

SEMESTER V

S. No.	Course Code	Course title	Cate Gory	Periods per week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1.	AU3501	Mechanics of Machines	PCC	3	0	0	3	3
2.	AU3502	Automotive Electrical and Electronics	PCC	3	0	0	3	3
3.		Professional Elective I	PEC	-	-	-	-	3
4.		Professional Elective II	PEC	-	-	-	-	3
5.		Professional Elective III	PEC	-	-	-	-	3
6.		Professional Elective IV	PEC	-	-	-	-	3
7.		Mandatory Course-I ^{&}	MC	3	0	0	3	0
PRACTICALS								
8.	AU3511	Automotive Electrical and Electronics Laboratory	PCC	0	0	4	4	2
TOTAL				-	-	-	-	20

[&] Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC- I)

SEMESTER VI

S. No.	Course Code	Course title	Cate Gory	Periods per week			Total Contact Periods	Credits
				L	T	P		
THEORY								
1.	AU3601	Automotive Pollution and Control	PCC	3	0	0	3	3
2.		Open Elective I*	OEC	3	0	0	3	3
3.		Professional Elective V	PEC	-	-	-	-	3
4.		Professional Elective VI	PEC	-	-	-	-	3
5.		Professional Elective VII	PEC	-	-	-	-	3
6.		Professional Elective VIII	PEC	-	-	-	-	3
7.		Mandatory Course-II ^{&}	AC	3	0	0	3	0
8.		NCC Credit Course Level 3 [#]		3	0	0	3	3 [#]
PRACTICALS								
9.	AU3611	Computer Aided Vehicle Design and Analysis Laboratory	PCC	0	0	4	4	2
10.	AU3612	Engine Testing and Emission Measurement Laboratory	PCC	0	0	4	4	2
TOTAL				-	-	-	-	22

*Open Elective – I shall be chosen from the emerging technologies.

[&] Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)

[#] NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

Attested

ELECTIVE – MANAGEMENT COURSES

Sl. No.	Course Code	Course Title	Category	Periods per week			Total Contact Periods	Credits
				L	T	P		
1.	GE3751	Principles of Management	HSMC	3	0	0	3	3
2.	GE3752	Total Quality Management	HSMC	3	0	0	3	3
3.	GE3753	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE3754	Human Resource Management	HSMC	3	0	0	3	3
5.	GE3755	Knowledge Management	HSMC	3	0	0	3	3
6.	GE3792	Industrial Management	HSMC	3	0	0	3	3

MANDATORY COURSES I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	MX3082	Elements of Literature	MC	3	0	0	3	0
3.	MX3083	Film Appreciation	MC	3	0	0	3	0
4.	MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3	0

MANDATORY COURSES II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3085	Well Being with Traditional Practices (Yoga, Ayurveda and Siddha)	MC	3	0	0	3	0
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX3089	Industrial Safety	MC	3	0	0	3	0

Attested

VERTICAL 3: VEHICLE RESEARCH AND VALIDATION

Sl. No.	Course code	Course title	Category	Periods Per week			Total Contact periods	Credits
				L	T	P		
1.	AU3017	Advanced Automotive Materials	PEC	3	0	0	3	3
2.	AU3018	Noise, Vibration and Harshness	PEC	3	0	0	3	3
3.	AU3019	Combustion Thermodynamics and Heat Transfer	PEC	3	0	0	3	3
4.	AU3020	Alternative Fuels and Energy Systems	PEC	3	0	0	3	3
5.	AU3021	Automotive Instrumentation	PEC	3	0	0	3	3
6.	AU3022	Testing and Measurement Systems	PEC	3	0	0	3	3
7.	AU3023	Homologation	PEC	3	0	0	3	3
8.	AU3024	IC Engine Process Modelling	PEC	3	0	0	3	3

VERTICAL 4: SPECIAL PURPOSE VEHICLES

Sl. No.	Course code	Course title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1.	AU3025	Agricultural Vehicles	PEC	3	0	0	3	3
2.	AU3026	Defence Vehicles	PEC	3	0	0	3	3
3.	AU3027	Constructions Vehicles	PEC	3	0	0	3	3
4.	AU3028	Marine Vehicles	PEC	3	0	0	3	3
5.	AU3029	Space Vehicles	PEC	3	0	0	3	3
6.	CME386	Gas Dynamics and Jet Propulsion	PEC	3	0	0	3	3
7.	CRA332	Drone Technologies	PEC	3	0	0	3	3

