O.P. Jindal University

Raigarh-Chhattisgarh

Scheme and Syllabus
of
B.Sc.
3 Year Programme

Discipline: Aircraft Maintenance
Programme Code: **[03NUG026]**

Department of Physics
School of Science

Session: 2026-2027 onwards

Program Outcomes

PO-1: Disciplinary Knowledge- Attain profound knowledge in Discipline with advanced concepts in science & technology to design the methodology suitable to the problem encountered and ability to apply the knowledge to solve real-life problems.

PO-2: Research Skills- Attain Research Skills to analyse problems, formulate a hypothesis, evaluate and validate results with the help of advanced tools and technology, and draw a logical conclusion.

PO-3: Communication- Able to present scientific and technical information with clarity, conciseness, and correct manner in both oral and written presentation.

PO-4: Leadership Skills- Ability to demonstrate leadership and work collaboratively as a part of a team in multidisciplinary settings.

PO-5: Ethics- Attain the relevant knowledge and skills to identify unethical behaviour and truthful actions in all aspects and demonstrate standard professional ethics in the discipline concerned.

PO-6: Lifelong Learning- Ability to seek new knowledge and skills and inculcate the habit of self-learning throughout life and adapting to contemporary demands of workplace.

Programme Specific Outcomes (PSO)

PSO-1: Utilize the knowledge of Aircraft Maintenance Science in innovative, dynamic, and challenging environments for the design and development of new products.

PSO-2: Use the software package in the design, manufacturing, testing, and maintenance of aeronautical-based components and systems.

PSO-3: To work as a team member will be a main requirement in an industry or in any Business enterprise and also play a role in the success of the organization.

PSO-4: To undertake research in the areas of aircraft maintenance, design requirements of aircraft, aero engine and demonstrate professional acumen in the development of Aircraft Maintenance Science.

PSO-5: To exhibit professionalism in their chosen profession and adapt to current trends, technologies and industrial scenarios.

SCHEME OF TEACHING AND EXAMINATION

First Semester

Sl No.	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits : L+ T+ (P/2)
								PRE		End Sem	Total	
					L	T	P	Mid Sem	TA			
1	AMS26-B-CC101	MAJOR	Electrical Fundamentals I	2	4	0	0	15	15	70	100	4
2	AMS26-B-CC102		Electrical Fundamentals I Lab	2	0	0	4	-	15	35	50	1
3	AMS26-B-CC103		Basic Aerodynamics	2	4	0	0	15	15	70	100	4
4	AMS26-B-CC104		Basic Aerodynamics - Lab	2	0	0	4	-	15	35	50	1
5	AMS26-B-MN101	MINOR	Mathematics	2	3	0	0	15	15	70	100	3
6		AEC	Communicative English	2	2	0	0	-	15	35	50	2
7		SEC	Computer Fundamentals Lab	2	0	0	4	-	15	35	50	2
8		SEC	Gender Sensitization: Society, Culture and Change	2	2	0	0	-	15	35	50	1
9		VAC	Indian Knowledge System	2	2	0	0	-	15	35	50	2
10		VAC	UHV II	2	2	0	0	-	15	35	50	2
												22

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

Second Semester

Sl. No.	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits : L+ T+ (P/2)
					L	T	P	PRE		End Sem	Total	
								Mid Sem	TA			
1	AMS26-B-CC201	MAJOR	Electrical Fundamentals II	2	4	0	0	15	15	70	100	4
2	AMS26-B-CC202		Electrical Fundamentals II Lab	2	0	0	4	-	15	35	50	1
3	AMS26-B-CC203		Electronic Fundamentals & Digital Technology 1	2	4	0	0	15	15	70	100	4
4	AMS26-B-CC204		Electronic Fundamentals And Digital Techniques I Lab	2		0	4	-	15	35	50	1
5	AMS26-B-MN201	MINOR	Physics	2	3	0	0	15	15	70	100	3
6	AMS26-B-MN202		Physics- Lab	2	0	0	2	-	15	35	50	1
7		AEC	Environmental Studies and Disaster Management	2	2	0	0	-	15	35	50	2
8		SEC	Small Business Management	2	2	0	0	-	15	35	50	2
9		VAC	Indian Knowledge System: Concepts and Applications in Science	2	2	0	0	-	15	35	50	2
10		VAC	Yoga, Happiness and Wellbeing	2	0	1	2	-	15	35	50	2
												22

Third Semester

Sl. No.	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					L	T	P	PRE Mid Sem	PRE TA	End Sem	Total	
1	AMS26-B-CC301	MAJOR	Electronic Fundamental & Digital Technology II	3	3	0	0	15	15	70	100	3
2	AMS26-B-CC302		Electronic Fundamental & Digital Technology II Lab	3		0	2	-	15	35	50	1
3	AMS26-B-CC303		Aircraft Structure & Associated Systems	3	3	0	0	15	15	70	100	3
4	AMS26-B-CC304		Aircraft Structure Lab	3	0	0	2	-	15	35	50	1
5	AMS26-B-CC305		Aircraft Materials & Hardware	3	3	0	0	15	15	70	100	3
6	AMS26-B-CC306		Aircraft Material & Hardware - Lab	3	0	0	2	-	15	35	50	1
7	AMS26-B-MN301	MINOR	Chemistry	3	3	0	0	15	15	70	100	3
8	AMS26-B-MN302		Chemistry- Lab	3	0	0	2	-	15	35	50	1
9		AEC	English Language	3	2	0	0	-	15	35	50	2
10		SEC	Basics of Design/ AutoCAD/Engg. Drawing	3	0	1	2	-	15	35	50	2
11		VAC	The one thing and Extreme ownership	3	2	0	0	-	15	35	50	2
												22

