

**DR. A. P. J. ABDUL KALAM TECHNICAL UNIVERSITY
LUCKNOW, UTTAR PRADESH**



STUDY & EVALUATION SCHEME WITH SYLLABUS

FOR

B. TECH. 3rd YEAR

MECHANICAL ENGINEERING

[Effective from Session: 2020-21]

MECHANICAL ENGINEERING#

B. Tech Mechanical Engineering Evaluation Scheme

SEMESTER- V														
Sl. No.	Code	Subject	Periods			Evaluation Scheme				End Semester			Total	Credits
			L	T	P	CT	TA	Total	PS	TE	PE			
		-												
		-												
		*												
		Total	17	3	6								950	22
*														

SEMESTER- VI														
Sl. No.	Code	Subject	Periods			Evaluation Scheme				End Semester			Total	Credits
			L	T	P	CT	TA	Total	PS	TE	PE			
		-												
		-												
		Total	17	3	6								900	21

MECHANICAL ENGINEERING#

It is suggested that the students should choose Departmental Electives Specializationwise that will support them to gain enough learning of the chosen Specialization.

Department Electives

	Specialization-1	Specialization-2	Specialization-3	Specialization-4	Specialization-5
Specialization	Manufacturing and Automation	Automation and Industry 4.0	Design and Analysis	Thermal Engineering	Automobile Engineering
Sem V Code					
Departmental Elective-I					
Sem V Code					
Departmental Elective-II					
Sem VI Code					
Departmental Elective-III					
Sem VII Code					
Departmental Elective-IV					
Sem VII Code					
Departmental Elective-V					

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It is suggested that the students may also do the following MOOCs in addition to mandatory courses. This will enhance their learning in a particular Specialization. One MOOC per semester is recommended.

Suggested MOOCs Course

Specialization	Specialization -1	Specialization -2	Specialization -3	Specialization -4	Specialization -5
	Manufacturing and Automation	Automation and Industry 4.0	Design and Analysis	Thermal Engineering	Automobile Engineering
Sem V	Advance Machining Process	Control Systems	Experimental Stress Analysis	Fluid dynamics and turbo machines	Vehicle Dynamics
Sem VI	Introduction to robotics	Introduction to robotics	Introduction to CFD	Introduction to CFD	Control Systems
Sem VII	Automation in Manufacturing	Introduction to Industry 4.0 and Industrial Internet of Things	Introduction to Composites	Fundamentals of Compressible Flow	Introduction to hybrid and Electric Vehicles
Sem VIII	Production and Operation Management	Supply Chain management	Material Characterization	Computational Fluid Dynamics for Incompressible Flows	Fuel Cell Technology

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Subject Code: KME 501	Heat and Mass Transfer	L T P : 3 1 0	Credits: 4
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The students will be able to		Blooms Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

UNIT-1

Introduction to Heat Transfer

(L-5 Hours)

Steady State one-dimensional Heat conduction

(L-3 Hours)

UNIT-2

Fins

(L-3 Hours)

Transient Conduction

(L-3 Hours)

UNIT-3

Forced Convection

(L-5 Hours)

Natural Convection

(L-5 Hours)

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UNIT-4

Thermal Radiation

(L-8 Hours)

UNIT-5

Heat Exchanger

(L-5 Hours)

Condensation and Boiling

(L-3 Hours)

Introduction to Mass Transfer

(L-2 Hours)

Reference Books:-

MECHANICAL ENGINEERING#

Subject Code: KME 502	Strength of Material	L T P : 3 1 0	Credits: 4
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Course Outcomes: The student will be able to		Blooms Taxonomy
CO 1		
CO 2		
CO 3		
CO 4		
CO 5		
CO 6		

Unit I **8 Hours**
Compound stress and strains:

Unit II **8 Hours**
Stresses in Beams: ,

Deflection of Beams:

Torsion:

Unit III **8 Hours**
Helical and Leaf Springs:

Columns and Struts:

Unit IV **8 Hours**
Thin cylinders & spheres:

Thick cylinders:

Unit V

8 Hours

Curved Beams:

Unsymmetrical Bending:

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Text Books:

Reference Books:

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MECHANICAL ENGINEERING#

Subject Code: KME 503	Industrial Engineering	L T P : 3 1 0	Credits: 4
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Course Outcomes: The students will be able to		Blooms Taxonomy
CO1		
CO2		
CO3		
CO4		
CO5		