VERTICAL 5 : PRODUCT AND PROCESS DEVELOPMENT

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1.	AU3030	Automotive Product Design	PEC	3	0	0	3	3
2.	AU3031	Ergonomics in Automotive Design	PEC	3	0	0	3	3
3.	AU3032	Vehicle Control Systems	PEC	3	0	0	3	3
4.	CME339	Additive Manufacturing	PEC	2	0	2	4	3
5.	AU3033	Finite Element Analysis	PEC	3	0	0	3	3
6.	AU3034	New Product Development Process	PEC	3	0	0	3	3
7.	AU3035	Automotive Product Life Cycle Management	PEC	3	0	0	3	3
8.	CAU332	Dynamics of Ground Vehicles	PEC	3	0	0	3	3

VERTICAL 6: DIVERSIFIED COURSES GROUP 1

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact periods	Credits
				L	T	P		
1.	AU3041	Engine and Vehicle Management Systems	PEC	3	0	0	3	3
2.	AU3042	Transport Management	PEC	3	0	0	3	3
3.	AU3043	Vehicle Maintenance	PEC	3	0	0	3	3
4.	AU3044	Two and Three Wheelers	PEC	3	0	0	3	3
5.	CIE362	Entrepreneurship Development	PEC	3	0	0	3	3
6.	CSF331	Disaster Management	PEC	3	0	0	3	3
7.	AU3036	Advance Theory of IC Engines	PEC	3	0	0	3	3
8.	IE3491	Operations Research	PEC	3	0	0	3	3

VERTICAL 7: DIVERSIFIED COURSES GROUP 2

Sl. No.	Course code	Course Title	Category	Periods Per week			Total Contact periods	Credits
				L	T	P		
1.	ME3492	Hydraulics and Pneumatics	PEC	3	0	0	3	3
2.	CML331	Fundamentals of Nanoscience	PEC	3	0	0	3	3
3.	CAU331	Intellectual Property Rights	PEC	3	0	0	3	3
4.	AU3037	Road Vehicle Aerodynamics	PEC	3	0	0	3	3
5.	CIE350	Lean Six Sigma	PEC	3	0	0	3	3
6.	AU3038	Renewable Sources of Energy	PEC	3	0	0	3	3
7.	AU3039	Vehicle Air-Conditioning	PEC	3	0	0	3	3
8.	AU3040	Solar Energy Technology	PEC	3	0	0	3	3

PROGRESS THROUGH KNOWLEDGE

Attested

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

**OPEN ELECTIVE I AND II
(EMERGING TECHNOLOGIES)**

To be offered other than Faculty of Information and Communication Engineering


SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OCS351	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2.	OCS352	IoT Concepts and Applications	OEC	2	0	2	4	3
3.	OCS353	Data Science Fundamentals	OEC	2	0	2	4	3
4.	CCS333	Augmented Reality /Virtual Reality	OEC	2	0	2	4	3

OPEN ELECTIVES – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
3.	OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
4.	OCE353	Lean Concepts, Tools And Practices	OEC	3	0	0	3	3
5.	CME365	Renewable Energy Technologies	OEC	3	0	0	3	3
6.	OME354	Applied Design Thinking	OEC	3	0	0	3	3
7.	MF3003	Reverse Engineering	OEC	3	0	0	3	3
8.	OPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
9.	OAS352	Space Engineering	OEC	3	0	0	3	3
10.	OIM351	Industrial Management	OEC	3	0	0	3	3
11.	OIE354	Quality Engineering	OEC	3	0	0	3	3
12.	OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
13.	OML351	Introduction to Non-Destructive Testing	OEC	3	0	0	3	3
14.	OMR351	Mechatronics	OEC	3	0	0	3	3
15.	ORA351	Foundation of Robotics	OEC	3	0	0	3	3
16.	OAE352	Fundamentals of Aeronautical Engineering	OEC	3	0	0	3	3
17.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
19.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20.	OEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
21.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22.	OCH351	Nano Technology	OEC	3	0	0	3	3
23.	OCH352	Functional Materials	OEC	3	0	0	3	3

