| | | |
|---|---|---|
| | **K.S.R. COLLEGE OF ENGINEERING (Autonomous)**<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | **CURRICULUM**<br>**UG**<br>**R - 2016** |

| | |
|---|---|
| Department | Electronics and Communication Engineering |
| Programme | B.E - Electronics and Communication Engineering |

**SEMESTER - I**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16EN151 | Technical English – I<br>(Common to all Branches) | HS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16MA152 | Engineering Mathematics – I<br>(Common to all Branches) | BS | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3. | 16PH153 | Engineering Physics<br>(Common to all Branches) | BS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16CY154 | Engineering Chemistry<br>(Common to all Branches) | BS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16CS146 | Fundamentals of Computer and C Programming<br>(Common to AU,CE,EC,EE & ME) | ES | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16GE141 | Basics of Civil and Mechanical Engineering(Common to CS,EC,EE & IT) | ES | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | - | Physics & Chemistry Laboratory*<br>(Common to all Branches) | BS | - | - | 3 | - | - | - | - |
| 8. | 16CS127 | Computer Practices Laboratory<br>(Common to AU, CE, EC, EE & ME) | ES | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16AU027 | Engineering Graphics Laboratory<br>(Common to CS, EC, EE & IT) | ES | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| | | | **Total** | **18** | **1** | **9** | **23** | **800** | | |

* End semester examination only in II Semester

**SEMESTER - II**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16EN251 | Technical English – II<br>(Common to all Branches) | HS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16MA242 | Engineering Mathematics – II<br>(Common to AU,CE,EC, EE, ME & IT) | ES | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3. | 16PH243 | Materials Physics<br>(Common to EC & EE) | BS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16CY254 | Environmental Science and Engineering(Common to all Branches) | HS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16CS236 | C++ and Data Structures | EEC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16EC211 | Electric Circuit Theory | ES | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16GE228 | Physics & Chemistry Laboratory<br>(Common to all Branches) | BS | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16CS226 | C++ and Data Structures Laboratory | EEC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16EC221 | Electric Circuits Laboratory | ES | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 10. | 16HR251 | Career Development Skills – I<br>(Common to all Branches) | EEC | - | 2 | - | - | 50 | 50 | 100 |
| | | | **Total** | **18** | **4** | **9** | **26** | **1000** | | |

| | K.S.R. COLLEGE OF ENGINEERING (Autonomous)<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | CURRICULUM<br>UG<br>R - 2016 |
|---|---|---|

| Department | Electronics and Communication Engineering |
|---|---|
| Programme | B.E - Electronics and Communication Engineering |

**SEMESTER - III**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16MA341 | Engineering Mathematics – III (Common to AU,CE,EC, ME& IT) | ES | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2. | 16EC311 | Digital Electronics | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC312 | Electronic Devices and Circuits | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC313 | Engineering Electromagnetics | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 5. | 16EC314 | Signals and Systems | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 6. | 16EE331 | Electrical Machines | ES | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16CS326 | Open Source and Web Development Laboratory | EEC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16EC321 | Electronic Devices and Circuits Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16EC322 | Digital Electronics Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 10. | 16HR352 | Career Development Skills – II (Common to all Branches) | EEC | - | 2 | - | - | 50 | 50 | 100 |
| | | | **Total** | **18** | **5** | **9** | **27** | **1000** | | |

**SEMESTER - IV**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16MA431 | Probability and Stochastic Process | ES | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 2. | 16EC411 | Analog Communication Systems | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC412 | Electronic Circuits | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 4. | 16EC413 | Linear Integrated Circuits | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16EC414 | Microprocessors and Microcontrollers | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16EE436 | Control Systems | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16EC421 | Electronic Circuits and Simulation Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16EC422 | Linear Integrated Circuits Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16EC423 | Microprocessors and Microcontrollers Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 10. | 16HR443 | Career Development Skills - III | EEC | - | 2 | - | - | 50 | 50 | 100 |
| | | | **Total** | **18** | **4** | **9** | **26** | **1000** | | |

| | K.S.R. COLLEGE OF ENGINEERING (Autonomous)<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | CURRICULUM<br>UG<br>R - 2016 |
|---|---|---|

| | |
|---|---|
| Department | Electronics and Communication Engineering |
| Programme | B.E - Electronics and Communication Engineering |

**SEMESTER - V**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16EC511 | Digital Communication Systems | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC512 | Digital Signal Processing | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 3. | 16EC513 | Electronic Instrumentation | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC514 | Transmission Lines and Wave Guides | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 5. | 16EC541 | Computer Networks<br>(Common to EC & EE) | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | | Professional Elective - I | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16EC521 | Digital Signal Processing Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16EC522 | Communication Systems Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16EC523 | Computer Networks Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 10. | 16HR544 | Career Development Skills - IV | EEC | - | 2 | - | - | 50 | 50 | 100 |
| | | | **Total** | **18** | **4** | **9** | **26** | **1000** | | |

**SEMESTER - VI**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16EC611 | Antenna and Wave Propagation | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC612 | Wireless and Cellular Communication | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC613 | Embedded Systems | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC614 | VLSI Design | PC | 3 | 1 | 0 | 4 | 30 | 70 | 100 |
| 5. | | Open Elective - I | OE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | | Professional Elective - II | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16EC621 | VLSI Design Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16EC622 | Embedded Systems Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 9. | 16HR645 | Career Development Skills - V | EEC | - | 2 | - | - | 50 | 50 | 100 |
| | | | **Total** | **18** | **3** | **6** | **23** | **900** | | |

| | | |
|---|---|---|
| | **K.S.R. COLLEGE OF ENGINEERING (Autonomous)**<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | **CURRICULUM**<br>**UG**<br>**R - 2016** |

| | |
|---|---|
| Department | Electronics and Communication Engineering |
| Programme | B.E - Electronics and Communication Engineering |

**SEMESTER - VII**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16HS751 | Professional Ethics (Common to all Branches) | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC711 | RF and Microwave Engineering | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC712 | Fiber Optical Communication | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC713 | Digital Image Processing | PC | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | | Open Elective - II | OE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | | Professional Elective - III | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 7. | 16EC721 | RF and Microwave Laboratory | PC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| 8. | 16EC722 | Mini Project | EEC | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| | | | **Total** | **18** | **0** | **6** | **22** | **800** | | |

**SEMESTER - VIII**

| Sl.No. | Course Code | Course Name | Category | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| **THEORY** | | | | | | | | | | |
| 1. | 16HS001 | Principles of Management (Common to CE,EC & EE) | HS | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | | Professional Elective - IV | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | | Professional Elective - V | PE | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| **PRACTICAL** | | | | | | | | | | |
| 4. | 16EC821 | Project Work | EEC | 0 | 0 | 12 | 6 | 50 | 50 | 200 |
| | | | **Total** | **9** | **0** | **12** | **15** | **500** | | |

| | | |
|---|---|---|
| | **K.S.R. COLLEGE OF ENGINEERING (Autonomous)**<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | **CURRICULUM**<br>**UG**<br>**R - 2016** |

| | |
|---|---|
| Department | Electronics and Communication Engineering |
| Programme | B.E - Electronics and Communication Engineering |

**List of Electives**

Professional Elective – I (SEMESTER – V)

| Sl.No. | Course Code | Course Name | Specialization | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| 1. | 16EC561 | Medical Electronics | S4 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC562 | Advanced Microprocessors and Microcontrollers | S2 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC563 | Television Engineering | S4 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC564 | Information Theory and Coding | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16CS002 | Java programming (Common to CS & EC) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16CS005 | Computer Architecture (Common to CS,EC & EE) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7. | 16CS586 | Design and Analysis of Algorithms | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

S1 – VLSI
S2 – Embedded Systems
S3 – Communication
S4 – Electronics
S5 – Signal Processing
S6 – Networking
S7 – Computer Programming
S8 – Mathematics

Professional Elective – II (SEMESTER – VI)

| Sl.No. | Course Code | Course Name | Specialization | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| 1. | 16EC661 | Advanced Digital Communication Techniques | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC662 | Cryptography and Network Security | S6 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC663 | Soft Computing Techniques | S5 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC664 | Advanced Digital Systems Design | S4 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16EC665 | Architecture of DSPs | S5 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16EC666 | ARM System Architecture | S2 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7. | 16EC667 | Advanced Signal Processing | S5 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 8. | 16MA091 | Numerical Methods (Common to EC & IT) | S8 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 9. | 16CS001 | .NET Framework Technologies (Common to CS & EC) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 10. | 16CS003 | Operating Systems (Common to CS, EC & EE) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

| | | |
|---|---|---|
| | **K.S.R. COLLEGE OF ENGINEERING (Autonomous)**<br>(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with "A" Grade )<br>K.S.R. Kalvi Nagar, Tiruchengode – 637 215 | **CURRICULUM**<br>**UG**<br>**R - 2016** |

| | |
|---|---|
| Department | Electronics and Communication Engineering |
| Programme | B.E - Electronics and Communication Engineering |

**List of Electives**

Professional Elective – III (SEMESTER – VII)

| Sl.No. | Course Code | Course Name | Specialization | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| 1. | 16EC761 | Telecommunication and Switching Networks | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC762 | CMOS Analog Circuits | S1 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC763 | Fundamentals of Nano Technology | S4 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC764 | Computer Hardware and Interfacing | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16EC765 | High Performance Networks | S6 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16EC766 | Wireless Sensor Networks | S6 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7. | 16EC767 | ASIC Design | S1 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 8. | 16EC768 | Electronic System Design | S4 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 9. | 16EC769 | Embedded System Design | S2 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 10. | 16EC770 | Robotics | S2 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 11. | 16EC771 | CAD for VLSI | S1 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 12. | 16EC772 | Wireless Networks | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 13. | 16CS786 | Learning IT Essential by Doing(IE) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 14. | 16CS787 | DBMS and PHP | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

Professional Electives – IV & V (SEMESTER – VIII)

| Sl.No. | Course Code | Course Name | Specialization | Hours/ Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CA | ES | Total |
| 1. | 16EC861 | Satellite Communication | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2. | 16EC862 | MEMS Technology | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3. | 16EC863 | ADHOC Networks | S6 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4. | 16EC864 | Telecommunication System Modeling and Simulation | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5. | 16EC865 | Optical Networks | S6 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6. | 16EC866 | Multimedia Compression and Communication | S3 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7. | 16EC867 | Embedded Networks | S2 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 8. | 16EC868 | VLSI Signal Processing | S1 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 9. | 16CS886 | Software Engineering | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 10. | 16CS887 | Internet of Things (IE) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 11. | 16CS004 | Big Data and Analytics (IE)<br>(Common to CS & EC) | S7 | 3 | 0 | 0 | 3 | 30 | 70 | 100 |

**LIST OF PROPOSED ONE CREDIT COURSES**

| Sl.No. | Course Name | Number of hours | Offered by Internal / External |
|---|---|---|---|
| 1. | PCB Circuit Design | 20 Hours | Internal / External |
| 2. | Programming PIC Microcontrollers | 20 Hours | Internal / External |
| 3. | Real Time Applications of Aurduino | 20 Hours | Internal / External |
| 4. | LABVIEW | 20 Hours | Internal / External |
| 5. | MATLAB – Image and Signal Processing Tool box | 20 Hours | Internal / External |
| 6. | Industrial Automation using PLC and SCADA | 20 Hours | Internal / External |
| 7. | Network Simulator – 2 | 20 Hours | Internal / External |
| 8. | CCNA Fundamentals (Module 1) | 20 Hours | Internal / External |
| 9. | CCNA - Routing and Switching (Module 2) | 20 Hours | Internal / External |
| 10. | C and C++ Programming | 20 Hours | Internal / External |
| 11. | Java Programming | 20 Hours | Internal / External |
| 12. | .Net and PHP | 20 Hours | Internal / External |
| 13. | MongoDB | 20 Hours | Internal / External |
| 14. | Xilinx Programming | 20 Hours | Internal / External |
| 15. | Tanner | 20 Hours | Internal / External |
| 16. | Mentor Graphics | 20 Hours | Internal / External |
| 17. | Programming in Digital signal processors | 20 Hours | Internal / External |

**COURSE COMPONENT SUMMARY**

| Sl.No | Subject Area | Credits per semester | | | | | | | | Credits Total | Percentage Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | | |
| 1 | HS | 3 | 6 | | | | | | 3 | 12 | 6.38% |
| 2 | BS | 10 | 5 | | | | | | | 15 | 7.97% |
| 3 | ES | 10 | 10 | 7 | 4 | | | | | 31 | 16.48% |
| 4 | PC | | | 18 | 22 | 23 | 17 | 11 | | 91 | 48.40% |
| 5 | PE | | | | | 3 | 3 | 6 | 6 | 18 | 9.57% |
| 6 | OE | | | | | | 3 | 3 | | 6 | 3.19% |
| 7 | EEC | | 5 | 2 | | | | 2 | 6 | 15 | 7.97% |
| **Total** | | 23 | 26 | 27 | 26 | 26 | 23 | 22 | 15 | 188 | 100% |

Total Credits for regular Student - 188

Total Credits for lateral Student - 139

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EN151** | **TECHNICAL ENGLISH – I (Common to all branches)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***
- *To develop basic conversation skills.*
- *To build vocabulary skills with the right choice of words.*
- *To improve students' understanding of grammar in context progressively.*

**UNIT - I GRAMMAR AND VOCABULARY [ 9 ]**

Synonyms & Antonyms – Tenses (Simple Present, Present Continuous, Present Perfect, Simple Past, and Simple Future) - Use of modal auxiliaries – Infinitive and gerund – Preposition of time, place and movement – Concord (Subject & Verb Agreement) - British & American Terminology – Phrasal verbs (Put, Give, Look, Take, Get, Call) – Pick the grammatically correct sentences – Impersonal passive – Technical abbreviations and acronyms

**UNIT - II LISTENING [ 9 ]**

Active listening - Listening for the main idea - Predicting - Drawing inferences - Listening for specific details - Listening to news – Listening to dialogues – Listening to telephonic conversation.

**UNIT - III PHONETICS AND SPOKEN ENGLISH [ 9 ]**

Consonant sounds – Pronunciation guidelines related to vowels and consonant – Drills using minimal pairs – Welcome speech – Vote of thanks – MoC – Anchoring – Role play in academic context.

**UNIT - IV READING [ 9 ]**

Intensive reading – Predicting content – Interpretation – Skimming & scanning – Vocabulary building - Inference – Context based meaning – Note making

**UNIT - V WRITING SKILLS [ 9 ]**

Need based correspondence (request for joining hostel, bonafide certificate, In plant training & Industrial Visit) – Writing instructions - Letter of invitation (inviting, accepting and declining) – Paragraph writing with given hints - Letter to the editor of a newspaper.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***
- *Understand and apply grammar in context for professional communication.*
- *Understand the gist and specific information.*
- *Speak, express and interact in the society and place of study.*
- *Critically interpret by reading a text and comprehend a given text.*
- *Correspond and communicate for jobs.*

**Text Book :**

1 Dr.P.Rathna, "English Work Book – I", VRB Publishers Pvt. Ltd., Chennai,2015

**Reference Books :**

1 Meenakshi Raman. "Technical Communication", Oxford University Press, New Delhi, 2004
2 Seely,"The Oxford Guide to Writing and Speaking", Oxford University Press, NewDelhi, 2004
3 M AshraRizvi, "Effective Technical Communication", Tata McGraw Hill, New Delhi 2005
4 P.Kiranmani Dutt, "A course in Communication Skills", Cambridge University Press, NewDelhi, 2008

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16MA152** | **ENGINEERING MATHEMATICS – I (Common to all Branches)** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To study the concepts of matrices and its applications.*
- *To study the concepts and its applications of ordinary differential equations.*
- *To improve their ability in solving geometrical applications of differential calculus problems.*
- *To study the concepts of functions of several variables and three dimensional analytical geometry*

**UNIT - I MATRICES [12]**

Introduction – types of Matrices- Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley-Hamilton theorem (statement only) and its applications – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

**UNIT - II ORDINARY DIFFERENTIAL EQUATIONS [12]**

Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy"s and Legendre"s linear equations – Methods of variation of parameters – Simultaneous first order linear differential equations with constant coefficients.

**UNIT - III DIFFERENTIAL CALCULUS [12]**

Curvature in Cartesian co-ordinates – Radius of curvature – Centre of curvature and circle of curvature – Involutes and evolutes – Envelopes (except evolutes as the envelope of normals) – Properties of envelopes and evolutes.

**UNIT - IV FUNCTIONS OF SEVERAL VARIABLES [12]**

Partial derivatives – Euler"s theorem for homogenous functions – Jacobians – Taylor"s series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.

**UNIT - V THREE DIMENSIONAL ANALYTICAL GEOMETRY [12]**

Equation of straight line – Angle between two lines - Coplanar lines and shortest distance between skew lines (symmetrical form only) – Equation of a sphere – Plane section of a sphere – Orthogonal spheres.