Fourth Semester

Sl. No.	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					L	T	P	PRE		End Sem	Total	
								Mid Sem	TA			
1	AMS26-B-CC401	MAJOR	Gas turbine engine	3	3	0	0	15	15	70	100	3
2	AMS26-B-CC402		Gas Turbine Engine Lab	3	0	0	2	-	15	35	50	1
3	AMS26-B-CC403		Aircraft maintenance practices	3	3	0	0	15	15	70	100	3
4	AMS26-B-CC404		Maintenance Lab	3	0	0	2	-	15	35	50	1
5	AMS26-B-CC405		Aircraft Systems 1	3	3	0	0	15	15	70	100	3
6	AMS26-B-CC406		Aircraft Systems 1 Lab	3	0	0	2	-	15	35	50	1
7	AMS26-B-MN401	MINOR	Corrosion and NDI Techniques	3	3	0	0	15	15	70	100	3
8	AMS26-B-MN402		Corrosion and NDI Techniques- Lab	3	0	0	2	-	15	35	50	1
9		DSE-I	Opted from the pool of courses by the university	3	3	0	0	15	15	70	100	6
10		AEC	Professional Development or Developing Soft Skills and Personality	2	2	0	0	-	15	35	50	2
11		VAC	Emotional Intelligence	2	2	0	0	-	15	35	50	2
												26

Students after completion of Semester IV shall do an internship of 4 credits during the summer vacation.

Fifth Semester

Sl. No.	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits : L+ T+ (P/2)
					L	T	P	PRE Mid Sem	PRE TA	End Sem	Total	
1	AMS26-B-CC501	MAJOR	Workshop practices	4	3	0	0	15	15	70	100	3
2	AMS26-B-CC502		Workshop practices Lab	4	0	0	2	-	15	35	50	1
3	AMS26-B-CC503		Aircraft System 2	4	3	0	0	15	15	70	100	3
4	AMS26-B-CC504		Aircraft System 2 Lab	4	0	0	2	-	15	35	50	1
5	AMS26-B-CC505		Avionics	4	3	0	0	15	15	70	100	3
6	AMS26-B-CC506		Avionics Lab	4	0	0	2	-	15	35	50	1
7	AMS26-B-MN501	MINOR	Composites and fibers	4	3	0	0	15	15	70	100	3
8	AMS26-B-MN502		Composites and fibers Lab	4	0	0	2	-	15	35	50	1
9		DSE-II	Opted from the pool of courses by the university	4	4	0	0	15	15	70	100	6
10	AMS26-B-PR501	Project	Minor Project	4					30	70	100	4
11	AMS26-B-IN501		**Internship**	4					30	70	100	4
												30

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

Sixth Semester

Sem	Course Code	Course Category	Name of the Course	Level of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					L	T	P	PRE		End Sem	Total	
								Mid Sem	TA			
1	AMS26-B-CC601	**MAJOR**	Ground handling and support system	4	4	0	0	15	15	70	100	4
2	AMS26-B-CC602		Ground handling and support system Lab	4	0	0	2	-	15	35	50	2
3	AMS26-B-MN601	**MINOR**	Quality Management System	4	3	0	0	15	15	70	100	3
4	AMS26-B-MN602		Quality Management System Lab	4	0	0	2	-	15	35	50	1
5		**DSE-III**	Opted from the pool of courses by the university	4	4	0	0	15	15	70	100	4
6				4	0	0	4	-	15	35	50	2
7		**DSE-IV**	Opted from the pool of courses by the university	4	4	0	0	15	15	70	100	4
8				4	0	0	4	-	15	35	50	2
9	AMS26-B-PR601		Major Project	4								6
												28

List of Elective Courses (Major)

Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
	L	T	P	PRE		End Sem	Total	
				Mid Sem	TA			
Elective	3	1	0	15	15	70	100	4
OR								
Elective	4	0	0	15	15	70	100	4
Elective Lab	0	0	2	-	15	35	50	2

Generic Elective/Minor/Interdisciplinary (Theory Papers)

GE-I Mathematics
GE-II Physics
GE-III Chemistry
GE-IV Corrosion and NDI Techniques
GE-V Composites and fibers
GE-VI Quality Management System

Note: Batch Size should not be less than 10 students for choosing an Elective Course

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

List of Discipline Specific Elective (DSE)

