

COURSE OBJECTIVES

To enable the students to

- be exposed to the fundamental principles of mechanics
- learn the effect of force on bodies
- understand the properties of different surface areas and solids
- learn basics of fluid mechanics and relate it to bio-fluids
- understand the action of friction and motion

UNIT I BASICS AND STATICS OF PARTICLES 9

Introduction – Units and Dimensions – Laws of Mechanics – Lami’s theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equivalent systems of forces – Principle of transmissibility.

UNIT II EQUILIBRIUM OF RIGID BODIES 9

Free body diagram – Types of supports – Action and reaction forces – Moments and Couples – Moment of a force about a point and about an axis - Varignon’s theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

UNIT III MECHANICS OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of rigid and non-rigid bodies -Centroids -Centroids of lines and areas -Rectangular, circular, triangular areas by integration – Polar moments of inertia of plane areas.

UNIT IV BASICS OF MECHANICS OF FLUIDS 9

Fluids – density – pressure – blood pressure and gravity – buoyancy – moments of force and stability – movement in water – Newton’s laws of viscosity – Definitions and simple problems on Newtonian fluid, Non-Newtonian fluid, Euler equations and Navier Stoke’s equations, Viscoelasticity, laminar flow and Turbulent flow.

UNIT V DYNAMICS OF PARTICLES 9

Displacements, Velocity and acceleration, their relationship – Relative motion – Newton’s laws of motion Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction.

COURSE OUTCOMES

Upon completion of this course the students will be able to

- use scalar and vector analytical techniques for analysing forces in statically determinate structures.
- understand the law of mechanics and various theorems. Apply the equilibrium concept to force systems of particle or solids in 2D and 3D
- apply the concepts of centroid or centre of gravity and moment of inertia for calculation.
- apply mathematical knowledge to predict the properties and characteristics of a fluid.
- solve problems using concepts of kinematics and kinetics of particles and analysis of their results.

TEXT BOOKS

1. Kottiswaran, N, "Engineering Mechanics – Statics and Dynamics", Sri Balaji Publications, Erode 2010.
2. Dr. R. K. Bansal, A Text Book of Fluid Mechanics, Laxmi Publications (P) Ltd., New Delhi. 2016.

REFERENCES

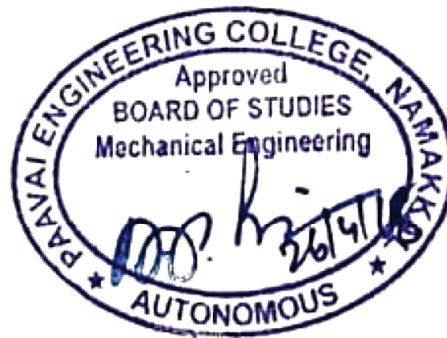
1. Palanichamy, M.S. and Nagan, S, "Engineering Mechanics – Statics and Dynamics", Third Edition, Tata McGraw -Hill Publishing, New Delhi, 2004.
2. Beer, F.P and Johnston Jr. E.R., —Vector Mechanics for Engineers (In SI Units): Statics and Dynamics, 8th Edition, Tata McGraw-Hill Publishing Company, New Delhi 2004.
3. Hibbeler, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
4. A Textbook of Strength of Materials by R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi 2018
5. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2000).

WEB LINKS

1. <http://nptel.ac.in/courses/112103109/>
2. <http://nptel.ac.in/courses/122104015/7>
3. <https://www.youtube.com/watch?v=HEj-QIjWXgs>

CO-POMapping

Mapping of Course Outcomes with Programme Outcomes(1/2/3indicatesstrengthofcorrelation) 3-Strong, 2-Medium, 1-Weak														
COs	ProgrammeOutcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO2	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO3	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO4	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO5	3	3	3	3	2	-	-	-	-	-	-	2	2	3



COURSE OBJECTIVES

To enable students

- ◆ learn the basics of diode and rectifiers
- ◆ study the basics and characteristics of BJT
- ◆ understand the basics and characteristics of FET
- ◆ know the basics of special semiconductor devices, power devices and display devices
- ◆ be familiar with the theory, construction, and operation of Basic electronic devices

UNIT I SEMICONDUCTOR DIODE 9

PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics. Clipping & Clamping Circuits – Voltage multipliers using diodes- Half wave and full wave rectifier.