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CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	2	3	1	2	2		1	1		2		1	3
2	1	1	2	3	1	2	2		1	1		2		1	3
3	1	1	2	3	1	2	2		1	1		2		1	3
4	1	1	2	3	1	2	2		1	1		2		1	3
5	1	1	2	3	1	2	2		1	1		2		1	3
Avg.	1	1	2	3	1	2	2		1	1		2		1	3

SEMESTER VI

AU3601

AUTOMOTIVE POLLUTION AND CONTROL

L T P C

3 0 0 3

COURSE OBJECTIVES:

The objective of this course is to prepare the students to have knowledge on the harmful effects of major pollutants of IC engines, emission standards, various pollution measurement devices and control techniques

UNIT I EMISSION FROM AUTOMOBILES 9

Sources of Pollution. Various emissions from Automobiles — Formation — Effects of pollutants on environment human beings. Emission control techniques – Emission standards - National and international.

UNIT II EMISSION FROM SPARK IGNITION ENGINE AND ITS CONTROL 9

Emission formation in SI Engines- Carbon monoxide- Unburned hydrocarbon, NO_x, Smoke — Effects of design and operating variables on emission formation – controlling of pollutants -Catalytic converters — Charcoal Canister — Positive Crank case ventilation system, Secondary air injection, thermal reactor, Laser Assisted Combustion.

UNIT III EMISSION FROM COMPRESSION IGNITION ENGINE AND ITS CONTROL 9

Formation of White, Blue, and Black Smokes, NO_x, soot, sulphur particulate and Intermediate Compounds – Physical and Chemical delay — Significance Effect of Operating variables on Emission formation — Fumigation, EGR, HCCI, Particulate Traps, SCR — Cetane number Effect.

UNIT IV NOISE POLLUTION FROM AUTOMOBILES 9

Sources of Noise — Engine Noise, Transmission Noise, vehicle structural Noise, aerodynamics noise, Exhaust Noise. Noise reduction in Automobiles — Encapsulation technique for noise reduction — Silencer Design.

UNIT V TEST PROCEDURES AND EMISSION MEASUREMENTS 9

Constant Volume Sampling I and 3 (CVSI & CVS3) Systems- Sampling Procedures — Chassis dyno - Seven mode and thirteen mode cycles for Emission Sampling — Sampling problems — world harmonized driving cycles - Emission analysers —NDIR, FID, Chemiluminescent, Smoke meters, Dilution Tunnel, SHED Test, Sound level meters. Particle counter

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Differentiate the various emissions formed in IC engines
2. Analyze the effects of pollution on human health and environment
3. Design the control techniques for minimizing emissions
4. Categorize the emission norms
5. Identify suitable methods to reduce the noise emissions.

Attested

TEXT BOOKS:

1. B.P Pundir , Engine Emissions, Narosa publications 2nd edition 2017
2. D.J.Patterson and N.A.Henin, 'Emission from Combustion Engine and their control', Anna Arbor Science Publication,1985.
3. G.P.Springer and D.J.Patterson, Engine Emissions, Pollutant formation, Plenum Press,New York, 1986.

REFERENCES:

1. A.Alexander, J.P.Barde, C.Iomure and F.J. Langdan, 'Road traffic noise', Applied science publisher ltd., London,1987.
2. Crouse and Anglin, 'Automotive Emission Control', McGraw Hill company.,Newyork 1993.
3. C.Duerson, 'Noise Abatment', Butterworths ltd., London1990.
4. V.Ganesan, 'Internal combustion Engines', Tata McGraw Hill Book Co, Eighth Reprint,2005.
5. L.Lberanek, 'Noise Reduction', Mcgrawhill Company., New york 1993.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	3	1		1	1	1					2		1	3
2	1	3	1		1	1	1					2		1	3
3	1	3	1		1	1	1					2		1	3
4	1	3	1		1	1	1					2		1	3
5	1	3	1		1	1	1					2		1	3
Avg.	1	3	1		1	1	1					2		1	3