Unit-I:
Overview of Industrial Engineering

Facility location and layout:

Unit II:
Production Planning and control:

Project Management:

Unit III:
Engineering economy and Inventory control:

Queuing Theory:

Unit IV
Work System Design:

Product Design and Development

Unit V:
Operational Analysis:

Books and References:

MECHANICAL ENGINEERING#

Subject Code: KME 551	Heat and Mass Transfer Lab	L T P : 0 0 2	Credits: 1
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The students will be able to		Blooms Taxonomy
CO1	Apply the concept of conductive heat transfer.	K3
CO2	Apply empirical correlations for both forced and free convection to determine the value of convection heat transfer coefficient	K3
CO3	Apply the concept of radiation heat transfer for black and grey body.	K3
CO4	Analyze the thermal behaviour of parallel or counter flow heat exchangers	K4
CO5	Conduct thermal analysis of a heat pipe	K4

List of Experiments

Minimum eight experiment of the following

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MECHANICAL ENGINEERING#

Subject Code: KME 552	Python Lab	L T P : 0 0 2	Credits: 1
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Course outcomes: The students will be able to		Blooms Taxonomy
CO1		
CO2		
CO3		
CO4		K4

List of Python Program

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Components required-

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MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – I: Specialization – Manufacturing and Automation

Subject Code: KME 051	Computer Integrated Manufacturing	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

Unit 1

Introduction to Computer Integrated Manufacturing (CIM):

Unit 2

Principles of Computer Graphics:

Transformation in Graphics:

Curves: -

Surface Modeling:

Solid modeling:

Unit 3

Computer Aided Manufacturing:

Unit 4

Group Technology: -

Flexible Manufacturing System:

Robotics:

- - -

Unit 5

Data and information in CIM:

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Material handling in CIM environment:

Rapid prototyping:

Books and References:

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MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – I: Specialization – Automation and Industry 4.0

Subject Code: KME 052	Mechatronics Systems	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to	Bloom Taxonomy

Unit I: Mechatronics & Its Scope
Mechatronics System:

Control System Concepts:

Unit II: Sensor & Transducer

UNIT III: ACTUATION SYSTEMS
Fluid Based Actuation

Electrical Actuation Systems:

UNIT IV: INDUSTRIAL CONTROLLERS
Programmable Logic Controllers:

Programming Techniques:

UNIT V: MECHATRONICS APPLICATIONS:

MECHANICAL ENGINEERING#

Text Books:



MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – I: Specialization – Design and Analysis

Subject Code: KME 053	Finite Element Methods	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

Unit 1

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Unit 2

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Unit 3

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Unit 4

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Unit 5

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Text Books:

MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – I: Specialization – Thermal Engineering

Subject Code: KME 054	I C Engine, Fuel and Lubrication	L T P : 3 0 0	Credits: 3
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CO	Course Outcome	Bloom Taxonomy

Unit-I (9 Hours)

Unit-II (7 Hours)

Unit-III (8 Hours)

Unit-IV (9 Hours)

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UNIT-V

(9 Hours)

Text Books

Reference Books

MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – I: Specialization – Automobile Engineering

Subject Code: KAU 051	Automobile Engines & Combustion	L T P : 3 0 0	Credits: 3
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Proposed By MIET

CO	Course Outcome	Bloom Taxonomy

Unit-I

(8 Hours)

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Unit-II

(8 Hours)

Combustion and Flames Propagation:

Unit-III

(7 Hours)

MECHANICAL ENGINEERING#

Unit-IV

(9 Hours)

UNIT-V

(8 Hours)

Text Books

Reference Books

MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – II: Specialization – Manufacturing and Automation

Subject Code: KME 055	Advance welding	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

UNIT-I:

Introduction:

Welding Arc:

Welding Power Sources:

UNIT-II:

Welding Processes:

Advances in Welding Processes:

UNIT-III:

Heat Flow Welding:

Welding Metallurgy:

UNIT-IV:

Repair & Maintenance Welding:

Weldability:

UNIT-V:

Weld Design:

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Welding Codes, WPS & PQR:

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Books and References:

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MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – II: Specialization – Automation and Industry 4.0

Subject Code: KME 056	Programming, Data Structures And Algorithms Using Python	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

UNIT 1: Introduction (8 Hours)