S. No..	Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
			L	T	P	PRE		End Sem	Total	
						Mid Sem	TA			
1	AMS26-B-DS401	Piston engines and Propellers	4	0	0	15	15	70	100	4
	AMS26-B-DS402	Piston Engines and Propellers Lab	0	0	4	-	15	35	50	2
	AMS26-B-DS403	Aircraft Communication & Navigation Systems	4	0	4	15	15	70	100	4
	AMS26-B-DS404	Aircraft Communication & Navigation Systems Lab	0	0	4	-	15	35	50	2
2	AMS26-B-DS501	Helicopter Structure & Systems	4	0	0	15	15	70	100	4
	AMS26-B-DS502	Helicopter Structure & Systems Lab	0	0	4	-	15	35	50	2
	AMS26-B-DS503	Transducers and sensors	4	0	0	15	15	70	100	4
	AMS26-B-DS504	Transducers and sensors: Practical	0	0	4	-	15	35	50	2
3	AMS26-B-DS601	Aviation legislation	4	0	0	15	15	70	100	4
	AMS26-B-DS602	Aviation Legislation Lab	0	0	4	-	15	35	50	2
	AMS26-B-DS603	Flight Navigation and guidance	4	0	0	15	15	70	100	4
	AMS26-B-DS604	Flight Navigation and Guidance Lab	0	0	4	-	15	35	50	2
4		Topics recommended for dissertation / University-	4	0	0	15	15	70	100	6

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

List of Ability Enchantment Courses

S.No.	Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
			L	T	P	PRE		End Sem	Total	
						Mid Sem	TA			
1		Communicative English	2	0	0	-	15	35	50	2
2		Environmental Studies and Disaster Management	2	0	0	-	15	35	50	2
3		English Language	2	0	0	-	15	35	50	2
		Professional Development or Developing Soft Skills and Personality	2	0	0	-	15	35	50	2

List of Skill Enhancement Courses (SEC)

S.No.	Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
			L	T	P	PRE		End Sem.	Total	
						Mid Sem.	TA			
1		Computer Fundamentals Practical	0	0	4	-	15	35	50	2
2		Gender Sensitization: Society, Culture and	1	0	0	-	15	35	50	1
3		Small Business Management	2	0	0	-	15	35	50	2
4		Basics of Design/ AutoCAD/Engg. Drawing	0	1	2		15	35	50	2
5		Value Education	2	0	0	-	15	35	50	2
6		Entrepreneurship	2	0	0	-	15	35	50	2

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

Course Code	Name of the Course	Periods per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC101	Electrical Fundamentals I	4	0	0	15	15	70	100	4

Course Description:

This course provides a foundational understanding of electrical principles, materials, and circuit behavior, essential for students in engineering, aviation maintenance, and applied technology fields. The content covers both theoretical and practical aspects of electrical science, enabling learners to apply concepts in real-world electrical and electronic systems.

Course Outcomes (CO)

Students will be able to	
CO 1	Understand the structure and distribution of electric charges in atoms, molecules, ions, and classify materials as conductors, semiconductors, or insulators based on their electron structure.
CO 2	Apply electrostatic laws, such as Coulomb's law, to analyze static electricity and electric field interactions between charges.
CO 3	Analyze DC circuits consisting of resistors, capacitors, and inductors in series, parallel, and series–parallel combinations to determine current, voltage, impedance, and power.
CO 4	Explain transformer construction, working principle, and perform calculations related to efficiency, voltage ratio, and power in single- and three-phase systems.
CO 5	Understand the operation and applications of electrical filters (low-pass, high-pass, band-pass, band-stop) in electronic circuits.

Syllabus

Unit 1

Electron Theory: Structure and distribution of electrical charges within atoms, molecules, ions, Compounds, Molecular structure of conductors, semiconductors, and insulators.

Static Electricity and Conduction: Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases, and a vacuum.

Unit 2

Electrical Terminology: The following terms, their units, and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow. Ohm's Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage, and current; Significance of the internal resistance of a supply.

Unit 3

Resistance/Resistor: (a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and

tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; (b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors;

Unit 4

DC Circuits Analysis: Graph theory, mesh and loop analysis, nodal analysis, concept of super mesh, Dc transient analysis, Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.
Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.

Unit 5

DC Theorems: Thevenins theorem, Nortons theorem, superposition theorem, maximum power transfer theorem, millmans theorem, reciprocity theorem, compensation theorem, tellegens theorem.

Textbook/ Reference Books:

1. EASA Module - 04 Electrical Fundamentals, Aircraft Tech Book Co., Aviation Maintenance Technician Certification Series.
2. Principle of Electronics by V. K. Metha, Rohit Metha S Chand Publishing,1th edition, 2020.
3. Electrical Technology- by B.L.Theraja
4. Aircraft Electrical System- by E.H.J.Pallett

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC102	Electrical Fundamentals I Lab Practical	0	0	4	-	15	35	50	2

Course Description:

This course provides hands-on experience in fundamental electrical principles, measurements, testing techniques, and circuit construction. It is designed to develop practical skills essential for electrical technicians, engineering students, and aviation maintenance trainees. Students will perform experiments involving static electricity, resistance, inductance, capacitance, AC/DC measurements, and power distribution systems, ensuring both theoretical understanding and practical proficiency in electrical diagnostics and circuit behavior.