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PROGRESS THROUGH KNOWLEDGE

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NX3651	NCC Credit Course Level 3*	L T P C
	(ARMY WING) NCC Credit Course - III	3 0 0 3

PERSONALITY DEVELOPMENT	9
PD 3 Group Discussion: Team Work	2
PD 4 Career Counselling, SSB Procedure & Interview Skills	3
PD 5 Public Speaking	4
BORDER & COASTAL AREAS	4
BCA 2 Security Setup and Border/Coastal management in the area	2
BCA 3 Security Challenges & Role of cadets in Border management	2
ARMED FORCES	3
AF 2 Modes of Entry to Army, CAPF, Police	3
COMMUNICATION	3
C 1 Introduction to Communication & Latest Trends	3
INFANTRY	3
INF 1 Organisation of Infantry Battalion & its weapons	3
MILITARY HISTORY	23
MH 1 Biographies of Renowned Generals	4
MH 2 War Heroes - PVC Awardees	4
MH 3 Study of Battles - Indo Pak War 1965, 1971 & Kargil	9
MH 4 War Movies	6
TOTAL: 45 PERIODS	

NX3652	NCC Credit Course Level 3*	L T P C
	(NAVAL WING) NCC Credit Course - III	3 0 0 3
PERSONALITY DEVELOPMENT	9	
PD 3 Group Discussion: Team Work	2	
PD 4 Career Counselling, SSB Procedure & Interview Skills	3	
PD 5 Public Speaking	4	
BORDER & COASTAL AREAS	4	
BCA 2 Security Setup and Border/Coastal management in the area	2	
BCA 3 Security Challenges & Role of cadets in Border management	2	
NAVAL ORIENTATION	6	
NO 3 Modes of Entry - IN, ICG, Merchant Navy	3	
AF 2 Naval Expeditions & Campaigns	3	
NAVAL COMMUNICATION	2	
NC 1 Introduction to Naval Communications	1	
NC 2 Semaphore	1	
NAVIGATION	2	
N 1 Navigation of Ship - Basic Requirements	1	
N 2 Chart Work	1	

SEAMANSHIP		15
MH 1	Introduction to Anchor Work	2
MH 2	Rigging Capsule	6
MH 3	Boatwork - Parts of Boat	2
MH 4	Boat Pulling Instructions	2
MH 5	Whaler Sailing Instructions	3
FIRE FIGHTING FLOODING & DAMAGE CONTROL		4
FFDC 1	Fire Fighting	2
FFDC 2	Damage Control	2
SHIP MODELLING		3
SM	Ship Modelling Capsule	3
TOTAL : 45 PERIODS		

NCC Credit Course Level 3*

NX3653	(AIR FORCE WING) NCC Credit Course Level - III	L T P C
		3 0 0 3
PERSONALITY DEVELOPMENT		9
PD 3	Group Discussion: Team Work	2
PD 4	Career Counselling, SSB Procedure & Interview Skills	3
PD 5	Public Speaking	4
BORDER & COASTAL AREAS		4
BCA 2	Security Setup and Border/Coastal management in the area	2
BCA 3	Security Challenges & Role of cadets in Border management	2
AIRMANSHIP		1
A 1	Airmanship	1
BASIC FLIGHT INSTRUMENTS		3
FI 1	Basic Flight Instruments	3
AERO MODELLING		3
AM 1	Aero Modelling Capsule	3
GENERAL SERVICE KNOWLEDGE		2
GSK 4	Latest Trends & Acquisitions	2
AIR CAMPAIGNS		6
AC 1	Air Campaigns	6
PRINCIPLES OF FLIGHT		6
PF 1	Principles of Flight	3
PF 2	Forces acting on Aircraft	3
NAVIGATION		5
NM 1	Navigation	2
NM 2	Introduction to Met and Atmosphere	3
AERO ENGINES		6
E 1	Introduction and types of Aero Engine	3
E 2	Aircraft Controls	3

Attested

TOTAL : 45 PERIODS

COURSE OBJECTIVES:

The objective of this course is to prepare the students to become familiar with the use of various modelling software for modelling and visualizing various engine components

LIST OF ENGINE DESIGN EXPERIMENTS

1. Design and modelling of piston, piston pin and piston rings.
2. Design and modelling of connecting rod assembly.
3. Design and modelling of crankshaft assembly.
4. Design and modelling of flywheel
5. Design and modelling of cam and camshaft.

