIL and ENVIRONMENTAL ENGINEERING (REVISED)	Credits / Hours per week							3-1-2
Semester	I	Year of Introduction: 2018 Year of Syllabus Revision: 2019	Maximum Marks / Grade							100
Mode of Transaction		Lectures: 3 Tutorial :1								
Course Outcome (CO) CVL1112CS										
CO1 To impart brief fundamental concept related to various materials and their use in building construction										
CO2 To study environmental pollution comprehensively and										
CO3 Students will know concept of linear and angular measurements										
CO4 Students will be aware of various constructional practices										
Unit No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Emp, Ent, SD	Relevance to L,N,R,G	Relation to G, ES,HV

									(PE)
1	Building Material Stone - Introduction to stone – Uses of stone – Characteristics of good building stone – Availability, suitability and properties of different stone. Bricks - Comparison between stone work and brick work – Advantages of bricks – Characteristics of good brick – Standard test for brick along with field test for brick. Lime - Classification of Lime, Precautions in handling Lime. Cement - Basic ingredient of ordinary cement – Physical properties of cement – Field examinations of cement – Storing of cement and its uses. Timber - Introduction to timber – Importance of seasoning – Wood base product. Steel - Introduction – Use of different form of steel – Marketable forms of steel. Aggregates. Bitumen. FRP. Optical fiber. Plastic - Properties of plastics – Types and uses of plastic.	12 hrs	25	2,3	CO1	PSO2			
2	Environmental Science and Sustainable Development Introductory Environmental Engineering Terminology— Introduction to various types of pollution- Water and land pollution and remedial measures for control, water and wastewater quality criteria – Disposal of wastes – Air pollution and remedial for control – Ecology, Environmental Protection and legislation. Hydrologic cycle, Rain water harvesting, Green building, Solid waste management, Environment Impact Assessment, Basic environmental chemistry, Sustainable development – clean development mechanism, Global warming, Ozone layer depletion, Acid rain, and Climate change.	12 hrs	25	2,3	CO2	PSO2	(Emp), (Ent) , (SD)	(L), (N), (R), (G)	(ES) , (PE)
3	Surveying and Leveling Surveying - Introduction – Principle – Object of survey – Classification – Basic instruments of linear and angular measurements – chain, tape, Offsetting, Types of offsets, Ranging methods. Prismatic compass, Types of meridians, Types of bearings. Traverse survey: open and closed Examples based on compass. Leveling – Definitions – Computation of reduced levels– Introduction to contour, Methods of leveling and Examples on Level. Modern tools: Introduction to Theodolite, Total station – Introduction to GPS, GIS, Remote sensing.	14 hrs	30	2, 3, 4, 5	CO3	PSO 1 PSO 2			

4	Building Construction Building Construction & Infrastructures: Types of constructions – roads, pipelines, transmission lines – Typical details of load bearing and framed structures – Brief discussion and illustrational sketches of typical important building components – Foundation – Functions, Types of foundations such as Spread footing, Stepped footing, Isolated and Combined column footing, Raft, and Grillage foundation. Lintels – Function, Types of lintel. Flooring, Roofing. Mortar and concrete specifications – Ingredients for mortar and concrete – classification of mortar and concrete – selection of mortar and its uses – precaution in using mortar – Pre-stressed concrete – grades of concrete, Internet of things for buildings, Hydropower plants.	10 hrs	20	1, 2, 3	CO4	PSO 1 PSO 2			
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		The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Civil Engineering			Academic Year		2022-23		
B. E. (Civil, Mech., Elec., Chem., Met. & Mat Sci., Electronics, IWM, Comp. Sc. & Engg., Text.Engg., Text.Tech, Text. Processing, Aerospace Engineering.)									
: Regular Program									
Year	I	Core / Elective / Foundation CVL1117LCS : FUNDAMENTALS OF CIVIL and ENVIRONMENTAL ENGINEERING (REVISED) : Field Practical			Credits / Hours per week		02		
Semester	I	Year of Introduction: 2018 Year of Syllabus Revision: 2019			Maximum Marks / Grade		50		
Course Outcome (CO) CVL1112LCS CO1 To impart brief fundamental concept related to various materials and their use in building construction CO2 To study environmental pollution comprehensively and CO3 Students will know concept of linear and angular measurements CO4 Students will be aware of various constructional practices									
Mode of Transaction		Practical's, discussion and viva			PSO1 is common for all experiments				
No.	Experiment				Contact Hours	Course Code	BT Level	CO	PSO
1	Conventional signs and symbols, scale, topographic-sheet				2		1,2,3	CO3	PSO1
2	Linear measurements: tape, ranging, offsets				4		2,3	CO3	PSO1
3	Compass: Introduction, Bearings				2		2,3,4	CO3	PSO1
4	Auto level: Introduction, HI, Rise and fall				6		2,3,4,5	CO3	PSO1
5	GPS : Introduction, and demonstration				2		2,3,4	CO3	PSO1