**Total (L : 45 T : 15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Interpret the basics of matrix applications in the field of engineering.*
- *Acquire knowledge in solving ordinary differential equations.*
- *Understand and apply the concepts of differential calculus problems.*
- *Improve Skills in developing and solving the functions of several variables.*
- *Understand the concepts of three dimensional analytical geometry and apply in the field of engineering*

**Text Book :**

1 Ravish R Singh and Mukul Bhatt, "Engineering Mathematics - I", MGH Publications, 3rd edition New Delhi, 2011.

**Reference Books :**

1 Grewal B.S,"Higher Engineering Mathematics", Tata McGraw Hill Publishing Company,43rd edition, New Delhi, 2013.

2 Bali N. P and Manish Goyal, "Text book on Engineering Mathematics", Laxmi Publications (p) Ltd, 6th edition 2011.

3 H.K. Dass, "Advance Engineering Mathematics", S. Chand & company, 11th edition 2015.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

**16PH153** **ENGINEERING PHYSICS** L T P C

**(Common to all Branches)** 3 0 0 3

***Prerequisite:*** *No Prerequisites needed for enrolling into the course.*

***Objectives:***

- *To understand the fundamentals of physics that have a direct application in the field of Engineering.*
- *To compute and analyze various problems related to Engineering Physics.*
- *To understand the basic concepts behind the Acoustics, Ultrasonics, Lasers, Optical fibers, Solar cells, Photo devices, and Quantum mechanics.*

**UNIT - I ACOUSTICS AND ULTRASONICS [9]**

Acoustics: Introduction – Classification of sound – Characteristics of musical sound – Loudness – Weber – Fechner law – Decibel – Absorption coefficient – Reverberation – Reverberation time – Sabine‟s formula: growth and decay (derivation) – Factors affecting acoustics of buildings and their remedies. Ultrasonics – Production – Piezoelectric method – Properties –Velocity measurement: acoustical grating –Engineering applications – SONAR.

**UNIT - II LASERS AND APPLICATIONS [9]**

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion, pumping – Einstein‟s A and B coefficients (derivation). Types of lasers – Nd-YAG, $CO_2$ and Semiconductor lasers (homo-junction and hetero-junction) – Qualitative Industrial Applications: Lasers in welding, heat treatment and cutting – Medical applications – Holography (construction and reconstruction).

**UNIT - III FIBER OPTICS AND APPLICATIONS [9]**

Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle (derivation) –Types of optical fibers (material, refractive index and mode) – Double crucible technique of fiber drawing – Splicing– Losses in optical fiber: attenuation, dispersion and bending –Fiber optical communication system (Block diagram) – Fiber optic sensors: temperature and displacement sensors –Medical Application: Endoscope.

**UNIT - IV SOLAR CELLS AND PHOTO DEVICES [9]**

Solar cells – classification – working- V-I characteristics – Experiment - Materials for solar cell– Applications– Photoconductive devices – PIN and Avalanche photodiode – Construction, working and characteristics – Light emitting diode – construction, working and characteristics – Applications: Voltage indicator and seven segment display.

**UNIT – V QUANTUM PHYSICS [9]**

Black body radiation – Planck‟s theory (derivation) – Deduction of Wien‟s displacement law and Rayleigh – Jeans‟ Law from Planck‟s theory – Compton effect – Theory and experimental verification – Matter waves – Schrödinger‟s wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box .

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe the impact of engineering solutions in the constructional and designing environment.*
- *Categorize the types of laser and utilize it for specific application based on their desirable requisite.*
- *Comprehend the fundamental ideas of optical fibers and to fabricate it for the potential applications.*
- *Exploit the concepts of photo devices for fabricating solar cells.*
- *Enumerate the preambles of quantum physics and to implement its concepts to tackle the cumbersome engineering problems.*

**Text Books :**

1 Dr.G.Senthil Kumar, “Engineering Physics – I” VRB Publishers Pvt Ltd, 2009

2 V. Rajendran, “Engineering Physics”, Tata McGraw Hill 2011

**References :**

1 BrijLal & Subramaniam, “A Text Book of Sound”, S. Chand & Co Ltd, New Delhi, 2005.

2 Dr. P. Mani, “Engineering Physics – I”, Dhanam Publications, Chennai, 2012.

3 S. Selladurai, “Engineering Physics-I”,PHI Learning Pvt, Ltd., New Delhi, 2010

4 Dr.S.Muthukumaran, G.Balaji and S.Masilamani, “Engineering Physics- I”, Sri Krishna Hi-Tech Publishing company Pvt. Ltd, 2010.

5 www.fadooengineers.com.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CY154** | **ENGINEERING CHEMISTRY (Common to all Branches)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To make the students conversant with basic concepts and applications of engineering polymers*
- *To understand the principles and functioning of batteries, fuel cell and solar cell*
- *To impart knowledge about the manufacture and uses of advanced engineering materials*
- *To gain sound knowledge on the water treatment methods and its industrial applications*
- *To acquaint the students with the basic concepts of corrosion mechanism and its control*

**UNIT - I ENGINEERING POLYMERS [9]**

Polymer: Definition, degree of polymerization, functionality – Polymerisation: Addition, condensation and co-polymerization, free radical mechanism of addition polymerization – Plastics: Classification, thermosetting and thermoplastics - Properties of polymers - glass transition temperature and tacticity - Preparation, properties and uses of engineering polymers [PVC, nylon-6,6 , PET and SBR] ; Fabrication of polymers – Compression and Injection moulding - Composites – FRP only.

**UNIT - II ENERGY STORAGE DEVICES [9]**

Batterie: Primary batteries, alkaline batteries, secondary batteries, lead - acid, nickel–cadmium and lithium batteries - Fuel cells: $H_2$-$O_2$ fuel cell, solar cells- principle, applications and advantages - Nano batteries and its applications - Nuclear energy – fission and fusion reactions; Nuclear reactor – components and power generation - breeder reactor.

**UNIT - III ADVANCED ENGINEERING MATERIALS [9]**

Abrasives - Moh‟s scale of hardness - types – natural [Diamond] – Synthetic [SiC] – Refractories: Characteristics, classifications [Acidic, basic and neutral refractories], properties, refractoriness, RUL, porosity, thermal spalling - Lubricants – Definition – Function – Characteristics – Properties - Viscosity index, flash and fire points, cloud and pour points, oiliness. Solid lubricants - Graphite and $MoS_2$. Nano materials – CNT- Synthesis [CVD, laser evaporation, pyrolysis] - Applications – Medicine, electronics, biomaterials and environment.

**UNIT - IV WATER AND ITS PURIFICATION TECHNIQUES [9]**

Hardness –types, equivalence of $CaCO_3$ [problems] ,units - estimation of hardness by EDTA method ; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge –priming and foaming –caustic embrittlement- boiler corrosion. Softening methods- internal conditioning- calgon, carbonate, phosphate - external conditioning – zeolite process and Ion exchange process; Desalination – reverse osmosis. Characteristics of potable water – domestic water treatment – break point chlorination.

**UNIT - V CHEMISTRY OF CORROSION AND ITS CONTROL [9]**

Electrochemical cells– types–single electrode potential and its determination; Electrochemical series - applications - corrosion - chemical corrosion - Pilling - Bedworth rule, electrochemical corrosion – mechanism, galvanic corrosion and differential aeration corrosion [Pitting corrosion, water line corrosion] - Factors influencing corrosion; Corrosion control - cathodic protection methods - Sacrificial anode and impressed current methods - Corrosion inhibitors.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Know the preparation and fabrication of various types of polymers and composite materials*
- *Understand the usage of nuclear power plants and batteries for the production of electricity.*
- *Gain knowledge in the manufacturing and uses of advanced engineering materials*
- *Familiarized with the water quality parameters and understand the various water treatment methods*
- *Perceive knowledge on the concept of corrosion and it's control.*

**Text Books :**

1 P.C. Jain and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Pub. Co., 16th edition, 2013.

2 Dr. A.Ravikrishnan, “Engineering Chemistry”, Srikrishna Hi-tech Publishing Company Pvt. Ltd. 14th edition, 2014.

**Reference Books :**

1 B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub. Co. Ltd., 14th edition, 2011.

2 S.S.Dara,” A Text book of Engineering Chemistry”, S.Chand & Co.Ltd., 10th edition, 2005.

3 Dr. S. Vairam, Dr. P. Kalyani, Dr. Subaramesh, “Engineering Chemistry”, Wiley India Pvt.Ltd., 2nd edition, 2013.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS146** | **FUNDAMENTALS OF COMPUTER AND C PROGRAMMING (Common to AU,CE,EC,EE & ME)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To learn the organization of a digital computer.*
- *To think logically and write pseudo code or draw flowchart of a problem.*
- *To write simple program using C language.*

**UNIT - I BASICS OF COMPUTERS [ 9]**

Generation and classification of computers – Basic computer organization – Number system and its conversions – Problem Solving - Algorithm – Pseudo code – Flow Chart.

**UNIT - II C PROGRAMMING BASICS [ 9]**

Fundamentals – Structure of a „C" program – Compilation and linking processes – Constants, variables – Data types – Operators – Expressions – Managing Input and output operations – Decision making and branching – Looping statements – Solving simple scientific and statistical problems.

**UNIT - III ARRAYS AND STRINGS [ 9]**

Arrays: Initialization – Declaration – One dimensional and two dimensional arrays – String: String Operations – String arrays – Simple programs: Sorting – Searching – Matrix operations.

**UNIT - IV FUNCTIONS AND POINTERS [ 9]**

Function: Declaration – Definition – Categories – Pass by value – Pass by reference – Recursion – Pointers: Definition – Initialization – Pointers arithmetic – Pointers to Pointers – Pointers and arrays – Example Problems.

**UNIT - V STRUCTURE AND UNION [ 9]**

Structure: Declaration – Definition – Structures within structures – Union – Programs using structure and Union – Storage classes – Pre-processor directives – Files.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Identify the basics of computer.*
- *Write C programs for solving simple scientific and statistical problems.*
- *Implement C programs for arrays and strings.*
- *Write C Programs using Functions and Pointers.*
- *Implement simple C applications using structures and unions.*

**Text Books :**

1 Ashok N.Kamathane, Computer Programming, Pearson Education, 2014.

**References :**

1 PradipDey, ManasGhosh, " Fundamentals of Computing and Programming in C", 1st edition, Oxford University Press, 2013.

2 Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley India Pvt. Ltd., Pearson Education in South Asia, 2011.

3 Yashavant P. Kanetkar, "Let Us C", BPB Publications, 2011.

4 Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.

5 Kernighan,B.W and Ritchie,D.M, "The C Programming language", 2nd edition, Pearson Education, 2006.

6 http://nptel.ac.in/courses/106105085/4

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16GE141** | **BASICS OF CIVIL AND MECHANICAL ENGINEERING (Common to CS, EC, EE & IT)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To develop awareness on materials, structures, components and methods in Civil Engineering.*
- *To acquire knowledge on Power plants, IC engines, Refrigeration and air conditioning systems.*

**A – CIVIL ENGINEERING**

**UNIT - I SURVEYING AND CIVIL ENGINEERING MATERIALS [9]**

Surveying: Objects – Types – Classification – Principles – Measurements of Distances – Angles – Leveling – Determination of Areas – Illustrative examples - Civil engineering materials: Bricks – Stones – Sand – Cement – Concrete – Steel Sections.

**UNIT - II BUILDING COMPONENTS AND STRUCTURES [9]**

Foundations: Types, Bearing Capacity – Requirement of Good Foundations- Superstructure – Types of Bridges and Dams - Brick Masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering – Mechanics – Internal and External Forces – Stress – Strain – Elasticity.

**B – MECHANICAL ENGINEERING**

**UNIT - III POWER PLANT ENGINEERING [9]**

Introduction, classification of Power Plants – working principles of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – merits and demerits – Pumps and Turbines – Working principle of Reciprocating pumps (single acting and double acting) – Centrifugal pump.

**UNIT - IV IC ENGINES [9]**

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and Two stroke cycles - Comparison of four stroke and two stroke engines.

**UNIT - V REFRIGERATION AND AIR CONDITIONING SYSTEM [9]**

Terminology of refrigeration and air conditioning, principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and split type room air conditioner.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Calculate the areas, volumes and relative positions of the object and to gain knowledge about the various materials used in construction.*
- *Familiar with construction practices and the components of the structures.*
- *Learn the working principle of various types of power plants, pumps and turbines.*
- *Gain the knowledge about the various classifications and terminologies of engines. Such as two stroke and four stroke petrol and diesel engines.*
- *Acquire the knowledge about the refrigeration process and the working principle of various types of Air conditioners.*

**Text Books :**

1 Ramesh Babu V, “Basic Civil & Mechanical Engineering”, VRB Publishers 2011.

2 Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, TMH Publishing Co., New Delhi, 1996.

**References :**

1 Seetharaman.S., “Basic Civil Engineering”, Anuradha Agencies, 2005.

2 Ramamrutham. S, “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd. 1999.

3 Venugopal.K and Prahu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam, 2000.

4 Shantha Kumar S.R.J.,” Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai, 2000.

5 http://nptel.ac.in

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| **PHYSICS AND CHEMISTRY LABORATORY** **(Common to all Branches)** | L | T | P | C |
|---|---|---|---|---|
| | 0 | 0 | 3 | 0 |

***Prerequisite:*** *Knowledge in Engineering Physics , Chemistry and Materials science*

***Objectives:***

- *To gain the practical knowledge and hands on experiences of understanding the physics concepts applied in optics, sound and thermal physics.*
- *To gain practical knowledge by applying theoretical principles and performing the following experiments.*

**List of Experiments in Physics Laboratory**

1.Determination of wavelength of laser using grating and the size of the particles.

2.Determination of thickness of the given material by Air – wedge method.

3.Determination of velocity of Ultrasonic waves and compressibility using Ultrasonic interferometer.

4.Spectrometer grating - Determination of wavelength of mercury spectrum.

5.Determination of thermal conductivity of a bad conductor by Lee‟s disc method.

**List of Experiments in Chemistry Laboratory**

1.Estimation of hardness in water by EDTA method.

2.Estimation of chloride in water sample by Argentometry.

3.Estimation of dissolved oxygen (DO) in water by Winkler‟s method.

4.Estimation of copper in brass by EDTA method.

5.Determination of molecular weight and degree of polymerization using viscometry.

6.Determination of rate of corrosion of mild steel by weight loss method.

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Comprehend the different physical parameters of optics and perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid.*
- *Understand the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.*
- *Know the applicability of water in various fields.*
- *Know the composition of brass quantitatively and the molecular weight of the polymer.*
- *Understand the nature of corrosion process.*

**Text Books :**

1. Physics Lab manual, Department of Physics, K.S.R. College of Engineering.
2. Chemistry Lab Manual, Department of Chemistry, K.S.R. College of Engineering.

**Reference Books :**

1. Dr.G.Senthilkumar, “Physics Lab manual”, VRB Publications Pvt. Ltd., (2006).
2. J.B. Yadav, “Advanced Practical Physical Chemistry”, GOEL Publishing House.
3. Gurdeep Raj, “Advanced Practical Inorganic Chemistry”, GOEL Publishing House.

***Note:***

- **A minimum of five experiments shall be offered in chemistry laboratory.**
- **Laboratory classes on alternate weeks for Physics and Chemistry.**

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS127** | **COMPUTER PRACTICES LABORATORY (Common to AU, CE, EC, EE & ME)** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objective:***

- *To gain the knowledge of PC hardware, Office software and simple applications using C programming.*

***List of Experiments:***

1. ***Study Experiment***
   a. Study of parts of the PC
   b. Study of Internet Connection
2. ***Word processing***
   a. Document creation, Text manipulation with scientific notations.
   b. Table creation, Table formatting and Conversion.
   c. Mail merge and Letter preparation.
   d. Drawing - flow Chart
3. ***Spread Sheet***
   a. Chart - Line, XY, Bar and Pie.
   b. Formulas and functions.
   c. Inclusion of object and protecting the sheet.
   d. Sorting and Import / Export features.
4. ***PowerPoint Presentation***
   Create simple power point presentation with animations
5. ***MS Access***
   Generate a student report using MS Access
6. ***Simple C Programming ****
   a. Conditional and looping Statements.
   b. Arrays and strings
   c. Structures and Unions
   d. Functions and pointers

* For programming exercises, Flow chart and pseudo code/algorithm are essential.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Be familiar with table creation, flow chart, mail merge and apply text manipulation in a word document*
- *Design a spreadsheet for creating the charts and apply formulas and functions.*
- *Create power point presentation with animations and generate a report in MS access.*
- *Apply good programming design methods for program development.*
- *Design and implement C programs for simple applications.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16AU027** | **ENGINEERING GRAPHICS LABORATORY (Common to CS, EC, EE & IT)** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *No prerequisites are needed for enrolling into the course*

***Objective:***

- *To develop skill for using software to create 2D and 3D models.*

**List of Experiments:**

1. Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.
2. Draw the conic curves and special curves by using AutoCAD.
3. Draw the front view, top view, side view of objects from the given pictorial view.
4. Draw the projections of straight lines.
5. Draw the projections of polygonal surface.
6. Draw the projections of simple solid objects.
7. Draw the sectional view and the true shape of the given section.
8. Draw the development of surfaces like prism, pyramids, cylinders and cone.
9. Draw the isometric projections of simple solids, truncated prism and pyramids.
10. Draw the isometric projections of cylinder and cone.