LIST OF CHASSIS DESIGN EXPERIMENTS

1. Design and modelling of frame
2. Design and modelling of clutch assembly.
3. Design and modelling of sliding mesh gearbox
4. Design and modelling of propeller shaft with universal joint.
5. Design and modelling of front and rear axle assembly

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Visualize the automotive components with the help of modelling software.
2. Modify design instantly if required at the initial design stage itself
3. Demonstrate the knowledge on designing components to withstand the loads and deformations.
4. Synthesize, analyse and document the design of the various components
5. Apply engineering techniques for developing vehicle components with industry standards

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CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	1	2	1		1	1		2		1	3
2	1	1	1	1	1	2	1		1	1		2		1	3
3	1	1	1	1	1	2	1		1	1		2		1	3
4	1	1	1	1	1	2	1		1	1		2		1	3
5	1	1	1	1	1	2	1		1	1		2		1	3
Avg.	1	1	1	1	1	2	1		1	1		2		1	3

COURSE OBJECTIVES:

The objective of this course is to prepare the students to acquire practical knowledge in automotive emission measurement and methods of testing engines.

LIST OF EXPERIMENTS:

1. Study of Engine Dynamometers.
2. Study of IC engine Pressure measurement systems for combustion analysis.
3. Performance study on petrol engine.
4. Performance study on diesel engine.
5. Determination of Frictional power on multi cylinder petrol/diesel engines.

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6. Heat balance test on an automotive petrol/diesel engine.
7. Measurement of HC, CO, CO₂, O₂ and NO_x using exhaust gas analyzer.
8. Diesel smoke measurement.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Identify the various emission measuring instruments
2. Describe the various engine testing instruments
3. Understand the procedure to measure the emission
4. Conduct testing for engine performance, combustion and emission characteristics
5. Recall the available emission norms

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1			1	2	1		1	1		2		1	3
2	1	1			1	2	1		1	1		2		1	3
3	1	1			1	2	1		1	1		2		1	3
4	1	1			1	2	1		1	1		2		1	3
5	1	1			1	2	1		1	1		2		1	3
Avg.	1	1			1	2	1		1	1		2		1	3

SEMESTER VII

AU3701

ENGINE AND CHASSIS COMPONENTS DESIGN

**L T P C
3 0 0 3**

COURSE OBJECTIVES:

The objective of this course is to prepare the students for understanding the design concept and principles involved in various engine components like cylinder, piston, connecting rod, crankshaft, flywheel, axle, suspension and steering systems.

UNIT I INTRODUCTION

9

Engineering materials - Introduction endurance limit, notch sensitivity. Tolerances, types of tolerances and fits, design considerations for interference fits, surface finish, surface roughness, Rankine's formula - Tetmajer's formula - Johnson formula- design of pushrods.

UNIT II DESIGN OF CYLINDER, PISTON AND CONNECTING ROD

9

Choice of material for cylinder and piston, design of cylinder, piston, and piston pin, piston rings, piston failures, lubrication of piston assembly. Material for connecting rod, determining minimum length of connecting rod, small end design, shank design, design of big end cap bolts.

UNIT III DESIGN OF CRANKSHAFT AND FLYWHEEL

9

Balancing of I.C. engines, significance of firing order. Material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations, development of short and long crank arms. Front and rear-end details. Determination of the mass of a flywheel for a given co-efficient of speed fluctuation. Engine flywheel - stresses on the rim of the flywheels. Design of hubs and arms of the flywheel, turning moment diagram.

UNIT IV DESIGN OF VEHICLE FRAME, SUSPENSION AND STEERING SYSTEMS

9

Study of loads-moments and stresses on frame members. Design of frame for passenger and commercial vehicle - Design of leaf Springs-Coil springs and torsion bar springs. Determination of optimum dimensions and proportions for steering linkages, ensuring minimum error in steering.