6	Theodolite and Total Station demonstration	6		2,3,4,5	CO3	PSO1
7	Any other term-work based on syllabus	2		1,2	CO1 CO4	PSO1, PSO2

Reference Books

1	Arora S.P. and Bindra S.P. (2012), A text book of Building Construction, Dhanpatai and Sons, Publishers.
2	Rangwala S.C. (2012), A text book of Building Construction, Charotar Publishing House, India.
3	Gilbert M Masters, (2006), Introduction to Environmental Engineering & Science, Prentice Hall of India Pvt. Ltd. New Delhi
4	Deshpande P.D., (2009) Basic Civil Engineering, Nirali Prakashan Pune.
5	G.S.Birdie, Water supply & Sanitary Engg., Dhanpatrai & Sons.
6	S.C.Rangwala, Engg. Materials, Charotar Books Staff, Anand.
7	Janardan Jha Building Material
8	Surendra Singh, Building Material, Vikas Pub. Pvt. New Delhi.
9	D.N.Ghose, Material of Construction, Tata McGraw Hill Pub. Co. Ltd. New Delhi
10	Surveying & Levelling – Kanetkar & Kulkarni Vol-I A.V.G. Prakashan, Puna.
11	Elementary Survey – B.C.Punmia Vol-I. Laxmi Pub. Dariya Gunj, New Delhi.
12	Surveying & Levelling – S.C.Rangwala, Charotar Pub. House, Anand.

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.E.-Aerospace Engineering

PSO1 Apply fundamentals of design, thermo-fluids and production engineering knowledge for innovative and critical thinking, problem-solving and Experimental skills with integrity and inclusivity in professional engineering practice or business.

PSO2 Achieve further career development through graduate education, professional development courses and/or on-the-job training and experience.

PSO3 Develop leadership and collaborative roles in their careers.

Programme Outcome (PO)

PO1 Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Mechanical Engineering		Academic Year		2022-23					
B E (Aerospace Engineering): Regular Programme										
Year	I	Core / Elective / Foundation ELE1102CS: Basic Electrical and Electronics Engineering	Credits / Hours per week				03 + 02			
Semester	I	Year of Introduction: 2022 Year of Syllabus Revision: NIL	Maximum Marks / Grade				100 + 50			
Mode of Transaction		Lectures and Laboratory								
Course Outcome (CO) (ELE1101CS) CO1 Evaluate the Electric AC and DC Circuits CO2 Explain Magnetic Circuit fundamentals CO3 Analyze various electrical machines CO4 Analyze dc circuits and ac circuits of semiconductor devices with their physical Operation CO5 Apply the knowledge of electronics devices , biasing and circuits CO6 Explain various forms of numerical representations in digital logic and carry out arithmetic operations										
Unit No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional(R)/Global (G)	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Profession

[illegible]

3.	Problems in Electrical Engineering By Parkersmith
4.	Electrical and Electronics Technology by Edward Hughes
5.	Integrated Electronics: Millman & Halkias
6.	Electronic Devices and Circuits: Applied Electronics: G. K. Mittal
7.	“Op-Amps and Linear Integrated Circuits” by Ramakant A Gayakwad
8.	Electronic Devices and Circuit Theory: by Robert Boylestad and Louis Nashelsky
9.	“Digital Logic and Computer Design” by M Morris Mano

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

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Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