Course Outcomes (CO)

After completing these experiments, students will be able to:	
CO 1	Demonstrate the laws of electrostatics and understand the relationship between charge, force, and potential difference.
CO 2	Determine the sensitivity and calibration of a ballistic galvanometer for charge and current measurements.
CO 3	Identify and test electrical components (resistors, fuses, capacitors) and interpret resistor colour codes accurately.

List of Experiments

1. Simple experiments with static electricity and Coulomb's law. Application of Electromotive Forces and Potential Difference Ballistic
2. Galvanometer: (i) Measurement of charge and current sensitivity
3. Measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking
4. Use of a range of test meters to measure volts, amps, and resistance.
5. Resistor colour codes - Calculation of resistance value using colour codes
6. Potentiometer, rheostat, and Wheatstone bridges, and determine the unknown Resistance
7. Use a Multimeter for measuring Resistances, checking electrical fuses, Identify various types of resistance
8. Identify various types of capacitances
9. Measurement of magnetic field strength. Magnetic field density and permeability using flux meter
10. Production of electricity by inductance methods
11. Single-phase and three-phase power supply distribution using star and delta connection
12. Construct a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor,
13. Construct parallel LCR circuit and determine its (a) Anti-resonant frequency and
    i. (b) Quality factor Q
14. Use of transformer in power distribution and measurements.

Note: 1. A Maximum of 20% experiments could be performed virtually.
2. Other course-related experiments can also be included.

Textbooks/Reference Books:

1. Control System Engineering, Norman S. Nise, Wiley
2. Automatic Control System Kuo & Golnaraghi McGraw-Hill
3. Modern Control Engineering Katsuhiko Ogata Pearson

Course Code	Name of the Course	Periods per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC103	Basic Aerodynamics	4	0	0	15	15	70	100	4

Course Description:

This course provides a foundation in atmospheric sciences and a comprehensive discussion of aerodynamic terms and principles along with flight mechanics, and high-speed flight theory. It is designed to equip learners with a strong understanding of how aircrafts operate, interact with the environment, and maintain stability throughout various phases of flight. The curriculum builds progressively from basic atmospheric concepts to advanced aerodynamic behavior at high Mach numbers.

Course Outcomes (CO)

Students will be able to	
CO 1	Visualize concepts related to Earth's Atmosphere and the International Standard Atmosphere (ISA) in context to aerodynamics of bodies.
CO 2	Understand and give a detailed description about the airflow around the body and aerofoil.
CO 3	Apply his knowledge on generation of Lift, Drag Relationship between lift, weight, thrust and drag.
CO 4	Analyse the equilibrium position in level flight, operation and effect of roll, pitch and yaw.
CO 5	Evaluate the flight stability and dynamics of bodies.

Syllabus

Unit 1

Physics of the Atmosphere: The characteristics associated with the Earth's atmosphere - such as gaseous Composition - Pressure – temperature - distribution effects of altitude - and effects of humidity – temperature, Pressure on density - International Standard Atmosphere (ISA) - its application to aerodynamics.

Unit 2

Aerodynamics : Airflow around a body - Boundary layer - laminar and turbulent flow - free stream flow - relative airflow - up wash and Downwash – vortices – stagnation -Basic Terminology: camber – chord - mean aerodynamic chord - profile (parasite) drag - induced drag - center of pressure - angle of attack - wash in and wash out - fineness ratio - wing shape and aspect ratio – Thrust – Weight - Aerodynamic Resultant - Generation of Lift and Drag – Lift coefficient - Drag coefficient – stall - High lift devices – slots – slats – flaps – Relationship - between lift – weight - thrust and drag.

Unit 3

Theory of Flight: Aeroplane Aerodynamics - Flight Controls - Level flight conditions - Operation and effect of roll control - ailerons and spoilers - pitch control – elevators – stabilizers - yaw control – rudders – fin – maneuvers – climbing – turning - gliding.

Unit 4

Flight Stability and Dynamics: Static stability - Dynamic stability – Longitudinal - lateral - and

directional stability - spiral stability and Dutch roll stability.

Unit 5

High Speed Theory: The speed of sound - compressibility and incompressibility - approaching the speed of sound – shock waves and their observation - effects of shock waves - shock drag - variation of speed of sound – critical Mach number – subsonic – transonic - supersonic speeds - behavior of aeroplane at shock stalls.

Textbook/ Reference Books:

1. Basic Aerodynamics by Thomas Forenz, Aircraft Technical Book Company, 2016
2. Aircraft Basic Science by Michael J. Kroes; Michael S. Nolan; Publisher: The McGraw-Hill Companies, Inc. Edition: Eighth Edition – 2013
3. Mechanics of Flight by A C Kermode, Pearson, 11 edition
4. Aerodynamics - By L J Clancy; Publisher: Shroff; Date 1 January 2006
5. Airframe & Power Plant Mechanics (General Handbook EA-AC 65-15A) by Federal Aviation Administration, 2019

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC104	**Basic Aerodynamics Lab**	0	0	4	-	15	35	50	2

Course Description:

This laboratory course provides hands-on experience with essential techniques in physical chemistry, enabling students to develop practical skills and a deeper understanding of key concepts to investigate the properties and behaviors of various substances, such as liquids, gases, and buffer solutions.

