Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)

Evaluation Scheme & Syllabus for
Department Of Mechanical Engineering

M.Tech .-(Automobile Engg.)
(II Semester)
(Effective from session 2025-26)

EVALUATION SCHEME

M.Tech AUTOMOBILE ENGG. (II SEMESTER)

STUDY AND EVALUATION SCHEME FOR M.TECH AUTOMOBILE ENGINEERING

SEMESTER-II

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
MENGIAU201	Engine Design	3	1	0	2	30	-	30	70	-	70	100
MCHASAU202	Chassis & Body Engg.	3	1	0	4	30	-	30	70	-	70	100
MVEHIAU203	Vehicle Dynamics	3	1	0	3	30	-	30	70	-	70	100
MNOISAU204	Noise & Vibration	3	1	0	3	30	-	30	70	-	70	100
MADVAAU205	Advanced Automotive Electronic	3	1	0	3	30	-	30	70	-	70	100
MSEMIAU206	Seminar -II	0	0	2	3	30	-	30	70	-	70	100
Total		15	5	8	24	180	125	305	420	125	545	850

Department Of Mechanical engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

L	T	P
3	1	2

MENGIAU201
Engine Design

Introduction:
Determination of engine power, Engine selection, swept volume, stroke, bore & number of cylinders, Arrangement of cylinders stroke to bore ratio. Design procedure of theoretical Analysis, Design considerations

Material selection & actual design of components –
Cylinder block deign, cylinder head design, piston & piston pin design, piston ring design, connecting rod design, crankshaft design, flywheel design, design of valve mechanism

Engine balancing:
Firing order, longitudinal forces, transverse forces, pitching moments, yawing moments, Engine layout, major critical speed & minor critical speed, design of engine mounting,

Design of cooling system –
design principles of exhaust & inlet systems, Primary design calculation of major dimensions of fuel injection system
.

Reference Books:

1. I. C. Engine & Air Pollution – E. F. Obert, Harper & Row Publishers, New York
2. Engine Design – Giles J. G., Lliffe Book Ltd.
3. Engine Design – Crouse, Tata McGraw Publication, Delhi
4. I.C. Engine byMaleev V. L., McGraw Hill Book, Co.
5. Machine Design-RS Khurmi , Scand publication India.

LIST OF EXPERIMENTS:-

1. Heat balance sheet of IC engine
2. Design of cylinder using simulation software.
3. Design of connecting rod using simulation software.
4. Design of piston using simulation software.
5. Study of engine vibration sources

L	T	P
3	1	0

Department Of Mechanical engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

MCHASAU202
Chassis & Body Engineering

Vehicle Aerodynamics:
Objects- vehicle drag and types, various types of forces and moments, effects of forces and moments, various body optimization techniques for minimum drag, principle of wind tunnel technology, flow visualization techniques, tests with scale models.

Car Body Details:
Types of car bodies, visibility, regulations, driver's visibility, methods of improving visibility, safety design, constructional details of roof, under floor, bonnet, boot, wings etc, Classification of coach work.

Design of Vehicle Bodies:
Vehicle body materials, Layout of the design, preliminary design, safety, Idealized structure-structural surface, shear panel method, symmetric and asymmetrical vertical loads in car, longitudinal loads.

Different loading situations-
load distribution on vehicle structure, Calculation of loading cases, stress analysis of bus body structure under bending and torsion, stress analysis in integral bus body.

Design of chassis frame:
Rules and regulations for body, recent safety measures, testing of body.

Reference Books:

1. Vehicle Body Engineering – Pawloski J., Business Books Ltd.
2. The Automotive Chassis: Engineering Principles – Reimpell J.
3. Vehicle Body Layout and Analysis – John Fenton, Mechanical Engg. Publications Ltd. London
4. Body Construction and Design – Giles J. G., Illife Books, Butterworth and Co.

LIST OF EXPERIMENTS:
1. To study different parts of chassis.
2. To do and study the Wheel alignment.
3. To do and study wheel balancing.
4. To do and study the different loading conditions of chassis.
5. To study and design a chassis

Department Of Mechanical engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

L	T	P
3	1	0

MVEHIAU203
Vehicle Dynamics

Suspension system –
requirements, types, air suspension, rubber suspension, Shock absorbers, design of leaf spring, coil spring and torsion bar, types of drives-Hotchkiss and torque tube,

Wheel alignments: wheel wobble, wheel shimmy, pitching, bouncing and rolling, roll centre and roll axis, anti-roll bar, road holding,

Handling Characteristics:
Steering geometry, Fundamental condition for true Rolling, Akerman's Steering Gear, Davis Steering gear, Steady state Handling - Neutral steer, Under steer and over steer, Steady state response, Yaw velocity, Lateral Acceleration, Curvature response & Directional stability, jack-knifing in articulated vehicle, loading of automobile chassis due to road irregularities,, comfort criteria, load transferred while braking and cornering, equivalent wt.of vehicle.