Programme Name: B.E.- Aerospace Engineering

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	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Applied Mathematics		Academic Year		2022-2023					
BE-I Aerospace Engineering										
Year	I	Core / Elective / Foundation AMT1220CS: Linear Algebra & Vector Calculus		Credits / Hours per week			03(L)+01(T)= 04			
Semester	II	Year of Introduction: 2022-23		Maximum Marks / Grade			100			
Mode of Transaction		Lecture and Tutorial								
Course Outcome (CO) (AMT1215CS) CO1 Implement various concepts of matrices in engineering problems and able to solve system of linear equations using matrices. CO2 Understands the Double, Triple integrations and can apply it appropriately, to evaluate Volume, Mass, Area, C.G. and M.I. CO3 Understand and know the properties of the improper integrals viz. Gamma, Beta, Error. Be aware and use them in problem evaluation. CO4 Able to focus on understanding and applications of gradient, curl and divergence in engineering problems. CO5 Understands the concept of different types of line integrals with evaluation techniques. CO6 Through various integral theorems, understands the relationships between various kinds of multiple integrals, line integral and apply These concepts in solving engineering problems related to area, mass volume, flow problems, work done etc. CO7 Able to understand and apply the concepts of Laplace transform to find out transform and inverse transforms for various functions.										
Uni t No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	Elemen ts of Employ ability (Emp)/ Entrepre neurship (Ent)/ Skill Develop	Relevan ce to Local (L)/ National (N)/ Regiona l(R)/Glo bal (G)	Relatio n to Gender (G), Environ ment and Sustaina bility (ES), Human

							ment (SD)		Values (HV) and Professional Ethics (PE)
1	Matrices: Reorientation of Matrices, Rank of a matrix (by row echelon form and normal form), solution of homogeneous and non – homogeneous systems of linear equations, Eigen values and Eigen vectors of a matrix, Cayley – Hamilton theorem. Special matrices: Hermitian, skew Hermitian, orthogonal and unitary matrices.	12	25	1, 2, 3, 5	CO1	PO1 PO2	Emp, SD	G	PE
2	Improper Integrals & Multiple Integrals: Improper integrals, Gamma and Beta functions and their properties, Error functions and its properties. Reorientation of concept of integrals, double and triple integrals, Evaluation techniques, change of order of integration, Integrals in polar and cylindrical coordinates, transformation of multiple integrals, Application of double and triple integrals for evaluation of area, volume and mass.	14	29	1, 2, 3, 4, 5	CO2 CO3 CO6	PO1 PO2			
3	Vector Calculus: Scalar and vector fields, gradient of a scalar field, directional derivatives, divergence and curl of a vector field and their applications. Line integrals, Green's theorem, Surface integrals, Stoke's theorem, Volume integrals, Gauss divergence theorem.	12	25	1, 2, 3, 4, 5	CO4 CO5 CO6	PO1 PO2			
4	Laplace Transform: Existence of Laplace transform, Laplace transforms of elementary functions, inverse Laplace transforms, linearity property, first and second shifting theorem, Laplace transforms of derivatives and integrals, Laplace transform of Dirac delta function, unit step function, and convolution theorem.	10	21	1, 2, 5	CO7	PO1 PO2			

Reference Books		
1.	B. V. Ramana	Higher Engineering Mathematics, Tata Mc. Graw – Hill. (Core Engineering Series), 2006.
2.	C. R. Wylie	Advanced Engineering Mathematics, Mc. Graw – Hill Inc., 1986
3.	David V. Widder	Advanced Calculus, Prentice Hall of India Pvt. Ltd., 1986.
4.	Erwin Kreyszing	Advanced Engineering Mathematics, (6th edition) John Wiley & Sons.,1988
5.	G. B. Thomas, R. L. Finney	Calculus and Analytic Geometry, Addison-Wesley Publishing Co., 2010
6.	H. Schneider, G. Phillip Barker	Matrices and Linear Algebra, Dover Publications Inc, New York, 1973.
7.	P. V. O’Neil	Advanced Engineering Mathematics, Cengage Learning (India edition), 1991.

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Civil Engineering					Academic Year		2022-23	
S.S. <u>B E – I</u> All branches of Engineering									
Year	I	Core / Elective / Foundation ENG1002CS: COMMUNICATION SKILLS				Credits / Hours per week		2+0+2	
Semester	II					Maximum Marks / Grade		50+50=100	
Mode of Transaction		Lectures, and Practicals							
Course Outcome (CO) ENG1002CS COMMUNICATION SKILLS CO1 To know the process of communication and its components. CO2 To improve the language skills i.e. Listening Skills, Speaking Skills, Reading Skills and Writing Skills (LSRW). CO3 To effectively Conduct meetings and conferences CO4 To enhance phonetic competence, comprehension skills, presentation skills, group discussion skills etc. CO5 To build confidence for communicating in English and create interest for the life-long learning of English language.									
Unit No.	Topic	Contact Hours	Weight age (%)	BT Level	CO	PSO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional(R) /Global (G)	Relation to Gender(G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Communication skills: Process of communication, Flows of Communication in organization, Barriers to communication (Formal Flow – Upward, Downward, lateral and diagonal, Strategies to improve Organizational Communication, Effectiveness in Managerial Communication, and importance of technical communication, Non verbal communication.	04	15%	1,2,	1	1	SD	G	ES
2	Listening Ability, Hearing and Listening, Types of Listening, Barriers to Effective Listening,	04	15%	1,2,3	2	1	SD	G	ES