Course Outcomes (CO)

After completing these experiments, students will be able to:	
CO 1	Know the operation of flight controls.
CO 2	Understand and give a detailed description of how the lift is being generated.
CO 3	Analyse the plan form of wings and their angle of attachment.

List of Experiments

1. Identifying and locating the main components of an aircraft.
2. Measurement of wing span and average chord of an aerofoil for calculation of aspect ratio.
3. Measurement of the dihedral/anhedral angle of an aero plane wing.
4. Demonstration of airflow over an aerofoil and its effect in a wind tunnel.
5. Measurement of the angle of incidence of the wing and determination of the wash-in/wash-out.
6. Measurement of wheel base and track.

7. Operation of aileron and identification of linkages from cockpit control to the control surfaces and their Movement.
8. Operation of elevator and identification of linkages from cockpit control to the control surface and their Movement.
9. Operation of rudder and identification of linkages from cockpit control to the control surface and their Movement.
10. Operation of flaps and identification of linkages from cockpit control to the control surface and their Movement.
11. Identification of different tabs, their linkages with controls, and their operation.
12. Measurement of the sweep back angle of the swept back wing.

Note: 1. A Maximum 20% experiments could be performed virtually.
2. Other course related experiment can also be included.

Textbooks/Reference Books:

1. Basic Aerodynamics by Thomas Forenz, Aircraft Technical Book Company, 2016
2. Aircraft Basic Science by Michael J. Kroes; Michael S. Nolan; Publisher: The McGraw-Hill Companies, Inc. Edition: Eighth Edition – 2013
3. Mechanics of Flight by A C Kermode, Pearson, 11 edition
4. Aerodynamics - By L J Clancy; Publisher: Shroff; Date 1 January 2006
5. Airframe & Power Plant Mechanics (General Handbook EA-AC 65-15A) by Federal Aviation Administration, 2019

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					PRE		End Sem.	Total	
		L	T	P	Mid Sem.	TA			
AMS26-B-MN101	**Mathematics**	4	0	0	15	15	70	100	4

Course Description:

This course introduces students to semiconductor components, digital logic systems, electronic circuit integration, and basic control technologies used in modern electronic and electromechanical systems. The content blends theoretical understanding with applied knowledge relevant to fields such as avionics, electrical engineering, automation, and instrumentation.

Course Outcomes (CO)

Students will be able to	
CO 1	Apply the knowledge of matrices to solve the problem and understand the applications of matrices.

CO 2	Analyse the characteristics and properties of three-dimensional geometric shapes and develop mathematical arguments about geometric relationships. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.
CO3	Fix the center of curvature, determines the direction of curvature of the curve at that specific point and to find the radius of curvature which determines the magnitude of that curvature
CO4	Find the rate of change of quantity with respect to other, find a function which is increasing or decreasing and to find the maximum and minimum value of a curve.
CO5	Get a clear idea about of how to manage and plan their project, concerning resource and time

Syllabus

Unit 1

Matrices: Rank of a matrix- Consistency of linear system of equations – Eigenvalue problem – Eigenvalues and eigenvectors of a real matrix- Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley–Hamilton theorem–inverse of a matrix-Similarity transformation-Basic concepts–Diagonalization by similarity transformation**.**

Unit 2

Three-dimensional analytical geometry: Direction cosines and ratios, Angle between two lines- Equations of a plane- Equations of a straight line– Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane– Plane section of a sphere – Orthogonal spheres.

Unit 3

Differential and Integral calculus: Curvature – Cartesian and polar co-ordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Properties of envelopes and evolutes - Evolutes as envelope of normal.
Integration: Introduction, types of integration, integration of elementary function, application of integration to find area and volume.

Unit 4

Functions of several variables: Functions of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and minima – Constrained maxima and minima – Lagrange's Multiplier method Jacobians.

Unit 5

Vector Calculus: Gradient, Divergence, Curl, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Stokes Theorem (without proof), Gauss Divergence Theorem (without proof).

Reference Book:

1. **Erwin Kreyszig**, *Advanced Engineering Mathematics*, John Wiley & Sons
2. **B. S. Grewal,** *Higher Engineering Mathematics*, Khanna Publishers
3. **H. K. Dass & Rama Verma,** *Engineering Mathematics*, Chand Publications
4. **Thomas, George B. & Finney,** *Calculus and Analytical Geometry,* Addison–Wesley

Course Code	Name of the Course	Periods per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC201	Electrical Fundamentals II	4	0	0	15	15	70	100	4

Course Description:

This course provides

- To familiarize with the general description of DC generator and DC motor types and factors affecting their functions.
- To provide technical knowledge on fundamentals of AC theory, production of sine wave, various values of sine wave, other types of wave forms and single and three phase AC principles
- To learn and apply theoretical fundamentals of RLC circuits, phase relationship between voltage and current in RLC and able to use mathematical formula for power factor calculations
- To educate the students understand the concept of transformer, a general description of its working principle, losses and types and to understand the operation, application and uses of various types of filters.
- To educate the student with general description of AC generators and AC motors types and factors affecting their functions and should be able to apply his knowledge in practical manner using procedures.