Ride Characteristics:
Human response to vibrations, Single degree & Two degree freedom, Free & Forced vibrations, Vehicle Ride Model, Two degree freedom model for sprung & unsprung mass, Two degree freedom model for pitch & bounce, Vibrations due to road roughness and engine unbalance, Transmissibility of engine mounting, Motion of vehicle on undulating road & Compensated suspension systems.

Reference Books:
1. Theory of Ground Vehicles - J. Y.Woung - John Willey & Sons, NY
2. Steering, Suspension & Tyres – J. G. Giles, Illefe Books Ltd., London
3. Mechanics of Road Vehicles – W. Steed, Illefe Books Ltd. London
4. Automotive Chassis – P. M. Heldt, Chilton Co. NK

Department Of Mechanical engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

L	T	P
3	1	0

MNOISAU204
Noise & Vibration

Noise:
Noise characteristics, Sources of noise, noise level measurement techniques, vehicular noise level, engine noise, transmission noise, brake squeal, structural noise, noise in auxiliaries, wind noises etc.

Noise Testing & Noise Control:
Mechanization of noise generation, noise control methodologies, noise control measures, environmental noise management.

Road vehicle noise standards Vibration:
Introduction, Single degree of freedom, damped, forced vibration, Multi degree of free vibration, modes, nodes, Holzer's method. Multi degree of freedom of vibration, matrix method, eigen values and vectors, natural frequencies & modes.

Model analysis:
Numerical methods for solution, Lagrange's equation for problem formulation, Two degree of freedom system, co-ordinate, coupling, solution Vibration under periodic force, use of Fourier series

Vibration of continuous systems:
Transverse vibration of cable, bar, torsion vibration of shaft, Rayliegh's method, Reyliegh-Ritz method Vibration control, Balancing of reciprocating & rotating masses, controlling natural frequencies, vibration isolation, vibration absorbers. Basics of non-linear vibration, causes of non-linearity, formulation, solution methods, iterative, graphical, methods of isoclines, stability of equilibrium state, types of singularity, limits cycle. Basic vibration measuring set up, brief introduction to experimental model analysis.

Reference Books:

1. Mechanical Vibration – S. S. Rao, New Age International (P) Ltd., New Delhi
2. Engineering Mechanics Static & Dynamics – I. H. Shames
3. Mechanical Vibration Analysis, P. Srinivasan, Tata McGraw Hill Pub. New Delhi
4. Non-linear Mechanical Vibration – P. Srinivasan, Tata McGraw Hill Pub. New Delhi
5. Fundamental of Mechanical Vibration – S. Graham Kelly, Tata McGraw Hill Pub.
6. Mechanical Vibration – Grover G. K., Nem Chand & Brothers, Roorkee

7. Engineering Vibration – Daniel J. Inman, Prentice Hall, NJ
8. Theory of Vibrations – W. T. Thomson, CBS Publishers, New Delhi

Department Of Mechanical engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

L	T	P
3	1	0

MADVAAU205
Advanced Automotive Electronics

Fundamentals of Automotive Electronics:
Microprocessor and micro computer applications in automobiles – Components for engine management system – electronic management of chassis system, vehicle motion control, electronic panel meters.

Sensors & Actuators :
Introduction, basic sensor arrangement, types of sensors, oxygen sensor cranking sensor – position sensors – engine cooling water temperature sensors, engine oil pressure sensor, fuel metering, vehicle speed sensor & detonation sensor, stepper motors – relays.

Electronic fuel injection & ignition system:
Introduction, feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, types of solid state ignition system and their principles of operation, electronic spark timing control.

Digital engine control system :
Open loop and close loop control system, engine cooling and warm up control, Acceleration, detonation and idle speed control-integrated engine system, exhaust emission control engineering, on-board diagnostics, diagnostics, future automotive electronic systems,

Automotive Electrical:
Batteries, starter motor & drive mechanism, D.C. generator & alternator, regulation for charging, lighting design, dash board instruments, horn, warning systems and safety devices.

Comfort and safety :
seats, mirrors and sun-roofs, central locking and electronic windows, cruise control, in-car multimedia, security, airbag and belt tensioners, other safety and comfort systems, advanced comfort and safety systems, New developments in comfort and safety.

The system approach to control & instrumentation:

Electronics fundamentals, Electronic components and circuits, digital electronics, microcomputer instrumentation and control, sensors and actuators, digital engine control systems, vehicle motion control, automotive instrumentation and telematics, new developments,

Reference Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffitns - Butterworths, London
2. Understanding Automotive Electronics – Bechfold SAE 1998
3. Fundamentals of Automotive Electronics - V.A.W.Hilliers - Hatchin, London
4. Automotive Computer & Control System– Tomwather J. R., Cland Hunter, Prentice Inc. NJ