**LIST OF EQUIPMENT (For a batch of 30 Students)**

| S.No. | Name of the Equipment | Qty. |
|---|---|---|
| 1. | Pentium IV computer or better hardware, with suitable graphics facility | 30 Nos. |
| 2. | Licensed software for drafting and modeling | 15 Nos. |
| 3. | Laser Printer or Plotter to print / plot drawings | 2 Nos. |

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Construct various plane curves.*
- *Do orthographic projection of lines and plane surfaces.*
- *Draw projections of solids and development of surfaces.*
- *Prepare isometric sections of simple solids.*
- *Develop the section of solids and surfaces.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | | | | |
|---|---|---|---|---|---|
| **16EN251** | **TECHNICAL ENGLISH – II (Common to all branches)** | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objective:***

- *To improve the Listening, Speaking, Reading and Writing skills*

**UNIT - I LANGUAGE FOCUS** **[9]**

Technical vocabulary – Changing words from one form to another – Articles – Compound nouns – Numerical adjectives – Prefixes & Suffixes – Framing questions – „Wh" question – Yes / No question – Discourse markers - Cause and effect expression -Expression of purpose – Editing text for spelling and punctuation.

**UNIT - II SPEAKING** **[9]**

Greetings and introductions – Making requests – Seeking information – Inviting people – Likes & dislikes – Instructions – Describing – Telephone etiquette.

**UNIT - III READING** **[9]**

Critical reading, making inference, Context based meaning - Transcoding (Interpretation of Charts).

**UNIT - IV PROFESSIONAL WRITING** **[9]**

Job application and resume - Report Writing - E-mail writing - Business correspondence – Calling for quotations, Seeking clarification, placing order and complaint

**UNIT - V LISTENING** **[9]**

Listening to fill up forms and gapped texts – Extensive listening – Listening and note taking - Listening for main ideas.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Comprehend and apply the enriched vocabulary, by knowing the basic grammatical structures, in academic and professional contexts.*
- *Recognize and use standard english in diverse situations.*
- *Critically interpret by reading a text and comprehend a given text.*
- *Write clearly in professional contest.*
- *Enhance the listening skill for academic purposes.*

**Text Books :**

1 Dr.P.Rathna, "English Work Book – II", VRB Publishers Pvt. Ltd., Chennai,2016.

**Reference Books :**

1 Dr.S.Sumant, "Technical English I", Tata McGraw Hill, Chennai 2012.
2 Department of Humanities and social sciences, Anna University, Chennai, English for Engineers and Technologists, Orient Longman, 2008.
3 HorySankar Mukerjee, Business Communication, Oxford University Press, New Delhi 2013.
4 Department of English, "English for Technologists and Engineers", Orient Black Swan, Chennai 2012.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16MA242** | **ENGINEERING MATHEMATICS – II (Common to AU,CE,EC, EE, IT & ME)** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *No prerequisites are needed for enrolling into the course*

***Objectives:***

- *To study the concepts of Laplace transform.*
- *To apply knowledge in finding inverse Laplace transform techniques.*
- *To study the double and triple integrations and its applications.*
- *To know the basics of vector calculus along with classical theorems involving them.*
- *To understand the concepts of analytic functions, conformal mapping and bilinear transformations.*

**UNIT - I LAPLACE TRANSFORMATION [12]**

Laplace transforms – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Initial and final value theorems - Transform of periodic functions.

**UNIT - II INVERSE LAPLACE TRANSFORMATION [12]**

Inverse Laplace transforms – Convolution theorem (excluding proof) – Solution of linear ordinary differential equations of second order with constant coefficients.

**UNIT - III MULTIPLE INTEGRALS [12]**

Double integration – Cartesian coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

**UNIT - IV VECTOR CALCULUS [12]**

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green‟s theorem in a plane, Gauss divergence theorem and stokes‟ theorem – Simple problems involving cubes and rectangular parallelopipeds

**UNIT - V ANALYTIC FUNCTIONS [12]**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and sufficient conditions (excluding proof) – Harmonic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z and bilinear transformations.

**Total (L: 45 T:15 ) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the fundamentals of Laplace transform and its applications.*
- *Interpret the concepts of Inverse Laplace transforms and solving linear ODE of second order with constant coefficients.*
- *Evaluate the area of the surface and volume using double and triple integrations.*
- *Acquire the basics of* vector calculus *and its applications.*
- *Understand and apply the concepts of analytic functions, conformal mapping and bilinear transformations.*

**Text Books :**

1. Ravish R Singh and Mukul Bhatt, “Engineering Mathematics II”, McGraw Hill Publications, 1st edition, New Delhi, 2014.

**Reference Books :**

1. Grewal B.S,”Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, 9th edition New Delhi, 2015.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, 7th edition, Wiley India, 2015.
3. Bali N. P and Manish Goyal, “Text book of Engineering Mathematics”, Laxmi Publications, 6th edition, 2011.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16PH243** | **MATERIALS PHYSICS (Common to EC & EE)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Knowledge in Engineering Physics*

***Objectives:***

- *To explore the concepts of conducting materials through classical and quantum approach.*
- *To describe the theory of intrinsic semiconducting materials and extrinsic semiconducting materials.*
- *To understand the fundamental concepts behind the magnetic, dielectric and modern engineering materials.*

**UNIT – I CONDUCTING MATERIALS [9]**

Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann –Franz law – Lorentz number – Drawbacks of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals.

**UNIT – II INTRINSIC SEMICONDUCTING MATERIALS [9]**

Band theory of solids- Crystalline structure- Imperfection in semiconducting crystals – Effective mass of an electron – Properties – Types of semiconductors, elemental and compound semiconductors – Intrinsic semiconductors – carrier concentration – Fermi energy level – Variation of Fermi level with temperature – Law of mass action in semiconductors – Electrical conductivity – Band gap determination.

**UNIT – III EXTRINSIC SEMICONDUCTING MATERIALS [9]**

Extrinsic semiconductor – P- type and N – type semiconductor: Carrier concentration, Fermi energy level, Variation of Fermi level with temperature, Electrical conductivity– Drift & diffusion current – Continuity equation – Hall effect – determination of Hall voltage – Experimental determination of Hall co-efficient - Applications .

**UNIT – IV MAGNETIC AND DIELECTRIC MATERIALS [9]**

Origin of magnetic moment – Bohr magneton: Dia, Para, Ferro and Anti ferromagnetism and its properties - Domain theory– Hysteresis – Soft and Hard magnetic materials – Applications (Qualitative) – Dielectrics – Dielectric constant – Polarization in dielectrics – Electronic, Ionic, Orientational and Space charge polarizations (Derivation for polarizability) – Internal or local field – Clausius – Mosotti equation – Dielectric loss – Applications.

**UNIT – V MODERN ENGINEERING MATERIALS [9]**

Metallic glasses: Preparation, properties and applications – Shape Memory Alloys (SMA): characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA – Nanomaterials: Synthesis – Solgels – Pulsed laser deposition – properties of nanoparticles and applications – Bioglasses.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Comprehend the basics of conducting materials and to determine the states of the electron in its associated energy level.*
- *Perceive the preambles, several characteristics of intrinsic semiconductors.*
- *Perceive the preambles, characteristics of extrinsic semiconductors and to conceive the Hall effect along with its applications.*
- *Categorize the magnetic materials for various applications based on their properties and employing the advanced concepts of dielectrics in electronic appliances.*
- *Apply the techniques for manufacturing of modern engineering materials.*

**Text Books :**

1 Dr.G. Senthil Kumar, “Engineering Physics – II”, VRB Publishers Pvt. Ltd, 2011

2 Dr. P. Mani, “Engineering Physics – II”, Dhanam Publications,2012

**References :**

1 G. Senthilkumar and N. Iyandurai, “Engineering Physics”, VRB Publications Ltd, Chennai, 2008.

2 Dr. P. Mani, “Engineering Physics – II”, Dhanam Publications, 2015

3 V. Rajendran, “EngineeringPhysics”, Tata McGraw Hill, 2011

4 M.N. Avadhanulu and P.G.Kshirsagar, “A Text Book of Engineering Physics”, S. Chand & Co, New Delhi 2005

5 www.fadooengineers.com

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CY254** | **ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to all Branches)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites are needed for enrolling into the course*

***Objectives:***

- *To impart knowledge on the principle of environmental science and engineering.*
- *To understand the usages of natural resources, ecosystem and biodiversity.*
- *To create awareness on pollution, value education, population growth and social issues.*

**UNIT - I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES [9]**

Environment – definition, scope and importance, need for public awareness; Forest resources – use, over exploitation, deforestation, mining, dams and their effects on forests and tribal people; Water resources – use, over utilization of surface and ground water, floods, drought, conflicts over water; Mineral resources – use, exploitation, environmental effects of extracting and using mineral resources ; Food resources - world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity; Role of an individual in conservation of natural resources.

**UNIT - II ECOSYSTEMS AND BIODIVERSITY [9]**

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers, forest ecosystem and aquatic ecosystems (Estuary and marine ecosystem); Food chain, food web, energy flow in the ecosystem, ecological pyramids – Ecological succession ; Biodiversity – Introduction, definition – Types (Genetic – species – Ecosystem diversity); Values of biodiversity; Hot-spots of biodiversity; Threats to biodiversity; Endangered and endemic Species of India; Conservation of biodiversity – I*n-situ* and E*x-situ* conservation of biodiversity.

**UNIT - III ENVIRONMENTAL POLLUTION [9]**

Pollution – introduction and different types of pollution; Causes, effects and control measures of air pollution, water pollution – BOD and COD (definition and significance), DO and its détermination by Winkler‟s method - Waste water treatment methods ; Primary, secondary and tertiary treatments. Thermal pollution – Noise pollution – Nuclear pollution (Nuclear wastes, nuclear accident and nuclear holocaust); Solid waste management – Causes, effects and control measures of urban and industrial waste; Hazardous waste – Medical and e-wastes.

**UNIT - IV SOCIAL ISSUES AND ENVIRONMENT [9]**

Urban problems related to energy; Water conservation – Rain water harvesting and watershed management; Resettlement and rehabilitation; Environmental ethics ; Issues and possible solutions; Climate change – Global warming and its effects on flora and fauna, acid rain, ozone layer depletion; Wasteland reclamation ; Environment protection act – Air (Prevention and control of pollution) act, water (Prevention and control of pollution) act, wildlife protection act and Forest conservation act; Issues involved in enforcement of environmental legislation. Disaster Management - Earth quake, cyclone, tsunami, disaster preparedness- response and recovery from disaster.

**UNIT - V HUMAN POPULATION AND ENVIRONMENT [9]**

Sustainable development – From unsustainable to sustainable development – 12 Principles of green chemistry – Environmental impact assessment (EIA) – Human population – Population growth and variation among nations; Population explosion; Family welfare programme and family planning; Environment and human health; Human rights; Value education – HIV / AIDS ; Women and child welfare; Role of information technology in environment and human health.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Play an important role in conservation of resources for future generation.*
- *Paraphrase the importance of ecosystem and biodiversity*
- *Analyze the impact of pollution and hazardous waste in a global and societal context*
- *Understand contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems*
- *Consider issues of environment and human population in their professional undertakings*

**Text Books :**

1 Anubha Kaushik and C. P. Kaushik, Environmental Science and Engineering, New Age International Publishers, 14th edition, 2014.

2 Dr. T. ArunLuiz, Environmental Science and Engineering, S.Chand & Co.Pvt.Ltd.,1st edition, 2016.

**Reference Books :**

1 G. Tyler Miller, Jr, Environmental Science,Thomson-South western, 11th edition, 2007.

2 Raman Sivakumar, Introduction to Environmental Science and Engineering, Tata McGraw Hill Education Pvt., Ltd., 4th edition 2012.

3 Dara S. S., A Text Book of Environmental Chemistry and Pollution Control, S. Chand & Co., 10th edition, 2005.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| **16CS236** | **C++ AND DATA STRUCTURES** | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of C Programming*

***Objectives:***

- *To understand the concepts of object-oriented programming.*
- *To learn the concepts of linear data structures and its applications.*
- *To understand the design and applications of non-linear data structures.*

**UNIT - I INTRODUCTION TO C++** **[9]**

Object Oriented Programming Concepts – Difference between object oriented and procedure oriented – Benefits – Applications – Introduction to C++ – Tokens – Data types – Operators – Classes – Objects – Default arguments – Static member functions – Static data members – Friend functions.

**UNIT - II CONSTRUCTORS AND INHERITANCE** **[9]**

Constructors – Destructors – Operator overloading: Unary operator overloading – Binary operator overloading – Inheritance – Virtual functions – Pure virtual functions – Exception handling.

**UNIT - III DATA STRUCTURES AND ALGORITHMS** **[9]**

Analysis of algorithms – Abstract data type – Lists – Stacks and queues – Priority queues – Binary heap – Application – Heaps – Hashing –Hash tables without linked Lists.

**UNIT - IV NONLINEAR DATA STRUCTURES** **[9]**

Trees – Binary trees – Traversals – Binary search Tree – AVL trees – Graph algorithms – Topological sort – Shortest path algorithm – Dijiktras algorithm – Minimum spanning Tree – Prim's and Kruskal's algorithms.

**UNIT - V SORTING AND SEARCHING** **[9]**

Sorting – Bubble sort –Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – Searching techniques – Linear search – Binary search.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe the concepts of object oriented programming.*
- *Demonstrate the ideas of constructors, inheritance and operator overloading.*
- *Analyze the concept of list ADT and its implementation.*
- *Gain the knowledge in binary, binary search tree with its operations, AVL tree.*
- *Describe the notions of shortest path and minimum spanning tree algorithms.*

**Text Books :**

1 E. Balagurusamy, “Object Oriented Programming with C++”, 4th edition, TMH India Pvt. Ltd., New Delhi, 2008.

2 M. A. Weiss, “Data Structures and Algorithm Analysis in C”, 2nd edition, Pearson Education, 2015.

**References :**

1 Robert Lafore, “Object Oriented Programming in-C++”, Galgotia Publication, 4th edition, 2014.

2 B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

3 A.K. Sharma, “Data Structures using C”, 1st edition, Pearson Education, 2011.

4 R. F. Gilberg, B. A. Forouzan, “Data Structures, 2nd edition”, Thomson India, 2005.

5 http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC211** | **ELECTRIC CIRCUIT THEORY** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *Engineering Mathematics - I, Engineering Physics*

***Objectives:***

- *To understand basic laws and theorems for solving electric circuits.*
- *To know the steady state and transient response of RLC circuits.*
- *To understand the basic concepts of coupled networks and three phase networks.*

**UNIT - I DC NETWORK ANALYSIS [12]**

Basic components and electric networks - Charge - Current - Voltage and power - Voltage and current sources - Ohms law - Kirchoff„s laws - Analysis of series and parallel networks - Voltage and current division - Networks reduction - Nodal and mesh analysis for linear resistive networks - An introduction to network topology.

**UNIT - II NETWORK THEOREMS AND DUALITY [12]**

Linearity and Non linearity - Superposition theorem - Thevenin„s theorem - Norton„s theorem - Maximum power transfer theorem - Reciprocity theorem - Star-Delta transformation - Duals - Dual networks.

**UNIT - III SINUSOIDAL STEADY STATE ANALYSIS [12]**

Sinusoidal steady state analysis - Characteristics of sinusoids - AC network power analysis - Instantaneous power - Average power - Apparent power and Power factor - Phase relationship for R, L and C - Analysis of simple series and parallel AC networks with phasor diagram.

**UNIT - IV TRANSIENTS AND RESONANCE IN RLC NETWORKS [12]**

Transient response of RL, RC and RLC networks for DC input and sinusoidal inputs - Series and parallel resonance - Frequency response - Quality factor – Bandwidth - Half power frequencies.

**UNIT - V COUPLED NETWORKS AND THREE PHASE SYSTEMS [12]**

Magnetically coupled networks - Self inductance - Mutual inductance - Co-efficient of coupling - Single and double tuned networks - Analysis and applications - Analysis of 3 phase 3 wire and 4 wire systems with Star and Delta connected loads (balanced & unbalanced) - 3 Phase power measurement by two watt meter method.