Course Outcomes (CO)

Students will be able to	
CO 1	Get knowledge on DC generators and DC motors types and factors affecting their functions.
CO 2	Understand the principle and concept of AC theory, production of sine wave, other types of wave forms and single and three phase AC principles.
CO 3	Apply the knowledge on transformers' working principle, losses and types and to understand the operation, application and uses of various types of filters.
CO 4	Analyze the principle of AC generators, types and AC motors, their types and factors affecting their functions.
CO 5	Evaluate concept of RLC circuits, phase relationship between voltage and current in RLC, power factor calculations.

Syllabus

Unit 1

DC Machines: Basic motor and generator theory - Construction and purpose of components in DC generator - Operation of - and factors affecting output and direction of current flow in DC generators - speed and direction of rotation of DC motors - Series wound - shunt wound and compound motors - Starter Generator construction.

Unit 2

AC Theory: Sinusoidal waveform – phase – period – frequency – cycle – Instantaneous - average, root mean square – peak - peak to peak current values and calculations of these values - in relation to voltage - current and power - Triangular/Square waves - Single/ 3 phase principles.

Unit 3

AC Circuits Analysis: Phase relationship of voltage and current in L - C and R - Power dissipation in L – C and R circuits – Impedance - phase angle - power factor and current calculations - True power - apparent power and reactive power calculations, RLC circuit analysis, Resonance

Filters: Operation, application, and uses of the following filters: low pass, high pass, band pass, and band stop.

Unit 4

Transformers: Transformer construction principles and operation; Transformer losses and Methods for overcoming them: Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three-phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.

Unit 5

AC Machines: Rotation of loop in a magnetic field and waveform produced - Operation and construction of revolving armature and revolving field type AC generators - Single phase - two phase and three phase alternators - Three phase star and delta connections advantage and uses - Permanent Magnet Generators - AC Motors – Construction - principles of operation and characteristics of - AC synchronous and induction motors both single and poly phase - Methods of speed control and direction of rotation.

TEXT BOOK:

1. Aircraft Electricity and Electronics -by Thomas Eismin (5th edition)
2. EASA Module-3- by Tom Forenz, Aircraft Tech Book co. (2016)

REFERENCE BOOKS:

1. Aircraft mechanics Hand Book – Airframe by FAA (9A),U.S Department of transportation, flight standard service,1976
2. Electrical Technology- by B.L.Theraja – 22nd edition
3. Aircraft Electrical System-by E.H.J.Pallett - 3rd edition Himalaya Book Company
4. Basic Electricity- by Dale Crane (2017)

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					PRE		End Sem.	Total	
		L	T	P	Mid Sem.	TA			
AMS26-B-CC202	**Electrical Fundamentals II Lab Practical**	0	0	4	-	15	35	50	2

Course objective:

1. To learn about DC generator and DC motor parts
2. To have knowledge on measurement of triangular/ square wave pattern by using CRO
3. To educate the testing of insulators and continuity on electrical cables.

Course Outcomes (CO)

After completing these experiments, students will be able to:	
CO 1	Apply his knowledge in practical for carrying out measurement of triangular/ square wave pattern by using CRO.
CO 2	Understand and carry out the testing of insulators and continuity on electrical cables.
CO 3	Compare DC generator and AC generator operation.

List of Experiments

1. Familiarization of DC Generator& parts
2. Familiarization of DC Motor& parts
3. Measurement of triangular/ square wave pattern by using CRO
4. Testing of Insulation and Continuity on electrical cables/ equipment
5. Testing of transformers in load & no-load conditions
6. Familiarization of AC Generator& parts
7. Familiarization of AC Motor& parts

Note: 1. A Maximum of 20% experiments could be performed virtually.
2. Other course-related experiments can also be included.

TEXT BOOK:

1. Aircraft Electricity and Electronics -by Thomas Eismin (5th edition)
2. EASA Module-3- by Tom Forenz, Aircraft Tech Book co. (2016)

REFERENCE BOOKS:

1. Aircraft mechanics Hand Book – Airframe by FAA (9A),U.S Department of transportation, flight standard service,1976
2. Electrical Technology- by B.L.Theraja – 22nd edition
3. Aircraft Electrical System-by E.H.J.Pallett - 3rd edition Himalaya Book Company
4. Basic Electricity- by Dale Crane (2017)

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC203	Electronic Fundamentals And Digital Techniques I	4	0	0	15	15	70	100	4

Course Description:

This course introduces students to semiconductor components, digital logic systems, electronic circuit integration, and basic control technologies used in modern electronic and electromechanical systems. The content blends theoretical understanding with applied knowledge relevant to fields such as avionics, electrical engineering, automation, and instrumentation.

Course Outcomes (CO)

Students will be able to	
CO 1	Acquire knowledge on the structure of a pn junction diode and its characteristics.
CO 2	Understand the characteristics of a BJT in different configurations and its operation.
CO3	Analyze the characteristics and parameters of Logic Gates and operational amplifiers.
CO4	Explain the basics and fabrication of PCB.
CO5	Analyze the working of the servomechanism and the Transducer.