UNIT II BIPOLAR JUNCTION 9

NPN -PNP -Junctions-Early effect-Current equations – Input and Output characteristics of CE, CB CC-Hybrid - π model - h-parameter model, Ebers Moll Model- Multi Emitter Transistor.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET- Current equation - Equivalent circuit model and its parameters, FINFET, DUAL GATE MOSFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, Schottky barrier diode-Zener diode- PIN Diode- Varactor diode – Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS - LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able

- ◆ Gain knowledge in the theory, construction, and operation of semiconductor diode
- ◆ Understand the basics and characteristics of BJT
- ◆ Know the basics and characteristics of FET

- Be familiar with the concepts of special semiconductor devices, power devices and display devices
- Design simple electronics circuits

TEXT BOOKS

1. J Millman, C. Halkias & Satyabrata JIT "Electronic Devices and Circuits", Tata McGraw-Hill, 2007.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory" Pearson Education 2006.

REFERENCES

1. Christo Papadopoulos, "Solid State Electronic Devices", Springer-Verlag, New York, 2014.
2. Salivahanan.S, Sureshkumar.N, "Electronic Devices and Circuits", 3rd edition, McGraw Hill, 2014.
3. Thomas L.Floyd, "Electronic Devices", Merrill, 1992
4. David A.Bell, " Electronic Devices and Circuits", Prentice Hall, 1986

WEB LINKS

1. www.electronics-tutorials.ws/
2. <http://www.radio-electronics.com>
3. www.allaboutcircuits.com
4. <http://textofvideo.nptel.iitm.ac.in/122106025/>
5. www.electronicsforu.com

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	1	1	-	2	2	2
CO2	3	3	3	3	3	-	-	-	1	1	-	2	2	2
CO3	3	3	3	3	3	-	-	-	1	1	-	-	2	2
CO4	3	3	3	3	3	-	-	-	1	1	-	-	2	2
CO5	3	3	3	3	3	-	-	-	1	1	-	2	2	2



COURSE OBJECTIVES

To enable students

- ◆ introduce electric circuits and its analysis
- ◆ impart knowledge on solving circuits using network theorems
- ◆ introduce the phenomenon of resonance in coupled circuits.
- ◆ educate on obtaining the transient response of circuits.
- ◆ know the concepts of duality

UNIT I BASIC CIRCUITS ANALYSIS 9

Ohm's Law – Kirchhoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power, Power Factor and Energy.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 9

Network reduction: voltage and current division, source transformation – star delta conversion – Thevenin and Norton Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 9

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits – Double tuned circuits

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 9

Transient response of RL, RC, RLC circuits using Laplace transform for DC input and A.C. with sinusoidal input – Characterization of two port networks in terms of Z, Y, h and ABCD parameters.

UNIT V CONCEPTS OF DUALITY 9

Concept of duality, Dual network, Graphs of a network, Trees, twig, link and branches, Incidence matrix, Tieset matrix and cutset matrix of a graph, Inverse networks and equalizers - Applications.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able

- ◆ Analyze electrical circuits
- ◆ Apply circuit theorems
- ◆ Analyze AC and DC Circuits
- ◆ Design resonance circuits
- ◆ Understand the concepts of Duality

TEXT BOOKS

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2007.
2. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi, 2001.

REFERENCES

1. M Russell, Mersereau and Joel R. Jackson, "Circuit Analysis- A System Approach", Pearson Education, 2007.
2. Chakrabati A, "Circuits Theory (Analysis and synthesis)", Dhanpath Rai & Sons, New Delhi, 1999.
3. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2003.
4. Robert L. Boylestad, "Experiments in Circuit Analysis to Accompany Introductory Circuit Analysis", Prentice Hall, 2000.

WEB LINKS

1. <http://www.electronics-tutorials.ws/>
2. www.electrical4u.com
3. <http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/esc102/index.html>
4. http://www.tina.com/1200_problems_and_examples
5. www.circuits-magic.com

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	3	3	-	-	-	1	1	-	2	2	1
C02	3	3	3	3	3	-	-	-	1	1	-	2	2	1
C03	3	3	3	3	3	-	-	-	1	1	-	2	2	1
C04	3	3	3	3	3	-	-	-	1	1	-	2	2	1
C05	3	3	3	3	3	-	-	-	1	1	-	2	2	1