**Total (L: 45 T:15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Recognize the various combinations of circuit elements and solve the electric circuits by applying basic circuital laws and transformations.*
- *Analyze the circuit responses to sinusoidal source and steady state response as a function of frequency.*
- *Analyze the electric circuits using circuit reduction techniques and minimize the complex electrical circuits using various network theorems.*
- *Understand the transient behavior of electric circuits with source free excitation, step and sinusoidal excitations.*
- *Develop an electrically coupled equivalent of magnetically coupled circuits and elucidate the response of three phase circuits employing balanced and unbalanced loads.*

**Text Books :**

1 Joseph A.Edminister, Mahmood Nahri, “Electric Circuits”, Schaum„s Series, Tata McGraw-Hill, New Delhi, 2001.

2 David A. Bell,” Fundamentals of Electric Circuits”, Oxford University press, 2009.

**References :**

1 W.H.Hayt,J.E.Kemmarly,S.M.Durbin, “Engineering Circuit Analysis”, McGraw- Hill, 6th edition, New Delhi, 2008.

2 Charles K. Alexander & Mathew N.O.Sadiku, “Fundamentals of Electric Networks”, McGraw- Hill, 2nd edition, 2003.

3 A.Sudhakar and S.P.Shyam Mohan, “Circuits and Network Analysis and Synthesis”, TMH, 3rd edition, 2007.

4 Chakrabati A, “Circuits Theory (Analysis and synthesis)”, Dhanpath Rai & Sons, New Delhi, 1999.

5 NPTEL Course Link : http://nptel.ac.in/courses/108102042/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16GE228** | **PHYSICS AND CHEMISTRY LABORATORY (Common to all Branches)** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Knowledge of Engineering Physics , Chemistry and Materials science*

***Objectives:***

- *To gain the practical knowledge and hands on experiences of understanding the physics concepts applied in materials science, properties of matter and solar cell.*
- *To gain knowledge in utilizing electrochemical methods by using analytical equipment and quantitative procedures.*

**List of Experiments in Physics Laboratory**

1. Determination of Young"s modulus of the material of a uniform bar by non – uniform bending method.
2. Determination of Band gap energy of a semiconductor.
3. Determination of Viscosity of a given liquid by Poiseuille"s method.
4. Torsional pendulum - Determination of rigidity modulus of a given wire.
5. V-I Characteristics of solar cell.

**List of Experiments in Chemistry Laboratory**

1. Conductometric Titration – Strong Acid Vs Strong base.
2. Conductometric Titration – Mixture of weak and strong acids.
3. Conductometric Titration – Precipitation, $BaCl_2$ Vs $Na_2SO_4$.
4. Estimation of Ferrous ion by potentiometry – $Fe^{2+}$ Vs $K_2Cr_2O_7$.
5. Estimation of Hydrochloric acid by $p^H$ metry.
6. Estimation of Iron by Spectrophotometry.

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.*
- *Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.*
- *Gain practical knowledge in determining the strength of a solution in a given solution by Conductometric titration methods.*
- *Get conceptual knowledge in estimating the concentration of Iron in solution by electrochemical methods.*
- *Determine the role of pH in quantitative analysis of a solution.*

**Text Books :**

1. Physics Lab manual, Department of Physics, K.S.R. College of Engineering.
2. Chemistry Lab Manual, Department of Chemistry, K.S.R. College of Engineering.

**Reference Books :**

1. Dr.G.Senthilkumar, "Physics Lab manual", VRB Publications Pvt. Ltd., (2006).
2. J.B. Yadav, "Advanced Practical Physical Chemistry", GOEL Publishing House.
3. Gurdeep Raj, " Advanced Practical Inorganic Chemistry", GOEL Publishing House.

***Note:***

- **A minimum of five experiments shall be offered in chemistry laboratory.**
- **Laboratory classes on alternate weeks for Physics and Chemistry.**

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS226** | **C++ AND DATA STRUCTURES LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Basic knowledge of C programming*

***Objectives:***

- *To learn an object oriented way of solving problems.*
- *To implement various concepts of OOPs using C++.*
- *To develop programming skills in design and implementation of data structures and their applications.*

**List of Experiments:**

**C++ :**

1. Simple class, objects and array of objects.
2. Operator overloading with and without using Friend function
3. Constructors and Destructors
4. Multilevel Inheritance
5. Virtual Function

**Data Structures:**

1. Implementation of Singly and Doubly linked lists.
2. Infix to postfix expression conversion and evaluation using stack.
3. Queue and its operations.
4. Expression tree - preorder, inorder, and postorder traversals.
5. Binary search tree.
6. Sorting- Heap sort , Merge sort

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Developing simple programs using class and objects concepts.*
- *Design and implement the concepts of inheritance, operator overloading.*
- *Implement the concept of singly and doubly linked list.*
- *Understand the concepts of stack and queue.*
- *Know the working of sorting algorithm.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC221** | **ELECTRIC CIRCUITS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisites:*** *Electric Circuit Theory*

***Objective:***

- *To understand and apply circuit theorems and concepts in engineering applications.*

**List of Experiments:**

1. Verification of Ohm„s laws and Kirchhoff„s laws
2. Verification of mesh and nodal analysis.
3. Verification of Thevenin„s and Norton„s theorems
4. Verification of Superposition theorem
5. Verification of Maximum power transfer theorem
6. Verification of Reciprocity theorem.
7. Measurement of self-inductance of a coil.
8. Power measurement using Wattmeter
9. Measurement of energy using single phase energy meter.
10. Study of CRO and measurement of voltage, frequency and power factor.
11. Transient response of RL and RC circuits for DC and AC inputs.
12. Frequency response of series and parallel resonance circuits
13. Study of frequency response of single tuned coupled circuits.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze an electric circuit using Kirchoff's laws and verify results.*
- *Evaluate currents and voltages in any part of a circuit using Mesh and Nodal analysis and verify the results.*
- *Minimize an electrical circuit using Thevenin's and Norton's theorems and verify results.*
- *Minimize an electrical circuit using Super position and Reciprocity theorems and verify results.*
- *Determine the values of self and mutual inductance of the coil and analyze the frequency response of series and parallel resonant circuits with results. Measure the power and energy of single phase AC circuits.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - II**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HR251** | **CAREER DEVELOPMENT SKILLS – I (Common to all branches)** | - | 2 | - | - |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To help individuals cope with continue changes in the world of work*
- *To help individuals understand their unique abilities, interests, and aptitudes.*

**UNIT - I SPOKEN ENGLISH [ 6 ]**

Basic rules of grammar – Parts of speech – Tenses – Verbs-Sentence construction – Vocabulary – idioms & Phrases – Synonyms –Antonyms – Dialogues and conversation – Exercise(Speaking)

**UNIT - II ESSENTIAL COMMUNICATION [ 6 ]**

Verbal communication – Effective Communication – Active Listening – Paraphrasing – Feedback, Non Verbal Communication – Body language of Self and Others, Importance of feelings in communication – Dealing with feelings in communication Practice – Exercise.

**UNIT - III WRITTEN COMMUNICATION – PART 1 [ 6 ]**

Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition - Change of voice - Change of speech - One word substitution - Using the same word as different parts of speech - Odd man out - Spelling & Punctuation (Editing).

**UNIT - IV WRITTEN COMMUNICATION – PART 2 [ 6 ]**

Analogies - Sentence formation - Sentence completion - Sentence correction - idioms & Phrases - Jumbled sentences, Letter drafting (Formal Letters) - Reading comprehension(Level 1) – Contextual usage - Foreign language words used in english – Exercise

**UNIT - V ORAL COMMUNICATION – PART 1 [ 6 ]**

Self-Introduction - Situational dialogues / Role Play (Telephonic Skills) - Oral presentations - Prepared –'Just A Minute' sessions (JAM) - Presentation skills – Exercises.

**Total = 30 Periods**

**Course Outcomes:** ***On completion of this course, the student will be able to***

- *Have competent knowledge on grammar with an understanding of its basic rules.*
- *Communicate efficiently and enhance interpersonal skills with renewed self-confidence.*
- *Construct sentence in english and make correction.*
- *Perform oral communication in any formal situation.*
- *Develop their LSRW skills.*

**Reference Books :**

1 Anne Laws, “Writing Skills”, Orient Black Swan, Hyderabad, 2011.

2 Raj N Bakshmi, “English Grammar Practice”, Orient Black Swan, Hyderabad, 2009.

3 Sarah Freeman, “Written Communication in English”, Orient Black Swan, Hyderabad, 2015.

4 Thakur K B Sinha, ”Enrich Your English“, Vijay Nicole, Chennai, 2005.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16MA341** | **ENGINEERING MATHEMATICS – III (Common to AU, CE, EC& ME)** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To study the concepts of partial differential equations.*
- *To know the basis of Fourier series.*
- *To understand the concepts of Fourier transforms.*
- *To acquire knowledge in the applications of partial differential equations.*
- *To know the basics of Z–Transforms and solving difference equation.*

**UNIT - I PARTIAL DIFFERENTIAL EQUATIONS [12]**

Formation of partial differential equations – Lagrange‟s linear equation – Solutions of standard types : F (p, q) = 0; Clairaut‟s form z = px + qy + F (p, q) – Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients.

**UNIT - II FOURIER SERIES [12]**

Dirichlet‟s conditions – General Fourier series – Odd and even functions – Half range sine and cosine series – Parseval‟s theorem – Harmonic analysis.

**UNIT - III FOURIER TRANSFORMS [12]**

Fourier integral theorem (without proof) – Fourier Transform pair – Sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem (without proof) – Parseval‟s identity.

**UNIT - IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS [12]**

Classification of Partial Differential Equations – Solutions of one dimensional wave equation – Problems on vibrating string with zero and non – Zero initial velocity – One dimensional heat equation – Problems of steady state condition with zero and non- zero boundary values.

**UNIT - V Z TRANSFORMS AND DIFFERENCE EQUATIONS [12]**

Z-Transforms – Elementary properties – Inverse Z-Transforms by using Partial Fraction method, Convolution theorem (without proof) and Residue theorem – Solutions of difference equations by using Z-Transforms.

**Total (L: 45 T:15 ) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Develop their ability in solving partial differential equations.*
- *Apply the basics of Fourier series and its application.*
- *Understand the concepts of Fourier Transforms.*
- *Develop their skills in applications of partial differential equations.*
- *Acquire knowledge in basics of Z–Transforms and solving difference equation by using Z – transform.*

**Text Book :**

1 Veerarajan.T “Engineering Mathematics”, Tata McGraw Hill Publications, 3rd edition, New Delhi, 2015.

**Reference Books :**

1 Bali N. P and Manish Goyal, “Text book of Engineering Mathematics” . 9th edition, Laxmi Pub. (P) Ltd, 2011.

2 Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th edition, Wiley India, 2014.

3 Dr. GrewalB.S, ”Higher Engineering Mathematics”, Tata McGraw Hill Pub. Co, 43rd edition, New Delhi, 2013.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC311** | **DIGITAL ELECTRONICS** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Electronic Circuits*

***Objectives:***

- *To outline the basic postulates of boolean algebra*
- *To familiarize with the methods for simplifying boolean expressions and implementation of logic functions*
- *To develop a design procedure for combinational circuits*
- *To be exposed to design using PLD and concepts of memory*
- *To understand the concepts of latches, flip-flops and counters*
- *To formulate a design procedure for sequential circuits and develop HDL models for digital circuits*

**UNIT - I MINIMIZATION TECHNIQUES AND LOGIC GATES [9]**

**Minimization Techniques**: Boolean postulates and laws - De-Morgan's theorem - Principle of duality - Boolean expression: Minterm, maxterm, Sum of Products, Product of Sums - Minimization of boolean expression: Algebraic method, Karnaugh map method, Don't care conditions, Quine - McCluskey method.

**Logic gates**: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR - Implementation of logic functions using basic gates, NAND-NOR implementations - TTL and CMOS digital logic families - Tristate gates.

**UNIT - II COMBINATIONAL CIRCUITS [9]**

Introduction - Design procedure - Half adder - Full adder - Half subtractor - Full subtractor - Parallel binary adder, Parallel binary subtractor - Fast adder : Carry look ahead adder - Serial adder/subtractor - BCD adder - Binary multiplier - Binary divider - Code converters - Parity generator - Parity checker - Decoders - Encoders - Multiplexers - Demultiplexers

**UNIT - III MEMORY AND PROGRAMMABLE LOGIC DEVICES [9]**

Classification of memories – ROM: ROM organization, PROM, EPROM , EEPROM, EAPROM, RAM: RAM organization - Memory expansion - Static RAM cell - Bipolar RAM cell - MOSFET RAM cell - Dynamic RAM cell - Programmable Logic Devices : Programmable Logic Array - Programmable Array Logic - Field Programmable Gate Arrays - Implementation of combinational logic circuits using ROM, PLA and PAL

**UNIT - IV SEQUENTIAL CIRCUITS [9]**

**Latches and Flip-flops**: SR, JK, D, T, and Master-Slave - Characteristic table and equation - Application Table - Edge triggering - Level Triggering - Realization of one flip flop using other flip flops.

**Counters:** Asynchronous and synchronous counter: Up, Down and Up/Down counter - Design of synchronous counter - Modulo–n counter - Registers: Shift registers, universal shift register - Shift register counters: Ring counter, Johnson counter - Sequence generator.

**UNIT - V SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS [9]**

**Synchronous Sequential Circuits:** General model, classification, analysis and design of synchronous sequential circuit - Use of algorithmic state machine.

**Asynchronous Sequential Circuits:** Analysis and design of fundamental mode and pulse mode circuits - Incompletely specified state machines - Problems in asynchronous sequential circuit - Hazards: Types of hazard, design of hazard free switching circuits.

**Hardware Description Language**: Introduction to VHDL, VHDL model for combinational and sequential circuits.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze different methods used for simplification of boolean expressions.*
- *Design and implement combinational circuits.*
- *Gain Knowledge on the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD and FPGAs.*
- *Analyze sequential digital circuits like flip-flops, registers and counters.*
- *Formulate a design procedure for sequential circuits and develop HDL models for digital circuits*

**Text Books :**

1 M. Morris Mano, "Digital Design", Prentice Hall of India Pvt.Ltd.,4th edition, 5th Impression,2012.
2 Soumitra Kumar Mandal, "Digital Electronics Principles and Applications", McGraw Hill, 7th Reprint, 2014.
3 Charles H.Roth," Fundamentals of Logic Design", 5th edition Thomson Learning, 2011.

**References :**

1 John F. Wakerly, "Digital Design Principles and Practices", Pearson Education, 9th Impression, 2013.
2 John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 9th Reprint, 2012.
3 Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill, 21st Reprint, 2012.
4 Donald P.Leach,Albert Paul Malvino and GoutamSaha, "Digital Principles and Applications", McGraw Hill Education, 8th Edition,2015.
5 Stephen Brown, ZvonkoVranesic, "Fundamentals of Digital Logic with VHDL Design", TMH, 3rd edition, 2012.
6 NPTEL Course Link:http://nptel.ac.in/courses/117106086

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC312** | **ELECTRONIC DEVICES AND CIRCUITS** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Material science and Electric circuit theory*

***Objectives:***

- *To gain knowledge in the operations of basic electronic devices.*
- *To analyze the small signal equivalents circuits for transistor.*
- *To understand the concepts of rectifiers, filters, regulators and power supplies.*

**UNIT - I DIODES AND TRANSISTOR [9]**

**DIODES:** Introduction, depletion layer, biasing of PN Junction, diode current equation - Capacitance in diode: Space charge and diffusion capacitances - VI Characteristics - Effect of temperature – Zener diode and its characteristics – Breakdown mechanisms.

**TRANSISTOR**: Introduction, construction – Biasing – Operation of NPN and PNP transistors – Configurations: VI characteristics, current gain, leakage current – Transistor as an amplifier and switch.

**UNIT - II FET AND OTHER SEMICONDUCTOR DEVICES [10]**

**FET:** Construction and working of N-Channel and P-Channel JFET– Construction and working of Enhancement and Depletion type MOSFET– Comparison of BJT with FET – Thermal effect on MOSFET.

**OTHER SEMICONDUCTOR DEVICES:** Construction, working and applications: Tunnel diode – PIN diode – Varactor diode, LED, LCD, LASER, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – UJT and SCR.

**UNIT - III TRANSISTOR BIAS AND STABILITY [8]**

Need for biasing – Q point – DC and AC load line – Factors affecting Q point – Stability factor – BJT biasing: Fixed bias, collector to base bias, voltage divider bias – Bias compensation techniques: Diode compensation, thermistor, sensistor. FET biasing: Fixed bias, self-bias, voltage divider bias.

**UNIT - IV MIDBAND ANALYSIS AND FREQUENCY RESPONSE OF AMPLIFIERS [9]**

**MIDBAND ANALYSIS OF AMPLIFIERS:** Hybrid parameter – Eber‟s moll model – Small signal equivalent circuit: CE, CB and CC amplifiers – Miller‟s theorem – Darlington amplifier and Bootstrapping emitter follower – Emitter coupled differential amplifier, CMRR.