	Traits of a Good Listener.								
3	Presentation Skills and Writing skills: Effective Presentation strategies: Purpose, analyzing the audience and locale, organizing the content, Oral presentation, Graphic presentation, Presentation aids, Personality Development. Newsletters, technical article and business letters. Technical Reports, characteristics, Importance, objectives, categories of report, format structure of reports, types of reports, importance of plagiarism check.	10	40%	1,2,3	3,4	1	SD	G	ES
4	Group Discussion and work place communication: Qualities needed for effective group discussion. Email etiquettes, Telephone Etiquettes, Role and responsibility of engineer, Work culture in jobs. Work place, rights and responsibilities	04	15%	1,2,4	4	1	SD	G	ES
5	Interviews and meetings: Types of interview, General preparation for interview, Gathering information about the company, knowing about the role/job position, Types of interviewing questions, Non-verbal communication to win the interview. Meeting and Conferences: Planning a meeting (Agenda and notice), Conducting a meeting, Post meeting actions (Minutes), Planning & Conducting a Conference (anchoring and Report writing), and Video/web conferences	04	15%	1,2,3	3,4	1	SD	G	ES

T.W./ Pr.	Termwork / Practicals shall be based on above syllabus.
REFERENCES	
1.	G,S,B,K Babu Rao, “Business Communication and Soft Skill”, Himalaya Publishing house (1stEdition)
2.	Raman Sharma, “Technical Communications”, Oxford Publication, London, 2004
3.	Sharma, R. and Mohan, K. “Business Correspondence and Report Writing”, TMH New Delhi2002.
4.	Kumar S and Lata P Communication Skills 2011: New Delhi Oxford University Press

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Applied Mechanics		Academic Year	2022-23
B.E. (Mechanical): Regular Program				
Year	I	Core / Elective / Foundation APM1216CS: APPLIED MECHANICS	Credits / Hours per week	3+1+2
Semester	II	Year of Introduction: Year of Syllabus Revision: 2010,2022	Maximum Marks / Grade	100+50=150
Mode of Transaction		Lectures		
Course Outcome (CO) APM1208CS Students will be able to... CO 1: Apply concept static equilibrium in evaluation of unknown quantities, friction application and support reactions. CO 2: Analyze plane and space truss and apply for design of truss. CO 3: Evaluate center of gravity and moment of inertia which enables to find deflection in beams. CO 4: Illustrate theory of lifting machines and tooth gearing, power transmission in belts. CO 5: Determine kinetics and kinematics force acting on a body, work, power and energy, impulse and momentum. CO 6: Evaluate elastic properties and stresses in the materials.				

Unit No.	Topic/Unit	Contact Hours	Weightage (%)	BT Level	CO	PS O	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional (R)/ Global (G) developmental needs	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV) and Professional Ethics (PE)
1	Statics: Introduction, forces and force systems Introduction to the subject of applied mechanics and its various branches. SI units, coplanar, concurrent and non-concurrent force systems, resultant and resolutions, forces in space, moment of force, varignon's theorem, couple and its properties. Concentrated and uniform loads, equilibrium of a particle. External & internal forces, equilibrium of rigid body, types of supports. Structural members and beams, reactions of beams, determinateness. connected bodies, two force and three force members. Trusses, method of joint, method of section, space frames.	13	25	1,2,3,4,5	CO1, CO2	PS O1 2	SD,EMP	G	ES