UNIT 2: Data Structure (7Hours)

UNIT 3: Function and File Handling (8 Hours)

UNIT 4: Classes and Object (8 Hours)

UNIT 5: Algorithm (7 Hours)

Reference Books:

- 1.
 - 2.
 - 3.
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MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – II: Specialization – Design and Analysis

Subject Code: KME 057	Mechanical Vibrations	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

UNIT – I

(10 Hours)

UNIT – II

(8Hours)

UNIT- III

(8Hours)

UNIT- IV

(10 Hours)

UNIT- V

(8Hours)

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Books and References:

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-
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Case study Reference#1 _____

Case study Reference#2:

7. Case study Reference#3:

8. MOOC reference: _____

Recommended software packages:

MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – II: Specialization – Thermal Engineering

Subject Code: KME 058	Fuels and Combustion	L T P : 3 0 0	Credits: 3
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	The students will be able to	Blooms Taxonomy
CO1		
CO2		
CO3		
CO4		
CO5		
CO6		

Unit-I

Classification and Properties of Fuels:

- - - - -

Solid Fuels:

- - - - -

Unit-II

Liquid Fuels:

- - - - -

Gaseous Fuels:

- - - - -

Unit-III: Combustion and Flames Propagation

Unit-IV: Combustion Equipment

- - - - -

Unit-V: Air Pollution

Text book (s):

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Reference Books:

MECHANICAL ENGINEERING#

Semester – V: Departmental Elective – II: Specialization – Automobile Engineering

Subject Code: KAU 052	Automotive chassis and suspension	L T P : 3 0 0	Credits: 3
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Course Outcomes: The students will be able to		Blooms Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

Unit I

Chassis Layouts and Frames

Automotive Frames -

Unit II

Transmission: -

Drive Line: -

Unit III

Suspension System: -

Braking Systems: -

Unit IV

Axles:

Steering System:

Unit V

Wheels and Tyres:

Bearings

Recent Trends in Chassis Systems:

Text Books:

References:

3.

MECHANICAL ENGINEERING#

Subject Code: KME 601	Refrigeration & Air Conditioning	L T P : 3 1 0	Credits: 4
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The students will be able to		Blooms Taxonomy
CO1	-	
CO2	-	
CO3		
CO4	-	
CO5		
CO6		

Unit-1

8 Hours

Refrigeration:

Air Refrigeration cycle:

Unit-2

8 Hours

Vapour Compression System:

Multistage System:

Unit-3

8 Hours

Vapour Absorption system;

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Refrigerants:

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**Unit-4
Air Conditioning:**

8 Hours

**Unit-5
Refrigeration System Equipment**

8 Hours

Application:

Other systems

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Reference Books:

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MECHANICAL ENGINEERING#

Subject Code: KME 602	Machine Design	L T P : 3 1 0	Credits: 4
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Course Outcomes: The student will be able to		Blooms Taxonomy
CO 1		
CO 2		
CO 3		
CO 4		
CO 5		

Unit I **8 Hours**
Introduction

Design against Fluctuating Loads

Unit II **8 Hours**
Riveted Joints

Welded Joints

Shafts

Unit III **8 Hours**
Spur Gears

Helical Gears

Unit IV
Sliding Contact Bearing

8 Hours

Rolling Contact Bearing

Unit V
IC Engine Parts

8 Hours

Friction Clutches

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Note: Design data book is allowed in the examination

Text Books:

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Reference Books:

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MECHANICAL ENGINEERING#

Subject Code: KME 603	Theory of Machines	L T P : 3 1 0	Credits: 4
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Course Outcomes: The students will be able to		Blooms Taxonomy
CO1		
CO2	-	
CO3		
CO4		
CO5		
CO6		

Unit I

(09 Hours)

Velocity analysis:

Acceleration analysis:

Unit II

(10 Hours)

Cams:

Gears and gear trains:

Unit III

(08 Hours)

Force analysis:

Unit IV

(09 Hours)

Balancing:

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Governors:

Unit V

(09 Hours)

Brakes and dynamometers:

Gyroscope:

Text / Reference Books

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Suggested Software



MECHANICAL ENGINEERING#

Subject Code: KME 651	Refrigeration & Air Conditioning Lab	L T P : 0 0 2	Credits: 1
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The students will be able to:		Blooms Taxonomy
CO1		
CO2		
CO3		
CO4		