**FREQUENCY RESPONSE OF AMPLIFIERS:** Cutoff frequencies – Hybrid π equivalent circuit – Low and high frequency response of CE and CS amplifiers.

**UNIT - V RECTIFIERS AND POWER SUPPLIES [9]**

**RECTIFIERS:** Analysis of half wave, full wave and bridge rectifiers with resistive load – Analysis for $V_{DC}$ and ripple voltage with C, L, LC and CLC filters – Voltage regulators: Zener diode regulator, transistor series and shunt regulator - Current limiting and over voltage protection circuit – SMPS.

**Total=45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge on construction, working and applications of diodes and bipolar junction transistor.*
- *Understand the construction, working and applications of junction field effect transistors, Special diodes, Optoelectronics and Triggering devices.*
- *Analyze the various biasing methods, biasing stability and bias compensation techniques.*
- *Ability to design h-parameters for various amplifiers and analyze the frequency response of amplifier circuits.*
- *Analyze the concepts of rectifiers & filter in terms of ripple factor and efficiency, various regulators and power supplies.*

**Text Books :**

1. Sedra / Smith, “Micro Electronic Circuits” Oxford University Press, 6th edition /second Impression 2013.
2. Anil K Maini, VarshaAgarwal, “Electronic Devices & Circuits”, John Wiley India, Reprint 2012

**References :**

1. Robert L. Boylestad and Louis Nasheresky, “Electronic Devices and Circuit Theory”, 11th edition, PHI, 2015.
2. David A. Bell, “Solid State Pulse Circuits”, 4th edition PHI, 2012.
3. Donald .A. Neamen, “Electronic Circuit Analysis and Design”, 2nd edition, Tata McGraw Hill, 2009.
4. Millman.J. and Halkias C.C, “Integrated Electronics”, Tata McGraw Hill, 48th Reprint 2008
5. NPTEL Course Link: http://nptel.ac.in/courses/117101106/7

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC313** | **ENGINEERING ELECTROMAGNETICS** | 3 | 1 | 0 | 4 |

***Prerequisites:*** *Engineering Mathematics I, II*

***Objectives:***

- *To understand the fields and potentials due to static charges.*
- *To understand the principles of static magnetic fields.*
- *To analyze how materials affect electric and magnetic fields.*
- *To understand the relation between fields under time varying situations.*
- *To familiarize the principles of propagation of uniform plane waves.*

**UNIT – I STATIC ELECTRIC FIELD [12]**

Introduction to coordinate systems: Rectangular, cylindrical and spherical – Introduction to line, surface and volume integrals – Definition of gradient, divergence and curl – Stoke‟s and Divergence theorem – Coulomb‟s law in vector form – Definition of electric field intensity – Principle of superposition – Electric field due to discrete charges – Electric field due to continuous charge distribution: Charges distributed uniformly on an infinite and finite line, axis of a uniformly charged circular disc , infinite uniformly charged sheet – Electric scalar potential – Relationship between potential and electric field – Potential due to infinite uniformly charged line – Potential due to electric dipole – Electric flux density – Proof of Gauss‟s law.

**UNIT - II STATIC MAGNETIC FIELD [12]**

The Biot-Savart‟s law in vector form – Magnetic field intensity due to a finite and infinite wire carrying a current – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current – Ampere‟s circuital law and applications – Magnetic flux density – The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current placed in a magnetic field – Torque on a loop carrying a current – Magnetic moment – Magnetic vector potential.

**UNIT - III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS [12]**

Poisson‟s and Laplace‟s equation – Electric polarization – Nature of dielectric materials– Definition of capacitance – Capacitance of various geometrics using Laplace‟s equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – Point form of Ohm‟s law – Continuity equation for current – Definition of inductance – Inductance of loops and solenoids – Simple examples – Energy density in magnetic fields – Nature of magnetic materials– Magnetization and Permeability – Magnetic boundary conditions.

**UNIT - IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS [12]**

Faraday‟s law – Maxwell‟s second equation in integral form from Faraday‟s law – Equation expressed in point form – Maxwell‟s equation in phasor form – Displacement current – Ampere‟s circuital law in integral form – Modified form of Ampere‟s circuital law as Maxwell‟s first equation in integral form – Equation expressed in point form – Maxwell‟s four equations in integral form and differential form – Poynting vector and the flow of power – Power flow in a co-axial cable – Instantaneous average and complex Poynting vector.

**UNIT - V ELECTROMAGNETIC WAVES [12]**

Derivation of wave equation – Uniform plane waves – Wave equation in phasor form – Plane waves in free space – Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect – Linear, Elliptical and Circular polarization – Reflection of plane wave from a conductor – Normal incidence – Reflection of plane waves by a perfect dielectric – Normal and oblique incidence – Brewster‟s angle.

**Total (L:45 T:15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the coordinate systems and analyse field due to various types of static charges and their potentials.*
- *Derive field equations for static magnetic field from fundamental laws, potential and force.*
- *Explain how the interaction of electric and magnetic fields with materials and Solve simple electrostatic and magneto static boundary value problems*
- *Understand the behavior of time varying field using Maxwell's equation and Derive Maxwell's equation from fundamental laws and pointing vector.*
- *Derive wave equation from Maxwell's equation for different mediums and deduce the equations to describe wave propagation and reflection at boundaries.*

**Text Books :**

1 W H.Hayt & J A Buck, "Engineering Electromagnetics" TATA McGraw-Hill, 7th edition 2007.

2 E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems" Pearson Education/PHI, 4th edition 2006.

**References :**

1 Matthew N.O.Sadiku, "Elements of Engineering Electromagnetics" Oxford University Press, 4th edition, 2007.

2 Narayana Rao, N "Elements of Engineering Electromagnetics", Pearson Education, New Delhi,6th edition 2006.

3 Ramo, Whinnery and Van Duzer, "Fields and Waves in Communications Electronics" John Wiley & Sons, 3rd edition 2003.

4 David K.Cheng, "Field and Wave Electromagnetics", Pearson Edition, 2nd edition, 2004.

5 G.S.N. Raju, "Electromagnetic Field Theory &Transmission Lines", Pearson Education, 1st edition, 2006.

6 NPTEL Course Link: http://nptel.ac.in/courses/115101005/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| 16EC314 | SIGNALS AND SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

***Prerequisites:*** *Engineering Mathematics – II*

***Objectives:***

- *To understand the basic properties of signals and systems.*
- *To learn Laplace, Fourier transforms and their properties.*
- *To familiarize Z transform, DTFT and their properties.*
- *To characterize LTI systems in the time domain and various transform domains.*

**UNIT - I CLASSIFICATION OF SIGNALS AND SYSTEMS [12]**

Continuous and Discrete time signals: Step, ramp, pulse, impulse, exponential - Classification of CT and DT signals and systems - Linear time invariant systems and its properties.

**UNIT - II ANALYSIS OF CONTINUOUS TIME SIGNALS [12]**

Fourier series analysis - Spectrum of CT Signals - Fourier transform and its properties - Laplace transform and its properties.

**UNIT - III LINEAR TIME INVARIANT – CONTINUOUS TIME SYSTEMS [12]**

Differential equations: Frequency response, impulse response, Fourier and Laplace transform in analysis of CT systems - Block diagram representation - Convolution integral - State variable equations and matrix representation of systems.

**UNIT - IV ANALYSIS OF DISCRETE TIME SIGNALS [12]**

Sampling of continuous time signals - Aliasing - DTFT and its properties - Z transform and its properties, Inverse Z transform.

**UNIT - V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS [12]**

Difference equations: Impulse response, LTI systems analysis using DTFT and Z transform - Block diagram representation - Convolution sum - State variable equations and matrix representation of systems.

**Total (L: 45 T:15 ) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basic concept of classification of signals and systems.*
- *Analyze continuous time signals using Fourier and Laplace Transforms.*
- *Apply Fourier and Laplace Transform techniques to find the response of CT systems.*
- *Analyze discrete time signals using DTFT and Z- Transforms.*
- *Apply DTFT and Z-Transforms techniques to find the response of DT systems.*

**Text Books :**

1 Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson Education, 2nd Edition, 2012.
2 Edward W Kamen and Bonnie‟s Heck, “Fundamentals of Signals and Systems”, Pearson Education, 2nd Edition, 2008.

**References :**

1 H P Hsu, RakeshRanjan “Signals and Systems”, Schaum‟s Outlines, Tata McGraw Hill, Indian Reprint 2013.
2 P.RameshBabu, R.Anandanatarajan, “Signals and Systems”, Scitech Publications, 4th edition, Reprint 2015
3 Simon Haykins and Barry Van Veen, “Signals and Systems”, John Wiley & Sons, 2nd edition, 2012.
4 Robert A. Gabel and Richard A.Roberts, “Signals & Linear Systems”, John Wiley, 3rd edition, 2014.
5 NPTEL course Link:http://http://nptel.ac.in/courses/117104074

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EE331** | **ELECTRICAL MACHINES** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Engineering Mathematics – II*

***Objective:***

- *To know the construction, principle of operation of DC, AC and Special machines.*

**UNIT - I D.C. MACHINES [9]**

Laws of Electromagnetism – Construction of DC machines – DC generator: EMF equation – Methods of excitation – Types– Armature reaction – Characteristics - DC Motor: Principle of operation, types – Back EMF – Torque equation – Characteristics – Starting and speed control of D.C series and shunt motors.

**UNIT - II TRANSFORMERS [9]**

Constructional details – Principle of operation – EMF equation – Transformation ratio – Transformer on no load and load – Equivalent circuit – Load test, open circuit and short circuit test – Voltage regulation – Auto transformer.

**UNIT - III INDUCTION MOTORS [9]**

Three phase induction motor: Construction, principle of operation, types, torque equation, torque slip characteristic, starting and speed control - Single phase induction motor: Split phase motor, capacitor start capacitor run motor, shaded pole motor.

**UNIT - IV SYNCHRONOUS MACHINES [9]**

Construction of Synchronous Machines – Alternator: Working principle, types, EMF equation, OC and SC characteristics – Voltage regulation – EMF and MMF methods – Brushless alternators - Synchronous motor: Working principle – Starting methods – Effect of change of excitation.

**UNIT - V SPECIAL MACHNIES [9]**

Stepper motor – Hysteresis motor – Reluctance Motor – AC series motor – Universal motor – Linear induction motor – Brushless DC motor.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Explain the construction, operating principle, performance, starting and speed control of DC machines.*
- *Demonstrate the construction, working principle and performance of transformers.*
- *Explain the constructional details, characteristics & starting methods of induction motor.*
- *Describe the constructional details, regulation characteristics and starting methods of synchronous machines.*
- *Explain the working principle of special electrical machines.*

**Text Books :**

1 Nagrath I. J and Kothari D. P., “Electric Machines”, Tata McGraw Hill Publishing Company Ltd, 4th ,Fifth Reprint 2012.
2 B.L.Theraja and A.K.Theraja, “A Text Book of Electrical Technology”, S.Chand Publishing, First multicolor Edition 2005, Reprint 2015.

**References :**

1 A.E. Fitzgerald, Charles KingselyJr and Stephen D.Umans, “Electric Machinery”, McGraw Hill Books Company, 7th edition, 2013.
2 K. Murugesh Kumar, “Electric Machines”, Vikas publishing house Pvt Ltd, 1st, 2003.
3 P.S. Bhimbhra, “Electrical Machinery”, Khanna Publishers, 7th edition, 2013.
4 Samarajit Ghosh, “Electrical Machines”, Pearson Education 2nd edition, 2012.
5 NPTEL Course Link: http://nptel.ac.in/courses/108106071/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS326** | **OPEN SOURCE AND WEB DEVELOPMENT LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Fundamentals of computers and programming.*

***Objective:***

- *To develop web programming skills using various open source software.*

**List of Experiments:**

1. Study of open source operating system installation and working With LAMP server.
2. Working with Linux commands.
3. Shell Script Programs.
4. Create a HTML document with form.
5. Create a website and perform the following using JavaScript.
   a. Operators
   b. Functions
   c. Arrays
6. Create a website using HTML and perform validation using JavaScript.
7. Write a PHP program to implement the following,
   a. Variables – Constants –Data Types
   b. Operators – Statements
   c. Functions – Arrays
8. Create and Execute DDL and DML commands Using MySQL.
9. Write a PHP program to connect MySQL database and retrieve a record in HTML table.
10. Develop online application for ticket booking using PHP and MySQL.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Install Linux OS and LAMP Server.*
- *Learn basic Linux commands and Shell scripts.*
- *Build website using HTML and Java script.*
- *Understand basic SQL Commands.*
- *Develop simple applications using PHP and MySQL.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC321** | **ELECTRONIC DEVICES AND CIRCUITS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Electric circuit theory*

***Objectives:***

- *To understand the characteristics of electronic devices.*
- *To design & Construct various amplifier circuits.*
- *To simulate the characteristics of devices using PSPICE.*

**List of Experiments:**

1. Characteristics of PN and Zener diode
2. Characteristics of CE, CB and CC configuration
3. Characteristics of JFET
4. Characteristics of UJT and SCR
5. Design and construct CE amplifier using voltage divider bias with and without bypass emitter capacitance
6. Design and construct CC amplifier using voltage divider bias
7. Design and construct CS Amplifier
8. Power supply circuit – Half, Full wave rectifier with simple capacitor filter and shunt regulator
9. Simulation using SPICE tool for any four device characteristics

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the V-I characteristics of two terminal device.*
- *Understand the V-I characteristics of three terminal device.*
- *Design and construct BJT & FET amplifier.*
- *Construct a Half wave and Full wave rectifier with and without filters.*
- *Simulate the device characteristics using SPICE tool.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC322** | **DIGITAL ELECTRONICS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Electronic Devices and Circuits laboratory*

***Objectives:***

- *To implement basic gates using Universal gates.*
- *To design and Implement combinational circuits using logic gates.*
- *To construct and study the functionality of multiplexer, demultiplexer, encoder and decoder.*
- *To analyze and verify the performance of synchronous counter, asynchronous counter and shift registers.*
- *To understand Hardware Description Language and simulate the combinational and sequential logic circuits.*

**List of Experiments:**

1. Realization of gates using universal gates
2. Design and implementation of Adder and subtractor using logic gates.
3. Design and implementation of Code converters using logic gates:
   (i) BCD to Excess-3 code and vice versa
   (ii) Binary to Gray code and vice-versa
4. Design and implementation of 4-bit Binary adder / subtractor and BCD adder using IC 7483.
5. Design and implementation of 2-bit Magnitude comparator using logic gates.
6. Design and implementation of 16-bit Odd / Even parity checker and generator using IC74180.
7. Design and implementation of Multiplexer and Demultiplexer using logic gates.
8. Design and implementation of Encoder and Decoder using logic gates.
9. Construction and verification of 4-bit Ripple counter.
10. Design and implementation of 3-bit synchronous up / down counter.
11. Design and Implementation of Modulo N Counter.
12. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops.
13. Simulation of combinational logic circuits and sequential logic circuits using HDL.
14. Design a Digital System .(Any Hardware/ Simulation circuit)

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Use Boolean simplification techniques to design a combinational hardware circuit*
- *Construct basic combinational circuits and verify their functionalities*
- *Apply the design procedure to design basic sequential circuits*
- *Determine the appropriateness of the choice of the ICs used in a given digital circuit*
- *Develop HDL models for combinational and sequential circuits*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - III**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HR352** | **CAREER DEVELOPMENT SKILLS –II (Common to all branches)** | - | 2 | - | - |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To enhance employability skills and to develop career competency*
- *To help individuals to develop a realistic understanding of themselves in regard to decision making and career alternatives.*

**UNIT - I VERBAL REASONING – PART 1 [ 6]**

Analogies - Alphabet test - Theme detection - Family tree - Blood relations (Identifying relationships among group of people) - Coding & Decoding - Situation reaction Test – Statement & conclusions

**UNIT - II SPEED MATH'S, QUANTITATIVE APTITUDE [ 6 ]**

Think without Ink(TWI) approach - Speed math‟s: Squaring of numbers - Multiplication of numbers - Finding square roots - Finding cube roots - Solving simultaneous equations faster – Number system: HCF, LCM - Decimals - Percentages - Averages - Powers and roots - Sudoku (level 1) - Series completion (Numbers, Alphabets, Pictures) - Odd man out – Puzzles

**UNIT - III QUANTITATIVE APTITUDE – PART 1 [ 6]**

Problem on ages - Percentages - Profit and loss - Simple & compound interest - Averages - Ratio, proportion

**UNIT - IV QUANTITATIVE APTITUDE – PART 2 [ 6 ]**

Speed, Time & Work and distance - Pipes and cisterns - Mixtures and allegations - Races - Problem on trains - Boats and streams Practices : Puzzles, Sudoku, series completion, problem on numbers

**UNIT - V WRITTEN COMMUNICATION & READING COMPREHENSION [ 6 ]**

What is writing - Sentence - Phrase - Kinds of sentences - Parts of sentence - Parts of speech - Articles - Types of sentences - Academic essay writing - Precise writing - Report abstracts - Letter writing - Memo - Cover letter - Resume writing

READING SKILLS : Importance of reading - Definition of reading - Levels of reading - Requirements of reading - Types of reading - Techniques of reading - Academic reading tips - Exercise

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Speak and write appropriately by understanding and applying the basic grammatical rules.*
- *Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.*
- *Enhance their communication skills and instructiveness.*
- *Enhance interpersonal relationship building skills with self-confidence.*
- *Critically evaluate various real time situation by resorting to analysis of key issues and factors*

**Reference Books :**

1 Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2 Abhijit Guha, "Quantitative Aptitude", TMH, 3rd edition.
3 M.B. Lal & Goswami, "Objective Instant Arithmetic" Upkar Publications.
4 Norman Lewis W.R, "Word Power Made Easy" GOYAL Publications.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16MA431** | **PROBABILITY AND STOCHASTIC PROCESSES** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course*

***Objectives:***

- *This course aims at providing the necessary basic concepts in random processes.*
- *To acquire fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.*

**UNIT - I RANDOM VARIABLES [12 ]**

Discrete and continuous random variables – Moments - Moment generating functions and their properties - Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions – Functions of Random Variable.