2	Center of gravity, moment of inertia and static friction: Centre of gravity, centroids of composite areas, built-up sections, product of inertia, mass moment of inertia. Types of friction, equilibrium on rough inclined plane, wedge and screw friction.	13	25	1,2,5	CO1, CO3	PS O 1 2			
3	Statics: Transmission of power: Theory of lifting machine, basic machines, linear law, belt drive, velocity ratio, compound belt drive, length of belt. Transmission of power, gearings, train of wheels, epicyclic gearing, speed reduction gear, differential types of gear.	13	25	2,3,4,5	CO4	PS O1			
4	Dynamics and elastic properties of materials: Review of kinematics of a particle, force, mass and acceleration, rectilinear and curvilinear motion, D'Alembert's principle. Work, power and energy, impulse and momentum, equations of motion, translation and fixed axis rotation, problems involving friction. Simple stresses and strains, hook's law, elastic limit, ultimate stress, factor of safety, lateral strain, poisson's ratio, stress concentration, temperature stress, simple shear, elastic moduli relations.	13	25	1,2,3,4,5	CO1, CO5, CO6	PS O1			
Reference Books									
1.	Applied Mechanics by S. B. Junnarkar and H. J. Shah, Charotar Pub.								
2.	Engineering Mechanics by Meriun and Kraige, John Wiley & Sons.								
3.	Vector Mechanics by Beer and E. R. Johnstons, McGraw-Hill Book Co.								
4.	Engineering Mechanics by Huges and Martin, E.L.B.S. and Macmillan.								
5.	Engineering Mechanics by R. S. Kumar.								

		The Maharaja Sayajirao University of Baroda			Academic Year		2022-23		
		Faculty Technology and Engineering							
		Department of Applied Mechanics							
B.E. (Aerospace Engineering): Regular Programme									
Year	I	Core / Elective / Foundation			Credits / Hours per week		01/02		
		APM1216LCS: Laboratory Practical & Graphics							
Semester	II	Year of Introduction: Year of Syllabus Revision: 2010,2022			Maximum Marks / Grade		50		
Mode of Transaction		Laboratory Experiments, Graphics, discussion and viva			is common for all experiments				
No.	EXPERIMENT				Contact hours	%weightage	BT Level	CO	PSO
1	LAW OF PARALLELOGRAM OF FORCES				2	5	2,3	CO1	PSO1,2
2	LAW OF POLYGON				2	5	2,3	CO1	PSO1,2
3	SIMPLE BEAM				2	5	2,3	CO1	PSO1,2
4	JIB CRANE				2	5	2,3	CO2	PSO1,2
5	THEORY OF LIFTING MACHINE				2	5	2	CO4	PSO1,2
6	ROPE AND PULLEY BLOCK				2	5	2,3	CO4	PSO1,2
7	SCREW JACK				2	5	2,3	CO4	PSO1,2
8	DIFFERENTIAL AXLE				2	5	2,3	CO4	PSO1,2

9	WORM AND WORM WHEEL	2	5	2,3	CO4	PSO1,2
10	MOMENT OF INERTIA OF FLY WHEEL	2	5	2,3	CO3,5	PSO1,2
11	RADIUS OF GYRATION OF COMPOUND PENDULUM	2	5	2,3	CO5	PSO1,2

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Programme Name: B.E.- Aerospace Engineering

PSO1 Apply fundamentals of design, thermo-fluids and production engineering knowledge for innovative and critical thinking, problem-solving and Experimental skills with integrity and inclusivity in professional engineering practice or business.

PSO2 Achieve further career development through graduate education, professional development courses and/or on-the-job training and experience.

PSO3 Develop leadership and collaborative roles in their careers.

Programme Outcome (PO)

PO1 Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

		The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Mechanical Engineering.					Academic Year				2022-2023	
		B. E. (Aerospace Engineering): Regular Programme										
Year	I	Core / Elective / Foundation MEC1219CS: Engineering Drawing			Credits / Hours per week				Lectures: 03 Practical/Lab: 04			
Semester	I (in All branched of engineering) /II in Mechanical Engineering	Year of Introduction: Year of Syllabus Revision: 2021-2022			Maximum Marks / Grade				Theory: 100 PR/TW/VIVA: 50			
Mode of Transaction: Lectures and Practical/Laboratory teaching												
	Course Outcome (CO) MEC1210CS CO1 Use the drawing instruments effectively and how to use the dimensioning methods. CO2 Observe, analyze and correlate two-dimensional (Orthographic view) and three dimensional (Isometric view) CO3 Construct and application of various engineering curves in engineering practice. CO4 Apply the knowledge of Projection of points, Lines and Planes in engineering. CO5 Understanding of solids and its sections with its true shape											
Unit No.	Topic			Contact Hours	Weightage (%)	BT Level	CO	PO	PSO	Elements of Emo, Ent, SD	Relevance to L,N, R, G	Relation to G, ES, HV PE
1	Introduction to Engineering Drawing: Introduction to ISI & ISO standards in drawing practice, Drawing instruments and their uses, Types of lines, lettering and dimensioning, construction of scales			02	04	1, 2, 6	CO3	PO1				
2	Engineering Curves:			06	12	1,2,6	CO5	PO2				

