

## CHAPTER 13

### ELECTRONIC SCIENCE

#### Doctoral Theses

164. ANIL KUMAR  
**Study of Surface Plasmon and Lossy Mode Resonances in Optical Waveguides and their Application.**  
Supervisor : Prof. Avinashi Kapoor and Dr. Vinod Kumar Sharma  
Th 21030

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1. Introduction to optical waveguides 2. Surface plasmon polaritons and lossy mode waveguides 3. Analysis of insulator-metal-insulator planar plasmonic waveguides 4. Surface plasmon polaritons polarizer 5. Resonant coupling between lossy ITO thin film modes and guided waveguide modes 6. Conclusion and future scope of present work.

165. BANSAL (Joyoti)  
**Carbon Nanotube Based Bio-Sensor.**  
Supervisor : Prof. P.K. Bhatnagar  
Th 21033

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1. Introduction 2. Material and methods 3. DNA sequence detection for bacterium bacillus anthracis using absorption of SWNT 4. Biosensor for DNA sequence detection using raman spectroscopy and gel electrophoresis : A comparative study 5. DNA sequence detection for anthrax using photoluminescence and FRET 6. Conclusion and future scope of work. Appendix. Published papers.

166. CHAUDHARI (Nainu Priya)  
**Design of High Performance Microstrip Lowpass and Multiband Bandstop Filters.**  
Supervisors : Prof. A. K. Verma  
Th 21235

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1. An overview 2. Uniform microstrip transverse resonance lowpass filters 3. Graphical method of synthesis of stopband responses of transverse resonance LPF 4. Non-uniform microstrip transverse resonance lowpass filters 5. Compact microstrip transverse resonance lowpass filter 6. Microstrip composite lowpass filters 7. Single and multiband bandstop filters.

167. DIXIT (Shiv Kumar)  
**Conducting Polymer Based Hybrid Solar Cells.**  
 Supervisor : Prof. P.K. Bhatnagar  
Th 21034

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1. An introduction to solar cells 2. Experimental techniques and measuring equipments 3. P3HT:CdSe/ZnS quantum dots based bulk heterojunction solar cell 4. Enhancement of efficiency of P3HT:CdSe/ZnS hybrid solar cell by adding SWCNT 5. Use of New Polymer PCDTBT for improved performance of thermally stable photovoltaic devices 6. Conclusions and future scope of work.

168. GULIANI (Renu)  
**Theoretical Modeling and Parameter Extraction of Dye Sensitized Solar Cell.**  
 Supervisors : Prof. Avinashi Kapoor and Dr. Amit Jain  
Th 21290

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1. Introduction 2. Review of literature 3. Extraction and analysis of Dye-Sensitized solar cell parameters 4. Effect of capacitance on output characteristics of DSSC using lambert W-Function and MATLAB simulation 5. Estimation of DSSC parameters using artificial neural networks 6. Conclusion and future scope. Bibliography.

169. MITTAL (Avneesh)  
**Genetic Algorithm Based Adaptive Control Systems.**  
 Supervisor : Prof. Avinashi Kapoor and  
 Dr. Tushya Kumar Saxena  
Th 21036

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1. Review of literature 2. Setting up the experimental setup 3. Genetic algorithm based incremental PID temperature controller for long dead time nonlinear bath 4. Genetic algorithm based tuning of fixed bias PID controller for a nonlinear constant temperature water bath under load disturbances 5. Adaptive tuning of PID controller for a nonlinear constant temperature water bath under set point disturbances using GANFC 6. Genetic algorithm based neuro fuzzy tuning of PID controller for a nonlinear temperature water bath with feedforward control 7. Future scope and suggestions. References.

170. NARANG (Rakhi)  
**Analytical Modeling and Simulation of Multiple Gate Geometry Tunneling Field Effect Transistors for Low Power Logic Circuit Design and Biosensing Applications.**  
 Supervisor : Prof. Mridula Gupta  
Th 21236

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1. Introduction 2. Analytical modeling of double-gate tunneling field-effect transistor (p-i-n- and p-n-p-n) using carrier concentration approach 3. Linearity and analog/RF performance analysis of tunnel FET 4. Drain current model for a gate ALL around pocket doped p-n-p-n tunnel FET 5. Device and circuit performance of tunnel FET: Role of architectural modifications 6. Assessment of ambipolar behavior of tunnel FET and influence of structural modifications 7. Dielectric modulated tunnel FET: An ultra-sensitive biomolecule sensor 8. Conclusions and future scope. Appendix.

171. SHIKHA MADAN  
**Optical and Electrical Characterization of II-VI Compound Semiconductor Quantum Dots.**  
 Supervisor : Prof. P.K. Bhatnagar  
Th 21029

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1. Introduction 2. Experimental technique and measuring equipments 3. Synthesis of II-VI compound semiconductor quantum dots and their optical characterization 4. Studies on electrical transport properties of CdSe:PMMA composite films 5. Color tuning in polymer light emitting diodes incorporating quantum dots 6. Conclusion and future scope of the work.

172. SINGH (Yumlembam Premkumar)  
**Theoretical Study of Absorption Enhancement in Silicon Substrate using Plasmonic Nanostructures for Photovoltaic Devices.**  
 Supervisor : Prof. Avinash Kapoor and Dr. Amit Jain  
Th 21032

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1. Introduction 2. Surface plasmons and review of literature 3. Computational electromagnetics in plasmonics 4. Enhanced optical absorption in thin silicon substrate: Application to photovoltaics 5. Localized surface plasmons enhanced light transmission into silicon wafer 6. Conclusion and future scope.

173. VANDANA KUMARI  
**Impact of Dielectric Pocket on Different Gate Geometry Mosfet Architectures for Improved Analog and Digital Performance: Modeling and Simulation.**  
 Supervisor : Prof. Mridula Gupta and Dr. Manoj Saxena  
Th 21031

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1. Introduction 2. Temperature dependent drain current model for gate stack insulated shallow extension silicon on nothing (ISESON) mosfet for wide range of operating temperature 3. Simulation study of insulated shallow extension silicon on nothing (ISESON) mosfet for low-voltage low-power applications for wide range of operative temperature 4. Performance investigation of insulated shallow extension silicon on nothing (ISESON) mosfet for low voltage digital applications 5. Temperature dependent drain current model for double gate mosfet incorporating dielectric pocket (DP-DG) 6. Analysis of empty space in double gate (ESDG) architecture: A novel device design 7. Conclusion and future research directions.