**UNIT - II TWO DIMENSIONAL RANDOM VARIBLES [12 ]**

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for independent identically distributed random variables).

**UNIT - III CLASSIFICATION OF RANDOM PROCESSES [12]**

Definition and examples - First order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

**UNIT - IV CORRELATION AND SPECTRAL DENSITIES [12 ]**

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener – Relationship between cross power spectrum and cross correlation function.

**UNIT - V LINEAR SYSTEMS WITH RANDOM INPUTS [12 ]**

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

**Total (L: 45 T: 15 ) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understanding the importance of one dimensional discrete and continuous random variables for Engineering Applications*
- *Analyze the importance of two dimensional random variables.*
- *Gain the knowledge of Stationary, Markov, Poisson, Sine wave processes*
- *Develop various ideas in power spectrums.*
- *Design and implement the concept of linear system and white noise.*

**Text Book :**

1 Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, 2nd edition 2014.

**Reference Books:**

1 Miller,S.L and Childers, S.L, “Probability and Random Processes with applications to Signal Processing and Communications”, Elsevier Inc., 2nd edition 2012.
2 Leon-Garcia,A, “Probability and Random Processes for Electrical Engineering”, Pearson Education Asia, 3rd edition, 2012
3 Yates and D.J. Goodman, “Probability and Stochastic Processes”, JW, 2nd edition, 2011.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| **16EC411** | **ANALOG COMMUNICATION SYSTEMS** | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Engineering Mathematics, Electronic Devices and circuits*

***Objectives:***

- *To familiarize random signals and noise in communication systems.*
- *To understand the concepts of different analog modulation techniques.*
- *To examine and infer the functions of AM, FM transmitters and Receivers.*

**UNIT - I RANDOM SIGNALS AND NOISE THEORY [9]**

Probability and random variables - Random process and Gaussian process - Probability density function- Autocorrelation - Power spectral density - External noise - Internal noise - Noise figure - Equivalent noise resistance - Noise temperature - Noise bandwidth- Noise triangle.

**UNIT - II AMPLITUDE MODULATION [9]**

Basic representation of communication system - Baseband and band pass signal - Transmission media - Electromagnetic spectrum - Need for modulation - Amplitude modulation: Single tone and multi tone modulation, phasor representation, power relations, representation of DSBSC and SSBSC - Principles of VSB Signals - Frequency translation - FDM- Nonlinear distortion - Generation of AM: Low level, high level, SSBSC and DSBSC.

**UNIT - III ANGLE MODULATION AND PULSE MODULATION [9]**

Frequency modulation: Single tone and multi tone modulation, representation, frequency spectrum, phasor representation, narrow band and wide band FM, average power, bandwidth requirements - Principles of Phase modulation - Comparison of AM, FM & PM - Generation of FM: Direct method and indirect method - Pulse modulation: PAM, PWM &PPM.

**UNIT - IV AM RECEIVERS [9]**

Receiver parameters - Tuned radio frequency receiver - Super heterodyne receiver: RF section and characteristics - Frequency changing and tracking - Intermediate frequencies and IF amplifiers - Detection and automatic gain control - Costas receiver - Single side band receivers, AM detectors: Linear and non linear - Noise in DSBSC, SSBSC and AM receivers.

**UNIT - V FM RECEIVERS [9]**

Introduction - Comparison of AM and FM receiver - FM demodulators - FM demodulator comparison - Stereo FM multiplex reception - Pre-emphasis and de-emphasis - Noise in FM receivers.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Outline the concepts of random signals and noise in electronic communication.*
- *Understand the basic concepts of Amplitude Modulation.*
- *Understand the basic concepts of Angle and Pulse Modulation.*
- *Analyze AM Receivers and examine its noise performance.*
- *Analyze FM Receivers and examine its noise performance.*

**Text Books :**

1 George Kennedy, Bernard Davis & SRM Prasanna, “Electronic Communication Systems”, TMH, 5th edition, 2011.
2 Simon Haykin and Michael Moher, “Communication Systems”, Wiley India Pvt. Ltd., 5th edition, 2010.

**References :**

1 Wayne Tomasi, “Electronic Communications Systems – Fundamentals Through Advanced”, PE, 5th edition, 2008.
2 A.Bruce Carlson & Paul B. Crilly, “Communication Systems”, TMH Education, 5th edition, 2011.
3 H Taub, D Schilling & G Saha, “Principles of Communication Systems”, Tata McGraw-Hill Education, 4th edition, 2013.
4 P.Ramkrishna Rao, “Analog Communication”, Tata McGraw-Hill, 1st edition, 2011.
5 Proakis and Salehi, “Fundamentals of Communication Systems”, Pearson Education, 3rd edition, 2008.
6 Dennis Roddy and John Coolen, “Electronic Communication”, PE, 4th edition, Re-print 2009.
7 NPTEL Course Link:http://nptel.ac.in/courses/117102059/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC412** | **ELECTRONIC CIRCUITS** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *Electronic devices and circuits*

***Objectives:***

- *To gain knowledge on power amplifiers and its efficiency.*
- *To analyze the methods of constructing feedback amplifiers, oscillators and tuned amplifiers.*
- *To understand the performance of wave shaping circuits, multivibrators and time base generators.*

**UNIT - I LARGE SIGNAL AMPLIFIERS [12]**

Classification of amplifiers – RC coupled Class A amplifier – Transformer coupled class A amplifier, efficiency – Second and higher order harmonic distortions – Class B amplifier, push–pull amplifier and efficiency, complementary symmetry and efficiency – Distortion in amplifiers – Class C, Class D and Class S amplifiers – Thermal stability and heat sink.

**UNIT - II FEEDBACK AMPLIFIERS [12]**

Introduction – Classification – Block diagram – Loop gain – Gain with feedback – Effects of negative feedback: Sensitivity, desensitivity of gain, Cut–off frequencies, Distortion, Noise, Input impedance and output impedance with feedback – Negative feedback topologies – Method of identifying feedback topology and feedback factor – Nyquist criterion for stability of feedback amplifiers.

**UNIT - III OSCILLATORS [12]**

Barkhausen criterion – Mechanism for start of oscillation and stabilization of amplitude – Classification – General form of an LC oscillator – LC oscillators: Hartley, Colpitts and Clapp oscillators – RC oscillators: Phase shift, Wien bridge and Twin-T oscillators – Frequency range of RC and LC oscillators – Quartz crystal – Miller and Pierce crystal oscillators – Frequency stability of oscillators.

**BLOCKING OSCILLATORS:** Free running blocking oscillator – Monostable blocking oscillator with base timing and emitter timing.

**UNIT - IV TUNED AMPLIFIERS [12]**

Coil losses – Loaded and unloaded Q of tank circuit – Small signal tuned amplifier – Analysis of capacitor coupled single tuned and double tuned amplifiers – Effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifier – Large signal tuned amplifier: Class C tuned amplifier, efficiency and applications – Stability of tuned amplifier: Neutralization, Hazeltine neutralization method.

**UNIT - V MULTIVIBRATORS AND TIME BASE CIRCUITS [12]**

RC, RL Integrator and Differentiator circuits – Diode: Clippers and Clampers – Astable, monostable and bistable multivibrators – Triggering methods for bistable multivibrator – Schmitt trigger circuit – UJT saw tooth waveform generator –Time base circuits.

**Total(L:45 T:15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Classify various power amplifiers, analyze its power relations and show the necessity of heat sink and thermal stability*
- *Examine various feedback topologies of negative feedback amplifiers and outline the stability of feedback amplifiers.*
- *Build a mechanism for oscillation and study various types of oscillators*
- *Examine the purpose and need of tuned amplifiers, stability and neutralization*
- *Identify the purpose and study the characteristics of wave shaping circuits and time base generators in electronics*

**Text Books :**

1 Sedra / Smith," Micro Electronic Circuits" Oxford University Press, 6th edition /second Impression 2013.

2 Anil K Maini, VarshaAgarwal, "Electronic Devices & Circuits", John Wiley India, Reprint 2012

**References :**

1 Robert L. Boylestad and Louis Nasheresky," Electronic Devices and Circuit Theory", 11th edition, PE / PHI, 2015.

2 David A. Bell, "Electronic Devices and Circuits", 5th, Oxford University Press, 2008.

3 Millman.J. and Halkias C.C, "Integrated Electronics", McGraw Hill, 48th Reprint 2008.

4 Schilling.D.L and Belove.C "Electronic Circuits" 3rd edition, McGraw Hill 2002.

5 NPTEL Course Link:http://nptel.ac.in/courses/117108107/32

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC413** | **LINEAR INTEGRATED CIRCUITS** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Electron devices and circuits*

***Objectives:***

- *To introduce the basic building blocks of linear integrated circuits.*
- *To learn the linear and non-linear applications of operational amplifiers.*
- *To understand the analog multipliers and PLL.*
- *To learn the concepts of ADC and DAC.*
- *To introduce the concepts of special function ICs.*

**UNIT – I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR IC [9]**

Advantages of ICs over discrete components – Manufacturing process of monolithic ICs – Construction of monolithic bipolar transistor – Monolithic diodes – Integrated resistors – Monolithic capacitors – Inductors – Current mirror and current sources – BJT Differential amplifier with active loads – General operational amplifier stages – DC and AC characteristics – Open and closed loop configurations.

**UNIT - II APPLICATIONS OF OPERATIONAL AMPLIFIERS [9]**

Sign changer – Scale changer – Phase shift circuits – Voltage follower – V-to-I and I-to-V converters – Adder – Subtractor – Instrumentation amplifier – Integrator – Differentiator – Logarithmic amplifier – Antilogarithmic amplifier – Comparators, schmitt trigger – Precision rectifier, peak detector, clipper and clamper – First order low-pass, high-pass filters – Phase shift and wien bridge oscillator – Astable and monostable multivibrator - Triangular wave generator – Saw-tooth wave generator.

**UNIT - III ANALOG MULTIPLIER AND PLL [9]**

Analog multiplier using emitter coupled transistor pair – Gilbert multiplier cell – Variable transconductance technique – Analog multiplier IC and their applications – PLL: Closed loop analysis, voltage controlled oscillator, monolithic PLL IC 565 - Applications of PLL: AM/FM detection, FSK modulation/demodulation and frequency synthesizing.

**UNIT - IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS [9]**

Analog and digital data conversions - D/A converter: Specifications, Types: Weighted resistor type, R-2R ladder type, voltage and current mode R -2R ladder types – Switches for D/A converters – High speed sample and hold circuits – A/D Converters: Specifications, Types: Flash, successive approximation, single slope, dual slope – A/D Converter using voltage-to-time conversion.

**UNIT - V SPECIAL FUNCTION ICs [9]**

Timer IC 555 - IC voltage regulators – Three terminal fixed and adjustable voltage regulators – IC 723 general purpose regulator – Monolithic switching regulator – Switched capacitor filter IC MF10 – Frequency to voltage and voltage to frequency converters – ICL8038 function generator - Audio power amplifier – Video amplifier – Isolation amplifier – Opto-couplers and fibre optic IC.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Interpret the different steps involved in fabrication of IC's and analyze the DC and AC characteristics of OPAMP.*
- *Understand various applications of operational amplifiers.*
- *Design applications using analog multiplier and PLL.*
- *Classify and comprehend the working principle of D/A and A/D converters.*
- *Analyze the special function ICs.*

**Text Books :**

1 Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", TMH, 4th edition, 2015.
2 D. Roy Choudhry and Shail Jain, "Linear Integrated Circuits", New Age International Pvt.Ltd , 2nd edition,2012.

**References :**

1 S. Salivahanan& V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, 2nd edition, 2008.
2 Ramakant A. Gayakwad, "OP- AMP and Linear ICs", Prentice Hall, 4th edition, 2009.
3 Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley International, 5th edition, 2009.
4 B.S. Sonde, "Introduction to System Design using Integrated Circuits", New Age Pub, 2nd edition, 2013.
5 NPTEL Course Link:http://nptel.ac.in/video.php?subjectId=108106068.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC414** | **MICROPROCESSORS AND MICROCONTROLLERS** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Electronics*

***Objectives:***

- *To understand the concepts of 8 bit and 16 bit microprocessor.*
- *To understand the operations of peripheral interfacing.*
- *To familiarize 8 bit microcontroller architecture and programming.*
- *To familiarize the microprocessors and microcontroller applications.*

**UNIT – I 8 BIT MICROPROCESSOR ARCHITECTURE AND PROGRAMMING [9]**

Evolution – Introduction: Address, data and control bus, Clock generation – 8085: Hardware architecture, addressing modes, instruction set, timing diagrams, interrupts, assembly language programming.

**UNIT – II 16 BIT MICROPROCESSOR ARCHITECTURE AND PROGRAMMING [9]**

8086: Hardware architecture, signals, addressing modes, maximum and minimum mode configurations, assembler directives, instruction set, timing diagram, interrupts, assembly language programming.

**UNIT – III MICROPROCESSOR PERIPHERAL INTERFACING [9]**

Introduction - Programmable peripheral interface (Intel 8255) – Serial communication interface (8251) - Keyboard and display controller (8279) – Programmable interval timers (Intel 8253, 8254) – Programmable interrupt controller (8259) - Analog to digital converter, Digital to analog converter - Printer interface.

**UNIT – IV 8 BIT MICROCONTROLLER ARCHITECTURE AND PROGRAMMING [9]**

8051 Microcontroller: Hardware architecture, special function register, I/O ports and circuits, external memory, timers and counters, serial data input/output, interrupts, addressing modes, instruction set, assembly language programming.

**UNIT – V MICROCONTROLLER PERIPHERAL INTERFACING [9]**

8051 Interfacing: DC motor, stepper motor, sensors, relay, keyboard, switches, seven segment display, RTC and LCD. Case study: Traffic light control.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge in 8085 microprocessor and its programming.*
- *Practice the use of 8086 microprocessor for simple applications.*
- *Illustrate the use of peripherals for interfacing.*
- *Identify special features of microcontrollers.*
- *Design the microcontroller based systems.*

**Text Books :**

1 Krishna Kant, “Microprocessors and microcontrollers architecture, programming and system design using 8085, 8086, 8051 and 8096”, PHI, 2nd edition, 2014.

2 Douglas V Hall, “Microprocessors and interfacing, Programming and Hardware” TMH, 3rd edition, 2012.

**References :**

1 Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay “The 8051 Microcontroller and Embedded systems”, , Pearson Education, 2nd edition, 2011.

2 Ramesh S Gaonkar, “Microprocessor architecture programming and application with 8085” – Penram publications pvt., 6th edition, 2013.

3 Kenneth J. Ayala, “The 8086 Microprocessor: programming & interfacing the PC”, Delmar Publishers, 2007.

4 A K Ray, K M Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH, 3rd edition, 2012.

5 NPTEL Course Link : http://nptel.ac.in/courses/108107029/, http://nptel.ac.in/courses/106108100/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| 16EE436 | CONTROL SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Engineering mathematics*

***Objectives:***

- *To understand the open loop and closed loop (feedback) systems.*
- *To understand time domain and frequency domain analysis of control systems required for stability analysis.*
- *To understand the compensation technique that can be used to stabilize control systems.*

**UNIT – I CONTROL SYSTEM MODELING [9]**

Basic elements of control system - Open loop and closed loop systems - Differential equation - Transfer function, Modeling of electric systems, Translational and rotational mechanical systems - Block diagram reduction techniques - Signal flow graph.

**UNIT – II TIME RESPONSE ANALYSIS [9]**

Time response analysis - First order systems - Impulse and step response analysis of second order systems - Steady state errors - P, PI, PD and PID compensation.