[illegible]

	Reference Books	
1.		Bhatt, N.D., 'Engineering Drawing',
2		Engineering Drawing by P.J. Shah
3		Machine Drawing By N. D. Bhatt

Bloom's Taxonomy Levels: 1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

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Syllabus of Courses

		The Maharaja Sayajirao University of Baroda Faculty Technology and Engineering Department of Mechanical Engineering			Academic Year			2025-26			
		B. E. (Aerospace Engineering): Regular Programme									
Year	I Aero	Core / Elective/Foundation MEC1220CS: Introduction to Aerospace Engineering			Credits / Hours per week			Lectures: 04 Practical:- 02			
Semester	II	Year of Introduction: 2024 Year of Syllabus Revision:			Maximum Marks / Grade			Theory: 100 PR/TW/VIVA: 50			
Mode of Transaction: Lectures and Tutorials											
		Course Outcome (CO) MEC 1220CS CO1 To identify the unique terminology associated with aircraft and its background CO2 To understand behavior and effects of air over aircraft body CO3 To understand propulsion system of arial vehicle CO4 To understand airframe components and loads applied on aircraft structures. CO5 To explain fundamentals of avionics systems of an airplane									
Unit No.	Topic		Contact Hours	Weightage (%)	BT Level	CO	PSO	PO	Elements of Employability (Emp)/ Entrepreneurship (Ent)/ Skill Development (SD)	Relevance to Local (L)/ National (N)/ Regional(R)/Global (G)	Relation to Gender (G), Environment and Sustainability (ES), Human Values (HV)and Professional Ethics (PE)
1	Introduction to aeronautics: History of flight, types of arial vehicles, Types of aircrafts, Anatomy of the airplane, Ailerons, Elevators, Rudder, Flaps, Trim Tabs, Air brakes, Spoilers		08	10	1,2	CO1	PSO1	PO1, PO2	All	All	ES, PE
2	Airplane Aerodynamics: Basic Aerodynamics, Aerofoil nomenclature, Lift, Drag, and moment co-efficient, pressure co-efficient, critical pressure co-efficient, critical Mach number,		10	25	1,2	CO1	PSO1	PO1, PO2			

	drag-divergence Mach number, Wave drag, Induced drag, Drag polar curve, Finite wing, Swept and delta wing, High lift devices.									
3	Airplane Propulsion: Fundamentals of Propulsion, Propeller, Reciprocating engine, Jet propulsion, Turbojet, Turbofan, Ramjet, Scram jet engines. Rocket engine	10	25	1,2	CO2	PSO1	PO1,PO2			
4	Airplane structure: Introduction to aircraft structure, Basic function of aircraft structure, Aircraft configuration and principle types of Construction, Stress-Strain diagrams, Plane and Space, Trusses, loads on airplane components. Introduction to Landing gears	08	20	1,2,3	CO3	PSO1	PO1,PO2,P O3			
5	Aircraft Instruments: Air speed indicators, Altimeters, Rate of climb/descent meter, Basic instruments in Avionics. Elementary ideas about Hydraulic and pneumatic systems, pressurization, temperature control and oxygen system	08	20	1,2,3	CO3	PSO1	PO1, PO2			
	Total	44	100							
	List of Tutorials									
1	Historic evolution in the aircraft design	02	25	3,4	CO1					
2	Role of CFD in aircraft design	02	25	3,4	CO2					
3	Preparation guidance of manufacturing of RC plane	02	25	4,5	CO2					
4	Case study on flow measuring instruments	02	25	4,5	CO5					
	Total	08	100							
Reference Books										
1.	“Aerodynamics” by L.J.Clancy, Published by Sterling Book House, Indian Edition									
2.	“Fundamentals of Aerodynamics” by John D. Anderson, Jr. McGraw Hill Inc.									
3.	“Introduction to Flight” by John D. Anderson, Jr. McGraw Hill Inc.									
4.	“Gas Turbine” by V. Ganesan, Tata-McGraw Hill Publishing Company Ltd, New Delhi									
5.	“Theory and Analysis of Flight Structure” by R M Rivello, McGrawHill Book Co.									
6.	“Avionics Systems” by D H Middleton, Longman Scientific & Technical.									