Minimum eight experiments out of the following:

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MECHANICAL ENGINEERING#

Subject Code: KME 652	Machine Design Lab	L T P : 0 0 2	Credits: 1
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Course Outcomes: The student will be able to		Blooms Taxonomy
CO-1		K3
CO-2		K4
CO-3		K5

A Design of Machine Elements

**B. Computer Programs for conventional design
Computer and Language**

MECHANICAL ENGINEERING#

Subject Code: KME 653	Theory of Machines Lab	L T P : 0 0 2	Credits: 1
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The students will be able to:		Blooms Taxonomy
CO1		
CO2	-	
CO3		
CO4		
CO5		

List of Experiments

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NOTE: Student has to write computer program in C / C++ / Python and to run to compute the output values for at least ONE experiments.



MECHANICAL ENGINEERING#

Semester – VI: Departmental Elective – III: Specialization – Manufacturing and Automation

Subject Code: KME 061	Nondestructive Testing	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to	Bloom Taxonomy

Unit-I:
Introduction

Visual Inspection

Unit-II:
Liquid Penetrant Testing

Magnetic Particle Inspection

Unit-III:
Radiographic Testing

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Unit-IV:
Ultrasonic Testing

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MECHANICAL ENGINEERING#

Semester – VI: Departmental Elective – III: Specialization – Automation and Industry 4.0

Subject Code: KME 062	Artificial Intelligence	L T P : 3 0 0	Credits: 3
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Course Outcomes: Students are able to		Bloom's Taxonomy
CO 1		K2
CO 2	- -	K3
CO 3		K2
CO 4		K3
CO 5		K4
CO 6		K5

Unit 1: (9Hours)

Unit 2: (8Hours)

Unit 3: (9Hours)

Unit 4: (7Hours)

Unit 5: (7Hours)

MECHANICAL ENGINEERING#

Text Book:

Reference Books:

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MECHANICAL ENGINEERING#

Semester – VI: Departmental Elective – III: Specialization – Design and Analysis

Subject Code: KME 063	Tribology	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to	Bloom Taxonomy

UNIT –I Lubrication and Lubricants

UNIT –II Friction and Wear

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UNIT –III Lubrication of Bearings

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UNIT –IV Solid Lubrication and Surface Treatment

UNIT –V Friction, Lubrication and Wear in Kinematic pairs

Books and References:

MECHANICAL ENGINEERING#

Semester – VI: Departmental Elective – III: Specialization – Thermal Engineering

Subject Code: KME 064	Gas Dynamics and Jet Propulsion	L T P : 3 0 0	Credits: 3
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Course Outcomes: The students will be able to		Blooms Taxonomy
CO1		
CO2		
CO3		
CO4		
CO5		

UNIT -I:

-

UNIT-II:

-

UNIT -III:

-

UNIT -IV:

UNIT -V:

Books and References:

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Semester – VI: Departmental Elective – III: Specialization – Automobile Engineering

MECHANICAL ENGINEERING#

Subject Code: KAU 061	Automotive Electrical and Electronics	L T P : 3 0 0	Credits: 3
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The students will be able to		Blooms Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

Unit 1 [L 8 Hours]
Introduction to electrical fundamentals

Charge storing devices-

Unit 2 [L 8 Hours]
Starter Systems-

Charging System-

Unit 3 [L 8 Hours]
Automotive Ignition Systems

Auxiliary Systems:

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Unit 4

[L 8 Hours]

Automotive Electronics:

Control Units:

Unit 5

[L 8 Hours]

Automotive Sensors and Actuators:

Books:

References:

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MECHANICAL ENGINEERING#

B. Tech Mechanical Engineering Evaluation Scheme Effective in Session 2021-22 (Yet to finalized)

SEMESTER- VII													
Sl. No.	Code	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
		-											
		-											
		-											
		-											
		*											
		Total	9	0	12	21						850	18
*													

SEMESTER- VIII													
Sl. No	Code	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
		-											
		-											
		-											
		Total	9	0	18	27						850	18

MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – IV (Common for Three Specializations)

Specialization – Manufacturing and Automation

Automation and Industry 4.0

Design and Analysis

Subject Code: KME 071	Additive manufacturing	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to	Bloom Taxonomy