Syllabus

Unit 1

Diodes: Diode symbols - Diode characteristics - properties - Diodes in series and parallel - Main characteristics and use of silicon-controlled rectifiers (thyristors) - light emitting diode - photo conductive diode – varistor - rectifier diodes - Functional testing of diodes.

Unit 2

Transistors: Transistor symbols - Component orientation - Transistor Configuration – CE Configuration CB Configuration - Description - CC Configuration -Transistor characteristics - properties.

Unit 3

Integrated Circuits: Description and operation of logic circuits - Logic gate symbol - Truth table for Buffer Gate -NOT Gate - AND Gate - OR Gate- EX-OR Gate - NAND Gate - NOR Gate - EX-NOR Gate - linear circuits / operational amplifiers.

Unit 4

Printed Circuit Boards: Description of printed circuit boards - PCB Boards - Single Layer Board - Double Layered Board and Multi-Layered Board - use of printed circuit boards.

Unit 5

Servomechanisms: Understanding of the following terms - Open and closed loop systems- feedback - follow up - analogue transducers – LVDT – RVDT - Principles of synchro system- operation – types.

.

Reference Book:

1. Electronic Communication Systems (4th edition) by George Kennedy, 1999, Publisher Tata McGraw-Hill
2. Integrated Electronics (2nd edition), Jacob Millman, Christos Halkias, McGraw-Hill publication, July 2017
3. Aircraft Instruments and Integrated Systems (1st edition) by E H J Pallet, Pearson Education. 1992

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-CC204	Electronic Fundamentals And Digital Techniques I Lab	0	0	4	-	15	35	50	2

Course Description:

This laboratory courses focuses on the experimental study of semiconductor devices and their electrical characteristics under various operating conditions. It provides hands-on experience with basic electronic components, including diodes, light-emitting diodes, rectifier circuits, and transistors. Students will analyse device behavior in forward and reverse biasing conditions, evaluate performance parameters, and interpret V-I characteristics to understand real-world device functionality. The course also includes experiments on rectification circuits such as half-wave, full-wave, and bridge rectifiers, enabling learners to examine efficiency, ripple factor, peak inverse voltage (PIV), and regulation. Functional testing and series/parallel connection of diodes further enhance understanding of circuit design and practical implementation.

Course Outcomes (CO)

Students will be able to	
CO1	Able to analyses the characteristics of a transistor in forward and reverse biasing.
CO2	Examine the characteristics of a diode as Half half-wave rectifier and full wave rectifier.
CO3	Understand the functional testing of a diode.

List of Experiments

1. Analysis of characteristics of the diode in forward and reverse biasing
2. Analysis of characteristics of two diodes connected in series
3. Analysis of characteristics of two diodes connected in parallel
4. Analysis of characteristics of Silicon Controlled Rectifier
5. Analysis of characteristics of Light Emitting Diode in forward and reverse biasing
6. Analysis of characteristics of a diode as Half half-wave Rectifier
7. Analysis of characteristics of a diode as a full-wave Rectifier
8. Analysis of characteristics of the diode as a full-wave Bridge Rectifier
9. Analysis of functional testing of the diode
10. Analysis of characteristics of the Transistor in forward and reverse biasing

Note: 1. A Maximum of 20% experiments could be performed virtually.
2. Other course-related experiments can also be included.

Textbooks/Reference Books:

1. Electronic Devices and Circuit Theory by Robert L. Boylestad & Louis Nashelsky — A well-established textbook covering diodes, transistors, biasing, circuits, and device behaviour.
2. Solid State Electronic Devices by Ben G. Streetman & Sanjay Kumar Banerjee — Focuses on semiconductor device physics, including p-n junctions and devices like diodes and transistors.
3. The Art of Electronics by Paul Horowitz & Winfield Hill — A widely used reference that covers analog/digital electronics, device behaviour, and practical circuits.

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-MN201	**Physics**	4	0	0	15	15	70	100	4

Course Description:

This course provides a foundational understanding of classical mechanics and its extensions, integrating mathematical tools such as vector algebra with physical principles governing the motion of bodies. The course begins with the study of vectors, their algebraic properties, and differentiation, establishing the mathematical framework required for subsequent topics.

Course Outcomes (CO)

Students will be able to	
CO 1	Apply vector algebra concepts such as scalar and vector products to solve problems involving forces and motion.
CO 2	Interpret stress-strain relationships, calculate elastic constants, and experimentally determine the rigidity modulus using torsional methods.
CO3	Demonstrate understanding of conservation laws of momentum and energy and apply them to real-life systems like collisions and rocket motion.
CO4	Derive and solve differential equations of simple harmonic motion, and analyze energy relations in damped and undamped oscillators.
CO5	Explain the postulates of special relativity and compute relativistic effects such as time dilation, length contraction, and velocity addition.

Syllabus

Unit 1

Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter.

Unit 2

Elasticity: Hooke's law - Stress-strain diagram - Elastic Moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire -Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional pendulum- Determination of Rigidity modulus and moment of inertia - q, η, and s by Searle's method.