**UNIT – III FREQUENCY RESPONSE ANALYSIS [9]**

Frequency response - Bode plot, Polar plot, Nyquist plot - Frequency domain specifications from the plots - Constant M and N circles - Nichols chart - Use of Nichols chart in control system analysis - Series, Parallel, Series - Parallel compensators - Lead, Lag, and Lead Lag compensators.

**UNIT – IV STABILITY ANALYSIS [9]**

Stability - Routh - Hurwitz criterion - Root locus technique, Construction of root locus, Stability, Dominant poles, Application of root locus diagram - Nyquist stability criterion - Relative stability.

**UNIT – V STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS [9]**

State space representation of continuous time systems - State equations - Transfer function from state variable representation - Solution of the state equations - Concepts of controllability and observability - State space representation for discrete time systems - Sampled data control systems - Sampling theorem - Sample & Hold - Open loop & Closed loop sampled data systems.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Obtain the transfer function of basic elements and modeling of electrical and mechanical systems.*
- *Determine the time-domain behavior and steady-state error for standard inputs.*
- *Analyze the frequency response of second order system and design lag, lead, lag-lead compensator.*
- *Examine the stability of the system.*
- *Explain about state variable analysis and digital control system.*

**Text Books :**

1 J.Nagrath and M.Gopal, “Control System Engineering”, New Age International, 5th edition, 2007.
2 M.Gopal, “Control System Principles and Design”, Tata McGraw Hill, 2nd edition, 2002.

**References :**

1 Benjamin.C.Kuo, “Automatic control systems”, Prentice Hall of India, 7th edition, 2000.
2 A.NagoorKani, “Control Systems”, RBA Publications, Chennai, 2nd edition, 2009.
3 S.Palani, “Control Systems Engineering”, RBA Publications, Chennai, 2nd edition, 2009.
4 K. Ogata, “Modern Control Engineering”, PHI, New Delhi, 4th edition, 2002.
5 NPTEL Course Link : http://nptel.ac.in/courses/108103007/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC421** | **ELECTRONIC CIRCUITS AND SIMULATION LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Electronic Devices and Circuits*

***Objectives:***

- *To understand the design of amplifiers & oscillators.*
- *To understand the design of wave shaping circuits.*
- *To simulate the characteristic model of electronic circuits using SPICE tool.*

**List of Experiments:**

1. Class B complementary symmetry power amplifier.
2. Series feedback amplifier (voltage and current).
3. RC phase shift and Hartley oscillators.
4. Tuned class C amplifier.
5. Integrator, Differentiators, Clippers & Clampers.
6. Astable, Monostable Multivibrators.

**Simulation using SPICE Tool:**

7. Shunt feedback amplifier (voltage and current).
8. Wein Bridge and Colpitts oscillators.
9. Bistable Multivibrator and Schmitt trigger circuit.
10. Time base circuits.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the cross over distortion in Class B push pull Amplifier.*
- *Design the feedback amplifiers and obtain the frequency response.*
- *Design and construct LC and RC Oscillators using transistors.*
- *Design and construct wave shaping and multivibrator circuits.*
- *Simulate the electronic circuits using SPICE tool.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC422** | **LINEAR INTEGRATED CIRCUITS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisites:*** *Linear integrated circuits, Electronic devices and circuits lab*

***Objectives:***

- *To design amplifiers and filters using OP-AMPs.*
- *To perform mathematical operations using IC 741.*
- *To construct oscillator and regulator circuits.*
- *To learn PSpice and to perform simulation of LIC circuits.*

**List of Experiments:**

**Design and verification of**

1. Inverting, non inverting and differential amplifiers using OP-AMP
2. Integrator and differentiator using OP-AMP
3. Instrumentation amplifier using OP-AMP
4. Active low pass, high pass filters using OP-AMP
5. Astable & monostable multivibrators and schmitt trigger using OP-AMP
6. Phase shift and wien bridge oscillators using OP-AMP
7. Astable and monostable multivibrators using IC 555 timer.
8. Frequency multiplier using PLL.
9. Voltage regulator using LM723.
10. Simulation of any three experiments using PSpice.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the operation of op-amp in different applications.*
- *Validate the frequency response characteristic of various filters using operational amplifiers.*
- *Design waveform generators using timer.*
- *Construct voltage regulator using LM723.*
- *Simulate various applications of operational amplifiers using PSpice.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC423** | **MICROPROCESSORS AND MICROCONTROLLERS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Digital Electronics Laboratory*

***Objectives:***

- *To develop assembly language programs based on 8085, 8086 microprocessors and 8051 microcontroller.*
- *To understand the peripheral interfacing with microprocessors and microcontroller.*

**List of Experiments:**

1. 8085 Microprocessor
   (i) Arithmetic Operations
   (ii) Array Processing

2. 8086 Microprocessor
   (i) Arithmetic Operations
   (ii) Sorting and Searching
   (iii) String Manipulation

3. 8051 Microcontroller
   (i) Arithmetic Operations
   (ii) Logical and Bit Manipulation

4. Peripheral Interfacing
   (i) Programmable peripheral interface (8255) using 8085.
   (ii) Programmable interval timer (8253) using 8085.
   (iii) ADC and DAC using 8085.
   (iv) Keyboard and display controller (8279) using 8086.
   (v) Programmable interrupt controller (8259) using 8086.
   (vi) Stepper motor using 8051.

5. Simple 8051 programming using KEIL and Proteus Software.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Develop assembly language programming for 8085 microprocessor.*
- *Write assembly language programs for 8086 microprocessor.*
- *Illustrate programming concepts of microcontroller.*
- *Demonstrate programming with peripherals.*
- *Develop the programming using simulation software.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - IV**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HR443** | **CAREER DEVELOPMENT SKILLS - III** | - | 2 | - | - |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

**Objectives:**

- *To provide the opportunity for individuals to become acquainted with a wide range of occupational and educational opportunities.*
- *To assist individuals in making appropriate educational and occupational choices.*

**UNIT - I WRITTEN AND ORAL COMMUNICATION – PART 1 [ 6]**

Reading comprehension level 3 - Self introduction - News paper review - Self marketing - Debate- Structured and unstructured GDs psychometric assessment - Types & strategies to answer the questions practices - Sentence completion - Sentence correction - Jumbled sentences - Synonyms & antonyms - Using the same word as different parts of speech - Interpretation of pictorial representations - Editing

**UNIT - II VERBAL AND LOGICAL REASONING – PART 2 [ 6 ]**

Syllogism - Assertion and reasons - Statements and assumptions - Identifying valid inferences - identifying strong arguments and weak arguments - Statements and conclusions - Cause and effect - Deriving conclusions from Passages - Seating arrangements practices: Analogies - Blood relations - Statement & conclusions

**UNIT - III QUANTITATIVE APTITUDE – PART 3 [ 6 ]**

Probability - Calendar - Clocks - Logarithms - Permutations and combinations

**UNIT - IV QUANTITATIVE APTITUDE – PART 4 [ 6 ]**

Algebra - Linear equations - Quadratic equations - Polynomials - Problem on numbers - Ages - Train - Time and work - Sudoku - Puzzles

**UNIT - V DOMAIN PROFICIENCY [ 6 ]**

**Networks** – Solution Methods, Network Theorems, Time and frequency domain analysis of circuits.

**Electronic Devices** – Diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode, Basics of LASERs & IC fabrication.

**Analog Circuits** – Simple diode circuits, clippers, clampers, Biasing of transistors, Small Signal Equivalent circuits of diodes, BJTs, MOSFETs, amplifiers, filters, differential amplifiers, oscillators, simple op-amp & 555 circuits and Power supplies.

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the nuances of reading various texts*
- *Perform well in verbal and logical reasoning.*
- *Understand and develop the etiquette necessary to present oneself in a professional setting.*
- *Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.*
- *Enhance the comprehension skills in core subjects.*

**Reference Books :**

1 Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2 Abhijit Guha, “Quantitative Aptitude”, Tata McGraw Hill, 3rd edition
3 M.B. Lal & Goswami, “Objective Instant Arithmetic” Upkar Publications.
4 Norman Lewis,” Word Power Made Easy” W.R. GOYAL Publications

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| 16EC511 | DIGITAL COMMUNICATION SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Analog communication systems*

***Objectives:***

- *To learn the basics of digital communication*
- *To familiar with baseband formatting techniques*
- *To understand the baseband coding techniques*
- *To learn baseband reception techniques*
- *To exposed to band pass signal processing*

**UNIT - I FUNDAMENTALS OF DIGITAL COMMUNICATION [9]**

Elements of digital communication systems: Model of digital communication systems – Channel classification – Performance measure – Geometric representation of signals; Gram Schmidt orthogonalisation procedure – Bandwidth – Mathematical models of communication channel.

**UNIT - II BASEBAND FORMATTING TECHNIQUES [9]**

Sampling: Impulse sampling, natural sampling, sampler implementation – Quantization: Uniform and non-uniform – Encoding techniques for analog sources: PCM, DPCM, Delta modulation, Adaptive delta modulation, spectral waveform encoding, model-based encoding and comparison of waveform encoding methods.

**UNIT - III BASEBAND CODING TECHNIQUES [9]**

Block codes, convolutional codes – Concept of error free communication – Classification of line codes, desirable characteristics and power spectra of line codes.

**UNIT - IV BASEBAND RECEPTION TECHNIQUES [9]**

Noise in communication systems – Receiving filter – Correlator type – Matched filter type – Equalizing filter – Signal andsystem design for ISI elimination, Implementation – Eye pattern analysis – Synchronization – Detector; Maximum likelihood detector, error probability, figure of merit for digital detection.

**UNIT - V BANDPASS SIGNAL TRANSMISSION AND RECEPTION [9]**

Memory less modulation methods – Transmitter, receiver signal space diagram and BER; ASK, FSK, PSK, QAM, QPSK – Bandpass receiving filter, error performance – Coherent and non-coherent detection systems.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge about the basic transmission and reception of digital communication*
- *Understand the baseband formatting techniques*
- *Identify the various baseband coding methods*
- *Infer knowledge about baseband reception skills*
- *Formulate band pass signal processing systems*

**Text Books :**

1 Amitabha Bhattacharya, “Digital Communications”, Tata McGraw Hill, 2006, Re-print 2013.
2 Simon Haykin, “Digital Communications”, John Wiley, 4th edition, Re-print 2012.
3 Bernard Sklar, “Digital Communication”, Pearson Education, Revised edition, 2014.

**Reference Books :**

1 John.G. Proakis, “Fundamentals of Communication Systems”, Pearson Education, 2nd edition, 2013.
2 Michael. B. Purrsley, “Introduction to Digital Communication”, Pearson Education, 2006.
3 Herbert Taub & Donald L Schilling, “Principles of Communication Systems”, TMH, 3rd edition, 2008.
4 Leon W. Couch, “Digital and Analog Communication Systems”, Pearson Education, 7th edition, 2008.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC512** | **DIGITAL SIGNAL PROCESSING** | 3 | 1 | 0 | 4 |

***Prerequisites:*** *Signals and systems, Fundamentals of C programming*

***Objectives:***

- *To learn the DFT and to perform its computation with FFT*
- *To explore the design procedures for IIR and FIR digital filters*
- *To study the finite word length effects and fundamentals of multirate digital signal processing*
- *To understand the basics of DSP architecture and programming*

**UNIT - I DISCRETE FOURIER TRANSFORM AND FAST FOURIER TRANSFORM [12]**

Introduction to Discrete Fourier Transform pairs and its properties – Relation between z transform and DTFT with DFT – Fast Fourier Transform: Introduction, computations using Decimation in Time and Decimation in Frequency algorithms – Sectional convolution: Overlap add and overlap save methods.

**UNIT - II DESIGN OF INFINITE IMPULSE RESPONSE DIGITAL FILTERS [12]**

Design of analog Butterworth and Chebychev filters – Frequency transformation in analog domain – Design of IIR digital filters: Impulse invariance technique, Bilinear transformation – Prewarping – Frequency transformation in digital domain – Realization: Direct form I & II, Cascade and Parallel structures.

**UNIT - III DESIGN OF FINITE IMPULSE RESPONSE DIGITAL FILTERS [12]**

Amplitude and phase responses of FIR filters – Linear phase filters – Symmetrical linear phase filter, Asymmetrical linear phase filter – Windowing techniques: Rectangular, Hamming, Hanning and Blackman – Design using frequency sampling technique – Realization of FIR filters: Transversal, linear phase realization structures.

**UNIT - IV FINITE WORD LENGTH EFFECTS AND MULTIRATE SIGNAL PROCESSING [12]**

Quantization noise – Derivation for quantization noise power – Binary fixed point and floating point number representations – Truncation and rounding error – Input quantization error – Coefficient quantization error – Product quantization error – Limit cycle oscillations : Zero limit cycle oscillation, overflow limit cycle oscillation and signal scaling – Introduction to multirate signal processing : Up sampling, down sampling and effects of spectrum.

**UNIT - V DIGITAL SIGNAL PROCESSORS [12]**

Introduction to DSP architecture: Multiplier and multiplier accumulator, bus architectures and memory access scheme, multiported memory, pipelining, special addressing modes – Architecture of TMS320C6747 – Introduction to C programing for DSP applications with code composer studio and simple programs using C.

**Total (L: 45 T:15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand DFT, FFT, their properties and convolution.*
- *Design digital IIR filter using appropriate type and implement digital filters in various realization structures.*
- *Design appropriate type of FIR filter and implement digital filters in different FIR filter structures.*
- *Understand the finite word length effects and the fundamentals of multirate signal processing*
- *Know the basics of digital signal processors and the programming concepts*

**Text Books :**

1 John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", Pearson Education, 4th edition, 2014.

2 Venkataramani B and Bhaskar M, "Digital Signal Processor Architecture", Programming and Application, Tata McGraw Hill, 2nd edition, 2013.

**References :**

1 Mitra S K, Digital Signal Processing, "A Computer based approach", Tata McGraw Hill, 4th edition, 2013.

2 Sen M Kuo and Bob H Lee, "Real-Time Digital Signal Processing: Implementations, Application and Experiments with the TMS320C55X", John Wiley & Sons Ltd, 2003.

3 Texas Instruments "TMS320C6747 DSP data sheet and User's Manual".

4 Online reference: http://nptel.ac.in/courses/117102060/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC513** | **ELECTRONIC INSTRUMENTATION** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Engineering Physics & Electronic Devices and Circuits*

***Objectives:***

- *To learn about instrumentation and measurement concepts.*
- *To get familiarize about electronic storage and display devices.*
- *To understand the concepts of transducers and their processing.*
- *To gain knowledge on tool based measurement using LabVIEW.*

**UNIT - I BASIC INSTRUMENTATION AND MEASUREMENTS [9]**

Introduction- Functional elements of a measurement system - Units and standards of instruments - Errors and types - Permanent magnet moving coil and moving iron instruments - DC ammeters - DC voltmeters - Voltmeter sensitivity - Series type ohmmeter - Shunt type ohmmeter - Electronic multimeter - Calibration of DC instruments - Bridge measurements: Maxwell, Hay, Schering, Anderson and Wien bridge.

**UNIT - II TRANSDUCER AND ANALYTICAL INSTRUMENTS [9]**

Transducers: LVDT, Capacitive, Hall effect transducers, Piezo Electric transducers, Photo optic transducer - Computer aided measurements - Data acquisition - Probe analyzers - Spectro photometer - Chromatography - Differential refractometers.

**UNIT - III ELECTRONIC MEASUREMENT INSTRUMENTS [9]**

Function Generators - RF signal generators - Sweep generators - Wave analyzer - Harmonic distortion analyzer - Spectrum analyzer - Digital voltmeters and its types - Digital multimeters - Q meters - Vector meters - Frequency synthesizer - Frequency counters - Measurement of frequency and time interval.

**UNIT - IV STORAGE AND DISPLAY INSTRUMENTS [9]**

Cathode ray oscilloscope - Dual trace oscilloscopes - Analog and digital storage oscilloscope - Sampling CRO - Frequency modulation recording - Electromechanical servo type XT & XY recorders - LCD and LED - Dot matrix display.

