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**DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING**

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COURSE DISTRIBUTION		
Core Courses	03	09 Credit Hours
Elective Courses	03	09 Credit Hours
Interdisciplinary Electives	02	06 Credit Hours
Thesis	--	30 Credit Hours
Total		54 Credit Hours

**Core Courses (Robotics and Intelligent Systems)**

S. No.	Course	Credit Hours
1.	Non-Linear Control Systems	3
2.	Robot Mechanics & Control	3
3.	Machine Learning & Artificial Intelligence	3

**Core Courses (Electrical Power)**

S. No.	Course	Credit Hours
1.	Advanced Electrical Machines	3
2.	Advanced Power Conversion	3
3.	Advance Power Systems	3

**Core Courses (Communication Systems)**

S. No.	Course	Credit Hours
1.	Advanced Digital Communication	3
2.	Advanced Mobile and Wireless Communication	3
3.	Information and Coding Theory	3

**Core Courses (Signal Processing)**

S. No.	Course	Credit Hours
1.	Advanced Digital Signal Processing	3
2.	Advanced Digital Systems Design	3
3.	Bio-Medical Signal Processing	3

**Core Courses (Embedded Systems Design)**

S. No.	Course	Credit Hours
1.	Advanced Digital Systems Design	3
2.	Advanced VLSI Design	3
3.	Analog and Mixed System Design	3

**Core Courses (Nano Engineering)**

S. No.	Course	Credit Hours
1.	Modeling and Simulation of Nano Systems	3
2.	Nanofabrication	3
3.	Nano Scale Synthesis and Characterization	3

**Elective Courses (Robotics and Intelligent Systems)**

S. No.	Course	Credit Hours
1.	Sensor Technology/Advanced Sensors & Materials	3
2.	Advanced Digital Signal Processing	3
3.	Deep Learning & Big Data Analysis	3
4.	Bio-Medical Robotics	3
5.	Mobile Robotics & Autonomous Navigation	3

6.	Fuzzy Systems	3
7.	Human-Computer Interface	3
8.	Developmental Robotics	3
9.	Swarm Robotics & Bio-Inspired Robots	3
10.	IoT Based System Design	3
11.	Energy Storage & Energy Harvesting	3
12.	Computer Vision & Applications	3
13.	Intelligent Machine Design	3

#### Elective Courses (Electrical Power)

S. No.	Course	Credit Hours
1.	High Voltage DC Transmission	3
2.	Industrial Drives - Power Electronics	3
3.	Electric Vehicle Technology	3
4.	Electric Machine Design	3
5.	Photovoltaic Power System Design	3
6.	Wind Power System	3
7.	Distributed Generation & Micro grids	3
8.	Sustainable Energy System	3
9.	Electricity Market	3
10.	Steam and Gas Power Systems	3
11.	Smart Grids	3
12.	Power Economics & Management	3
13.	Electrical Power Quality	3
14.	Power System Stability	3

#### Elective Courses (Communication Systems)

S. No.	Course	Credit Hours
1.	mm-Wave Communication	3
2.	Microwave Systems Design	3
3.	Wireless Sensor Networks	3
4.	Advanced Optical Communication Systems	3
5.	Error Correcting Codes	3
6.	Multimedia Communication	3
7.	Advanced Communication Networks	3
8.	Radar Engineering	3
9.	Machine Learning Techniques	3
10.	Advanced Topics in Communication Systems	3

#### Elective Courses (Signal Processing)

S. No.	Course	Credit Hours
1.	Adaptive Filter Theory	3
2.	Bio-Medical Signal Processing	3
3.	Advanced Digital Image Processing	3
4.	Applied Signal Processing	3
5.	Computer Vision	3
6.	Pattern Recognition	3
7.	Statistical Signal Processing	3
8.	Estimation and Detection Theory	3
9.	Multirate Systems and Filter Banks	3
10.	Machine Learning Techniques	3

#### Elective Courses (Embedded Systems Design)

S. No.	Course	Credit Hours
1.	Digital Integrated Circuit Design	3
2.	Analog Integrated Circuit Design	3
3.	Advanced Digital Image Processing	3
4.	Electronic Packaging	3
5.	ASIC Design Methodology	3
6.	MEMS	3
7.	Semiconductor Material technology	3
8.	Non-Linear Control Systems	3
9.	System Validation	3
10.	Applied Signal Processing	3

**Elective Courses (Nano Engineering)**

S. No.	Course	Credit Hours
1.	Nano-Electronics	3
2.	Nano Devices For Energy Applications	3
3.	Nano Materials Characterization Instruments And Processing Techniques	3
4.	Nano-Photonics	3
5.	Smart Batteries	3
6.	Nano systems Integration	3
7.	Nano Medicine	3
8.	Nano Sensors and Systems	3
9.	Nano Electronics & Organic Electronics	3
10.	Special Topics in Nano Science & Engineering	3

**Inter-Disciplinary Elective Courses**

S. No.	Course	Credit Hours
1.	Convex Optimization	3
2.	Advanced Linear Algebra	3
3.	Numerical Analysis	3
4.	Advanced Engineering Mathematics	3
5.	Probability and Stochastic Processes	3