Unit 3

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. Laws of Motion: Frames of reference. Newton's Laws of Motion. Dynamics of a System of Particles. Centre of Mass."

Unit 4

Oscillations: Simple Harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy, and their time averages. Damped Oscillator.

Unit 5

Special Theory of Relativity: Constancy of speed of light. Postulates of the Special Theory of Relativity. Length Contraction. Time Dilation. Relativistic addition of Velocities.

Reference Book:

1. University Physics. FW Sears, MW Zemansky, and HD Young13/e, 1986. Addison Wesley
2. Navneet Kale, Applied Physics

Course Code	Name of the Course	Hours per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
		L	T	P	PRE		End Sem.	Total	
					Mid Sem.	TA			
AMS26-B-MN202	Physics Lab	0	0	4	-	15	35	50	2

Course Description:

This laboratory course provides students with practical exposure to fundamental experimental techniques in mechanics and material properties. It is designed to complement theoretical physics concepts through hands-on experience with precision instruments and measurement systems. Students will learn to determine physical quantities such as length, time, mass, moment of inertia, elastic constants, and acceleration due to gravity using standard scientific apparatus and experimental methodologies.

Course Outcomes (CO)

Students will be able to	
CO 1	Perform accurate linear and angular measurements using Vernier calipers, screw gauge, and traveling microscope.
CO 2	Demonstrate understanding of geometrical and mechanical measurement principles using tools like a sextant and flywheel.

CO3	Determine elastic constants such as Young's modulus and modulus of rigidity using the optical lever, Maxwell needle, and Searle's methods.

List of Experiments

1. Measurements of length (or diameter) using Vernier caliper, screw gauge, and Travelling microscope.
2. To determine the Height of a Building using a Sextant.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine the Young's Modulus of a Wire by the Optical Lever Method.
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine the Elastic Constants of a Wire by Searle's method.
7. To determine g by the Bar Pendulum.
8. To determine g by Kater's Pendulum.
9. To determine g and velocity for a freely falling body using the Digital Timing technique.

Note: 1. A Maximum of 20% experiments could be performed virtually.
2. Other course-related experiments can also be included.

Textbooks/Reference Books:

1. C. L. Arora – Practical Physics (Best for experiments like pendulum, screw gauge, elastic constants, etc.)
2. M. A. Wahid Khan – Practical Physics Manual (Easy language for UG level)
3. H. K. Malik & Singh – Engineering Physics Practical Manual (Good for modern methods)

Course Code	Name of the Course	Periods per week			Scheme of Examination and Marks				Credits: L+ T+ (P/2)
					PRE		End Sem.	Total	
		L	T	P	Mid Sem.	TA			
AMS26-B-SE201	**Small Business Management**	**2**	**0**	**0**	**-**	**15**	**35**	**50**	**2**

COURSE DESCRIPTION:
This course includes to understand the policy initiatives and infrastructural support for establishing small scale enterprises and analyze the opportunities for starting a small enterprise.

COURSE OUTCOMES:
After Completion of the course, students will be able to:

CO1	Find out a suitable idea for starting a small enterprise.
CO2	Visualize the importance of small scale enterprises in economic development.

COURSE CONTENT:
UNIT 1: Small Scale enterprises–An Introduction and overview– Definition– Scope and importance – relative advantages of small scale enterprises vis - a – vis –Large and medium scale industries – Efforts to development of SSE- Meaning and concept of entrepreneurship, the history of entrepreneurship

development, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship

UNIT 2: Policy and institutional infrastructure for small enterprises – Development agencies for small enterprise–small enterprises growth and environmental factors influence– funding agencies and their role in Developing SSE.- Meaning of entrepreneur, the skills required to be an entrepreneur, the entrepreneurial decision process, and role models, mentors and support system.

UNIT 3: Establishing the small scale enterprises–opportunities scanning–Choice of enterprise–Market assessment for SSE–Choice of technology and selection of site– Financing the new/small enterprise– Preparation of business plan– Ownership structure and organizational framework-Business ideas, methods of generating ideas, and opportunity recognition.

UNIT 4: Operating the small-scale enterprise – Financial management issues in SSE – Operation management issues in SSE – Marketing management issues in SSE- Importance of new venture financing, types of owner ship securities, venture capital, types of debt securities, Determining ideal debt-equity mix, and financial institutions and banks.

UNIT 5: Performance appraisal and growth strategies – Management performance assessment and control– Growth and stabilization strategies for small enterprises – Managing family enterprises–Related Cases-Exit strategies for entrepreneurs, bankruptcy, and Succession and harvesting strategy.

Dynamic Component for Continuous Internal Assessment only: Contemporary Developments Related to the Course during the Semester concerned.

TEXT BOOKS

1. MathurS.P.(1979)Economics of small-scale industries.
2. Siropolis.(1986)Entrepreneurship and small Business Management
3. Vasant Desai.(1979)Organization and management of small scale industries.

OP JINDAL UNIVERSITY
OP Jindal Knowledge Park, Punjipathra, Raigarh - 496109, (C.G.)
t: +91 7762 304 000 www.opju.ac.in