UNIT I

Introduction

Layer Manufacturing Processes

UNIT II

Development of Additive Manufacturing Technology

Generalized Additive Manufacturing Process Chain

UNIT III

Additive Manufacturing Processes

Vat Photo polymerization

Powder Bed Fusion Processes

Extrusion Based System

Material Jetting

Directed Energy Deposition Processes;

UNIT IV: Design & Software Issues

Additive Manufacturing Design and Strategies

Software Issue for Additive Manufacturing

UNIT V

Material Design & Quality Aspects

Applications

Books and References

MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – IV: Specialization – Thermal Engineering

Subject Code: KME 072	HVAC systems	L T P : 3 0 0	Credits: 3
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The students will be able to		Bloom Taxonomy
CO1		
CO2		
CO3		
CO4		
CO5		
CO6		

Unit-I (8 Hours)
Advanced Vapour Compression Cycles:

Refrigerants:

Unit-II (7 Hours)
Heat Pump:

Ventilation:

Air Conditioning system:

Unit-III (7 Hours)
Review of Psychrometry:

Design Condition:

Unit-IV: (11 Hours)
Load Calculation:

Unit-V (7 Hours)
Air Distribution:

Air Conditioning Apparatus:

Text Books

Reference Books

MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – IV: Specialization – Automobile Engineering

Subject Code: KAU 072	Hybrid Vehicle Propulsion	L T P : 3 0 0	Credits: 3
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The students will be able to		Blooms Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

UNIT I

Introduction to Hybrid Electric Vehicles: [L-4 Hours]

Conventional Vehicles: [L-4 Hours]

UNIT II

Hybrid Electric Drive-trains: [L-4 Hours]

Electric Drive-trains: [L-4 Hours]

UNIT III

Electric Propulsion unit: [L-10 Hours]

UNIT IV

Energy Storage: [L-5 Hours]

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Sizing the drive system:

[L-4 Hours]

UNIT V

Energy Management Strategies:

[L-8 Hours]

Text Books:

Reference Books:



MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – V: Specialization – Manufacturing and Automation

Subject Code: KME 073	Mathematical Modeling of Manufacturing Processes	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

Unit-1:

Unit-2:

Unit-3:

Unit-4:

Unit-5:

Books and References

Related Course's / Useful Links

MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – V: Specialization – Automation and Industry 4.0

Subject Code: KME 074	Machine Learning	L T P : 3 0 0	Credits: 3
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Course Outcomes:	Bloom's Taxonomy

Unit 1: Introduction to Machine Learning (6Hours)

Unit 2: Supervised Learning (9Hours)

Unit 3: Unsupervised Learning (9Hours)

Unit 4: Nonparametric estimations & Neural Networks (9Hours)

Unit 5: Predictive Algorithms (7Hours)

Suggested topics for project based learning:

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Text Book:

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Reference Book:

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MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – V: Specialization – Design and Analysis

Subject Code: KME 075	Computer Graphics and Product Modeling	L T P : 3 0 0	Credits: 3
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Course Outcome: Student will be able to		Bloom Taxonomy

Unit-1:

- -

Unit-2:

Unit-3:

- - -

Unit-4:

- -

Unit-5:

- - -

Books and References

Related Course's / Useful Link

MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – V: Specialization – Thermal Engineering

Subject Code: KME 076	Power Plant Engineering	L T P : 3 0 0	Credits: 3
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Course Outcome: The student will be able to		Bloom Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-4		
CO-5		

UNIT-I: Introduction

UNIT-II: Steam power plant

UNIT-III: Diesel power plant

Gas turbine power plant:

UNIT-IV: Nuclear power plant

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UNIT-V: Electrical system

Books and References:

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MECHANICAL ENGINEERING#

Semester – VII: Departmental Elective – V: Specialization – Automobile Engineering

Subject Code: KAU 073	Vehicle Body Engineering & safety	L T P : 3 0 0	Credits: 3
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The students will be able to		Blooms Taxonomy
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

UNIT-I:

Classification of Coachwork:

[L-9 Hours]

UNIT-II:

Vehicle Body Materials:

[L-9 Hours]

UNIT-II:

Aerodynamics:

[L-5 Hours]

Load Distribution:

[L-5 Hours]

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UNIT-IV:

Interior Ergonomics:

[L-4 Hours]

Vehicle Stability:

[L-4 Hours]

UNIT-V:

Noise and Vibration:

[L-5 Hours]

Impact protection:

[L-5 Hours]

Books &Reference:
