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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTMEMT308	DCC	Basics of Mechanics and Thermal Energy	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

(A) This course aims at introduction of basics of engineering mechanics andbasic concepts, laws & principles of thermodynamics. (B) It also covers the concept of Force, Pressure, stresses,zeroth, first and second law of thermodynamics. (C) It also includes the basic principles and applications of air standard cycles and engines.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.

1. To understand the basics of engineering mechanics.
2. To understand the application of forces, pressure and stresses.
3. To understand the laws of thermodynamics and its applications.
4. To understand the working and applications of various air standard cycles.
5. To understand the working and applications of I.C. Engines.

Syllabus

UNITI **8 Hrs.**

Static Forces: Introduction to Engineering Mechanics;Classification of Engineering Mechanics;Statistics, Dynamics, Kinematics, Kinetics etc.;Fundamental Laws of Mechanics.

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UNIT II **10 Hrs.**

Force, Pressure and Stress; Free Body Diagram; Bow's Notation, Characteristics and Effects of a Force;System of Forces, Resolution of a Force, Composition of Forces, Resultant / Equilibrant of forces; Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces;Lami's Theorem, Equilibrium of a Body Under Two/ Three/More Than Three Forces;Law of Superposition of Forces.

UNIT III **10 Hrs.**

Basic concepts of thermodynamics: Thermodynamic definition, Systems, Characteristics of system boundary and control surface,Thermodynamic properties; definition and units, specific properties, pressure, specific volume, Thermodynamic state, state point, state diagram, path and process, quasi-static process, cyclic and non-cyclic; processes; Zeroth law of thermodynamics.

UNIT IV **9 Hrs.**

First and Second Law of Thermodynamic: Statement of the First law of thermodynamics, Extension of the First law to control volume; steady flow energy equation (SFEE), applications. Limitations of first law of thermodynamics, Thermal reservoir, heat engine and heat pump theirefficiency, and COP. Kelvin-Planck statement of the Second law of Thermodynamics; Clausius statement of Second law of Thermodynamics, PMM I and PMM II, Numerical problems.

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UNIT V **8 Hrs.**

I.C. Engine-Introduction to I.C. Engines, classification of I.C. Engine Components, working of two stroke and four- stroke cycle engines.

Air Standard cycles-Definition andworking principle of Carnot, Otto, Diesel and Dual air Standard cycle, Calculate efficiency, their comparison and limitation of each cycle.

Text Books:

1. Prasad I.B., Applied Mechanics, Khanna Publication.
2. R.K. Rajput, Engineering Mechanics S. Chand & Co.
3. R.C. Hibbler –Engineering Mechanics: Statics & Dynamics.
4. Engineering Thermodynamics by P.K. Nag, McGraw-Hill Education 2011.

References:

1. Thermal Engineering by R.K. Rajput, Laxmi Publication House, 2010.
2. Engineering Thermodynamics by Onkar Singh,New Age International Publication,2013.
3. A Textbook of Engineering Thermodynamics by V.M. Domkundwar, Dhanpat Rai & Company, 2008.
4. Engineering Thermodynamics by Jones and Dugan, PHI Learning Pvt. Ltd. 2001.

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List of Experiments:

1. To verify the law of Triangle of forces and Lami's theorem.
2. To verify the law of parallelogram of forces.
3. To verify law of polygon of forces.
4. Study of First Law of Thermodynamic.
5. Study of second Law of thermodynamic.
6. To study heat engine and heat pump with calculation of their efficiency, and COP
7. To study working of two cycle engines.
8. To study working of four- stroke cycle engines.
9. Determination of efficiency of Diesel cycle.
10. Determination of efficiency of Otto cycle.

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DTEI301	DCC	MEASUREMENT AND INSTRUMENTATION	60	20	20	30	20	2	1	2	4

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Course Educational Objectives (CEOs):

1. To introduce the basic functional elements of instrumentation.
2. To introduce the fundamentals of electrical and electronic instruments.
3. To educate on the comparison between various measurement techniques.
4. To introduce various storage and display devices.
5. To introduce various transducers and the data acquisition system.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.

The students will be able to

1. To apply knowledge of measurement system.
2. To identify, formulate, and solve the fundamentals of electrical and electronic instruments.
3. Demonstrate various types of introduce various modern storage and display devices.
4. Demonstrate various types oftransducers and the data acquisition system.

Syllabus

UNIT I **8Hrs.**

Introduction to measurement: Definition, application and types ofmeasurement System, Accuracy, Precision, sensitivity, Resolution. Functional elements of an instrument, Static and dynamic characteristics, Errors in measurement, Statistical evaluation of measurement data, Standards and calibration.

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DTEI301	DCC	MEASUREMENT AND INSTRUMENTATION	60	20	20	30	20	2	1	2	4

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UNITII **9Hrs.**

Electrical and Electronics Instruments:

Construction and operation of moving coil, moving iron, Theory and Operation of D' Arsonval.Principle and types of analog and digital voltmeters, ammeters, Determination of B-H curve and measurements of iron loss, Instrument transformers, Instruments for measurement of frequency and phase.

UNIT III **7Hrs.**

Comparison Methods of Measurements

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges. Interference & screening, Multiple earth and earth loops, Electrostatic and electromagnetic interference, Grounding techniques.

UNIT IV **6Hrs.**

Modern Storage and Display Devices

Compact Disk CD), DVDs, USB Flash Drive, Hard Drive/SSD, Cloud Storage, OLED, Micro-LED display, Nano-cell Technology, Quantum dot LED (QLED).

UNIT V **7Hrs.**

Transducers and Data Acquisition Systems

Classification of transducers based upon Transduction principle,Introduction to Smart sensors and Micro Sensors, Introduction to Data Acquisition System (DAS)and its Industrial Application.

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Text Books:

1. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill, 4rth Edition 2019.
2. D.V.S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd, 2nd Edition 2011.

References:

1. A.J. Bouwens, "Digital Instrumentation", Tata McGraw Hill, 1997.
2. Martin Reissland, "Electrical Measurements"", New Age International (P) Ltd., Delhi, 2001.

List of Experiments:

1. Study of CRO and perform component testing using CRO.
2. Study of phase & frequency using Lissajous pattern with help of CRO.
3. Study and Perform Strain using strain gauge.
4. To study and perform LVDT (Linear Variable Differential Transformer) characteristics.
5. Study of function generator with its application.
6. To study and observe the balance condition for the Maxwell's bridge.
7. To study and observe the balance condition for the Schering bridge.
8. To study and observe the balance condition for the Hay's Bridge.
9. To study and observe the balance condition for the Wein's bridge.
10. To study and observe the balance condition for the Anderson's Bridge.

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DTMT302	DCC	Basic Digital Electronics	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):

1. To present the Digital fundamentals, Boolean algebra, and its applications in digital systems
2. To present a problem oriented introductory knowledge of combinational digital circuits and its applications.
3. To explain the various semiconductor memories and related technology.
4. To introduce the sequential circuits involved in the making various digital circuits.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.
The students will be able to:

1. Describe the number systems, conversions, and their applications.
2. Apply minimization techniques such as K maps, Tabular method etc. for the design of digital circuits.
3. Understand combinational and sequential circuits.
4. Differentiate various type of memories and there use in different applications.

Syllabus

UNITI **10 Hrs.**

Binary Number System:

Binary arithmetic: addition, subtraction, multiplication and division, Complements: 1's, 2's, 9's

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and 10's. Subtraction using complements, Octal number system, Hexadecimal number system, Conversion among binary, octal, decimal, and hexadecimal number systems, Codes: BCD, Gray, Excess-3, the parity bit.

UNITII **9Hrs.**

Logic Gates and Boolean Algebra:

Primary Gates: symbol, operation and truth-table, NAND, NOR, EX-OR, EX-NOR gates: symbol, operation, truth- table, Positive and Negative logic, De Morgan's theorems, Universal Gate, Laws and theorems of Boolean algebra, simplification of Boolean expression, Sum of products (SOP) and product of sums (POS) expression, Karnaugh maps: Four variable K-maps and their simplification techniques, Don't care condition.

UNIT III **8Hrs.**

Combinational Logic Circuits:

Arithmetic Circuits: Half adder, full adder, parallel binary adder, 1's complement subtractor circuit, 2's complement subtractor/adder circuits, 8421 adder, half and full subtractor, parallel binary subtractor, Binary to gray and gray to binary code converters, Decoder and Encoder, Multiplexer and Demultiplexers.

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UNIT IV **7Hrs.**

Memory and Programmable Logic:

Memory Classifications, RAM: Static and Dynamic, ROM: ROM, PROM, EPROM. Programmable Logic Array (PLA), Programmable Array Logic (PAL) and Structure. A/D and D/A Converter.

UNIT V **8Hrs.**

Flip-Flops:

S-R latch, S-R flip-flops asynchronous and synchronous, timing diagram, truth table, excitation table, D flip floptiming diagram, truth table, excitation table T flip floptiming diagram, truth table, excitation table, J K flip flop timing diagram, truth table.

Text Books:

1. Mano M. M. and Ciletti M., "Digital Design", Pearson Education (2008) 4th ed.
2. Leach D. P., Malvino A. P., Saha G.," Digital Principles and Applications", TMH, (2014), 8th ed.

References:

1. Floyd T. L. and Jain R. P.," Digital Fundamentals", Pearson Education (2008) 10th ed.
2. Tocci R. and Widmer N., "Digital Systems: Principles and Applications", Pearson Education (2007) 10th ed.

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List of Experiments:

1. To realize the basic logic gates.
2. To realize the NAND gate as a universal building block.
3. To realize the NOR gate as a universal building block.
4. To realize the HALF ADDER circuit
5. To realize the FULL ADDER circuit.
6. To realize the HALF SUBTRACTOR circuit.
7. To realize the AND-OR-INVERT circuit.
8. To realize the parity checker circuit.
9. To realize the exclusive-OR gate.
10. To realize the SR & JK flip-flop.

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