**UNIT - V VIRTUAL INSTRUMENTATION [9]**

Basics of LabVIEW- For loop and while loop - Other structures - Arrays and clusters - Graphs and charts - State machine - File I/P and O/P - String handling - Data acquisition with LabVIEW - Interfacing with DAQ assistance - Case study: LabVIEW in Signal processing, LabVIEW in Traffic light controller.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand different Instruments used for measurement and analyze bridges*
- *Select different types of transducers for measurement and to learn about analytical instruments for measurement*
- *Know about different types of signal generators used for various measurement purposes.*
- *Gain knowledge about different types of oscilloscopes, recorders and display devices.*
- *Expose the fundamentals of LabVIEW platform with simple experiments on LabVIEW and case studies*

**Text Books :**

1 A.K.Sawhney,"Electrical, Electronic measurement & Instrumentation", Dhanpat Rai & sons, 18th edition, Reprint 2012.

2 David A. Bell, "Electronics Instrumentation and measurements",Oxford University press,3rd edition,2013.

**Reference Books :**

1 Albert D.Helfrick and William D.Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Pearson / Prentice Hall of India, 2007

2 Jovitha Jerome, "Virtual Instruments using LabVIEW", PHI Learning Pvt. Ltd., 2010

3 H.S.Kalsi "Electronic Instrumentation" Tata McGraw Hill, 2nd edition, 2012

4 Prithiwiraj Prukait, Budhaditya Biswas, Santanu Das & Chiranjib Koley, "Electrical and Electronics Measurement and Instrumentation" Tata McGraw Hill, 2013

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC514** | **TRANSMISSION LINES AND WAVE GUIDES** | 3 | 1 | 0 | 4 |

***Prerequisite:*** *Engineering electromagnetic.*

***Objectives:***

- *To learn the fundamentals of filter design procedures and transmission lines.*
- *To discuss the distortion associated in transmission lines.*
- *To use transmission lines at radio frequencies.*
- *To familiarize propagation of signals through parallel planes and waveguides.*
- *To understand the working principle of resonators and its design procedures.*

**UNIT - I FUNDAMENTALS OF FILTERS AND TRANSMISSION LINES [12]**

The neper - The decibel - Characteristic impedance of symmetrical networks - Current and voltage ratios - Propagation constant - Properties of symmetrical networks - Filter fundamentals - Pass and stop bands - A line of cascaded T sections - Equivalent circuit - General solution of the transmission line - Physical significance of the equations - The infinite line.

**UNIT - II TRANSMISSION LINE THEORY [12]**

Wavelength - Velocity of propagation - Distortion line - Distortion less line condition - Loading - The telephone cable - Loaded telephone cable - Campbel‟s formula - Open and short circuited lines - Input impedance of open and short circuited lines - Reflection on a line not terminated in $Z_o$ - Reflection coefficient - Reflection factor and reflection loss - Insertion loss - Standing waves - Nodes - Standing wave ratio.

**UNIT - III THE LINE AT RADIO FREQUENCY [12]**

Parameters of open wire line and coaxial cable at RF - Line constants for dissipation - Voltages and currents on the dissipation less line - Power and impedance measurement on lines - Section of transmission line: λ/2, λ/4, λ/8 line - Impedance matching - Single and double stub matching - Circle diagram - Smith chart and its applications - Stub matching problems using smith chart.

**UNIT - IV GUIDED WAVES BETWEEN PARALLEL PLANES [12]**

Waves between parallel planes of perfect conductors - Field components of TM, TE & TEM waves between parallel planes - Manner of wave travel - Characteristics of TM, TE & TEM waves - Wave impedance - Attenuation factor of TM, TE & TEM waves.

**UNIT - V WAVEGUIDES AND RESONANT CAVITIES [12]**

Waves between rectangular waveguide - TM and TE waves in rectangular guide - Bessel functions - Waves between circular waveguide - TM and TE waves in circular waveguide - Characteristics of TM and TE waves in rectangular and circular wave guides - Excitation of wave guides - Resonant cavities - Rectangular resonant cavity - Q factor of a rectangular cavity resonator for $TE_{101}$ mode.

**Total (L: 45 T:15 ) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Develop a transmission line from filter concepts.*
- *Discuss the propagation of signals through transmission lines.*
- *Analyze signal propagation at radio frequencies.*
- *Explain radio propagation in parallel planes and waveguides.*
- *Design and analyze cavity resonators.*

**Text Books :**

1 John D. Ryder, "Networks, Lines and Fields", Prentice Hall of India, 2nd edition, 2015.

2 E.C.Jordan, K.G. Balmain: “EM Waves and Radiating Systems”, Prentice Hall of India, 2nd edition, 2011.

**Reference Books :**

1 Joseph Edminister, “Electromagnetics”, Schaum‟s Series, TMH, 4th edition, 2013.

2 G S N Raju, “Electromagnetic Field Theory and Transmission Lines”, Pearson Education, 2012.

3 S.F.Mahmoud, “Electromagnetic Waveguides Theory and Applications” Peter Peregrinus ltd, 1991.

4 B.Somanathan Nair, “Transmission Lines and wave guides”, Pearson Education, 2011.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC541** | **COMPUTER NETWORKS (Common to EC & EE)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To gain knowledge about layers in OSI and TCP/IP model.*
- *To understand the concept of data link layer protocols and connecting devices.*
- *To familiarize with the addressing and routing concepts*
- *To know about transport layer protocols and QoS enhancement methods.*
- *To learn the functions of application layer protocols and network security.*

**UNIT - I PHYSICAL LAYER [9]**

Data communications - Networks: Network criteria, connection types, network topology, network types - Network models: OSI model - TCP/IP model - Addressing - Guided and unguided transmission media - Switching: Circuit switched networks, datagram networks, virtual circuit networks - Dialup modems - DSL - Cable TV networks - Cable TV for data transfer.

**UNIT - II DATA LINK LAYER [9]**

Data link control: Framing, flow control and error control - Protocols: Simple protocol, stop and wait, sliding window, Go Back N, selective repeat - HDLC - Multiple access: Random access, controlled access - IEEE 802.3: Standard Ethernet, changes in the standard, fast Ethernet, gigabit Ethernet - Connecting devices: Hub, repeater, switch, bridge, router, gateway.

**UNIT - III NETWORK LAYER [9]**

Logical addressing: IPv4, IPv6 addresses - Internet Protocol: Internetworking, IPv4, IPv6, transition from IPv4 to IPv6 - Address mapping - Delivery - Forwarding - Routing protocols: Intra and inter domain routing, distance vector routing, link state routing, path vector routing, multicast routing protocols.

**UNIT - IV TRANSPORT LAYER [9]**

Transport layer services - Multiplexing and demultiplexing - User datagram protocol - Transmission control protocol - Congestion control - Quality of Service - Techniques to improve QoS.

**UNIT - V APPLICATION LAYER AND NETWORK SECURITY [9]**

Domain Name System (DNS) - E-mail - FTP - WWW - HTTP - Network security: Cryptography, symmetric key and public key algorithms, digital signature, management of public keys, communication security, authentication protocols.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand and describe the role of communication and physical layer in data networks and the Internet.*
- *Describe the concepts of data link layer services and protocols, multiple access protocols, Ethernet protocol and various connecting devices.*
- *Analyze the operations of the network layer protocols and also explain the fundamental concepts of routing.*
- *Identify the purpose of transport layer protocols and services, congestion control and QoS techniques.*
- *Describe the application layer protocols and the need for network security.*

**Text Books :**

1 Behrouz A. Forouzan, “Data Communication and Networking”, Tata McGraw-Hill, 5th edition, 2013.

2 Andrew S. Tannenbaum and David J. Wetherall, “Computer Networks”, Prentice Hall, 5th edition, 2011.

**Reference Books :**

1 Wayne Tomasi, “Introduction to Data Communication and Networking”, Pearson Education, 1st edition, 2007.

2 William Stallings, “Data and Computer Communications”, Pearson Education, 8th edition, 2014.

3 James F. Kurouse & Keith W. Ross, “Computer Networking: A Top down Approach”, Pearson Education, 5th edition, 2012.

4 Greg Tomsho, “Guide to Networking Essentials”, Cengage Learning, 7th edition, 2016.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC521** | **DIGITAL SIGNAL PROCESSING LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite :****Fundamentals of computing and C Programming*

***Objectives:***

- *To recall signal generation and processing*
- *To study the time and frequency representation of signals.*
- *To design and simulate IIR filters, FIR filters and analyzes their responses on Matlab.*
- *To implement the processing techniques using the Programmable Digital Signal Processors.*

**List of Experiments:**

**Using MATLAB / Equivalent open source**

1. Basic signal generation and processing
   a) Generation on signals such as unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
   b) Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
   c) Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.
2. Calculation of FFT of a signal in Time domain and frequency domain.
3. Convolution and correlation of two sequences.
4. Sampling and effect of aliasing.
5. Design of FIR filters and IIR filters.

**Using TMS 320C50 Processor**

6. Study of various addressing modes of DSP using simple programming examples.
7. Calculation of FFT.
8. Implementation of FIR filter and IIR filter.

**Using TMS 320C6747 Processor**

9. Sampling of input signal and display.
10. Convolution and correlation of two sequences.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Generate signals and process it, analyze signals using FFT and perform analytical convolution and correlation of two discrete time signals.*
- *Understand the issues and methods associated with the sampling of continuous time signals.*
- *Analyze and observe magnitude and phase characteristics of digital FIR and IIR filter design.*
- *Gain hands-on experience using TMS320C50 Digital signal processor.*
- *Compute the sampling, convolution and correlation of discrete-time sequences using TMS320C6747 floating point DSP processor.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC522** | **COMMUNICATION SYSTEMS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Analog communication systems*

***Objectives:***

- *To analyze the performance of various analog and digital modulation techniques.*
- *To understand the characteristics of ASK, FSK using MATLAB.*
- *To learn the concept of sampling and multiplexing.*
- *To analyze the performance of various antennas.*

**List of Experiments**

1. To construct AM modulator and demodulator circuit and determine the modulation index of various modulation types using spectrum analyzer and math mode of CRO.
2. To construct FM modulator and demodulator circuit and determine the modulation index.

**To construct and observe the waveforms for**

3. Pulse Modulation - PAM, PWM, PPM.
4. Pulse code modulation encoder and decoder.
5. Delta modulation and demodulation.
6. Digital Modulation Techniques - ASK, FSK, PSK. Compare its bit error performance using MATLAB.
7. Sampling & TDM.
8. Radiation pattern of Yagi-Uda, Horn, Loop antennas and determine its bandwidth, gain and directivity.
9. To simulate broadside array and end fire array using MATLAB.
10. Determine the S-parameters using network analyzer.(DUT Specific)
11. Frequency response of RF filters using spectrum analyzer.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge about the analog modulation techniques.*
- *Infer various types of digital modulation techniques.*
- *Analyze different types of radiation pattern of antenna*
- *Understand the nature of the S-parameters.*
- *Able to categorize the frequency response of RF filters*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC523** | **COMPUTER NETWORKS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***
- *Get practical exposure on basic networking concepts.*
- *Learn about LAN protocols and its operation.*
- *Know the functions of data link layer protocols and routing algorithms*
- *Understand the role of cryptography techniques and cable crimping.*
- *Gain knowledge about NS-2 programming*

**List of Experiments:**

1. PC to PC communication:

   Parallel communication using 8 bit parallel cable.

   Serial communication using RS 232 cable.
2. Ethernet LAN protocol:

   Create scenario and verify the performance of Ethernet LAN protocol.
3. Token bus and token ring protocols:

   Create scenario and verify the performance of token bus and token ring protocols.
4. Implementation of stop and wait protocol.
5. Implementation of Go Back N and selective repeat protocols.
6. Implementation of distance vector routing algorithm.
7. Implementation of link state routing algorithm.
8. Implementation of data encryption and decryption.
9. Transfer of files from PC to PC using windows socket processing.
10. Simulation and performance analysis of LAN using NS-2.
11. Crimping of Ethernet cable.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***
- *Design and analyze the performance of parallel and serial communication.*
- *Compare and contrast the performance of token bus and token ring protocols.*
- *Implement and understand the concept of data link layer protocols, routing algorithms and cable crimping*
- *Infer about network security and file transfer concepts.*
- *Simulate and evaluate the performance of LAN using NS2.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HR544** | **CAREER DEVELOPMENT SKILLS - IV** | - | 2 | - | - |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

**Objectives:**

- *To help individuals retaining valued students as they get to know about their skills and competencies and future aspirations as well*
- *To help individuals develop a realistic understanding of themselves in regard to decision making and career alternatives.*

**UNIT - I WRITTEN AND ORAL COMMUNICATION – PART 2 [ 6]**

Self introduction - GD - Personal interview skills practices on reading comprehension level 2 - Paragraph writing - Newspaper and book review writing - Skimming and scanning - Interpretation of pictorial representations - Sentence completion - Sentence correction - Jumbled sentences - Synonyms & antonyms - Using the same word as different parts of speech - Editing

**UNIT - II QUANTITATIVE APTITUDE - PART – 5 [ 6]**

Geometry - Straight line - Triangles - Quadrilaterals - Circles - Co-ordinate Geometry - Cube - Cone - Sphere

**UNIT - III DATA INTERPRETATION AND ANALYSIS [ 6]**

Data interpretation based on Text - Data interpretation based on graphs and tables. Graphs: Column graphs, Bar graphs, Line charts, Pie chart, Graphs representing area, Venn diagram & flow charts.

**UNIT - IV RESUME WRITING & PRESENTATION SKILLS [ 6]**

An introduction to the resume - Types of resumes - Common resume errors - Anatomy of a resume - What is a cover letter? - Types of cover letters - Enhancing the language and style of your resume and cover letter - Assessment

**Presentation Skills**: Oral presentation and public speaking skills; business presentations. - Understand the situation - Know your tools - Know yourself - Organize it, Write the script - Practice - Delivering a presentation

**UNIT - V DOMAIN PROFICIENCY [ 6]**

**Digital circuits -** Boolean algebra, logic gates, Combinatorial circuits, Sequential circuits, Sample and hold circuits, ADCs, DACs, Microprocessor (8085).

**Analog Communication -** Random signals and noise, Analog communication systems, AM, FM modulation and Demodulation, Spectral Analysis, super heterodyne receivers, signal-to-noise ratio.

**Digital Communication -** Sample and Hold Circuits, PCM & DPCM, Digital modulation techniques ASK, FSK, PSK, bandwidth consideration and probability of error calculations, Basics of TDMA, FDMA and CDMA and GSM.

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Perform well in interview types situation*
- *Understand the quantitative aptitude problems in geometry*
- *Understand and the data interpretation & analysis by using various graphs.*
- *Enhance the Skills in resume writing and presentation.*
- *Enhance the comprehension skills in core subjects.*

**Reference Books :**

1 Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2 Abhijit Guha, “Quantitative Aptitude”, Tata McGraw Hill, 3rd edition
3 M.B. Lal & Goswami, “Objective Instant Arithmetic” Upkar Publications.
4 Norman Lewis,” Word Power Made Easy” W.R. GOYAL Publications.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC611** | **ANTENNA AND WAVE PROPAGATION** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Engineering Electromagnetic & Transmission lines and wave guides.*

***Objectives:***

- *To gain knowledge about antenna fundamentals and radiation properties*
- *To understand the concept of antenna arrays*
- *To learn the different types of antennas*
- *To know various special antennas and measurement techniques*
- *To learn the various radio wave propagation*

**UNIT - I ELECTROMAGNETIC RADIATION AND ANTENNA FUNDAMENTALS [9 ]**

Review of electromagnetic theory: Vector potential - Retarded case - Hertizian dipole - Half wave dipole - Quarter wave monopole - Antenna characteristics: Radiation pattern, beam solid angle, directivity, gain, input impedance, polarization, bandwidth, reciprocity, effective aperture, effective length, antenna temperature.

**UNIT - II ANTENNA ARRAYS [9]**

Expression for electric field from two and N element arrays - Linear arrays: Broad side array and end fire array - Method of pattern multiplication - Binomial array - Phased arrays - Frequency scanning arrays - Adaptive arrays.

**UNIT - III LOW AND HIGH FREQUENCY ANTENNAS [9]**

Loop antennas: Radiation from small loop and its radiation resistance - Helical antenna: Normal mode and axial mode operation - Yagi uda antenna - Log periodic antenna - Rhombic antenna - Horn antenna - Reflector antennas and their feed systems - Micro strip antenna.

**UNIT - IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS [9]**

Special applications: Antenna for terrestrial mobile communication systems - GPR - Embedded antennas - UWB - Plasma antenna - Smart antennas. Antenna measurements: Radiation pattern - Gain - Directivity - Polarization - Impedance - Efficiency - Radiation standards.

**UNIT - V WAVE PROPAGATION [9]**

Ground wave propagation: Attenuation characteristics - Calculation of field strength - Space wave propagation: Reflection from ground for vertically and horizontally polarized waves - Reflection characteristics of earth - Resultant of direct and reflected ray at the receiver - Duct propagation - Sky wave propagation: Structure of the ionosphere - Effective dielectric constant of ionized region - Mechanism of refraction - Refractive index - Critical frequency - Skip distance - Maximum usable frequency - Fading - Diversity reception.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze antenna radiation principles and its fundamental parameters*
- *Understand the different types of antenna arrays*
- *Design various low and high frequency antennas.*
- *Know the special antennas and its measurements*
- *Analyze different wave propagation methods*

**Text Books :**

1 Prasad K. D "Antennas and Wave Propagation"- Tech India Publications, 2009.

2 John D Kraus and Ronalatory Marhefka, Ahmed S Khan, "Antennas and Wave Propagation" Tata McGraw-Hill, 4th edition, Reprint 2010.

**Reference Books :**

1 Ballanis "Antenna Theory" John Wiley & Sons 3rd edition 2012

2 E.C.Jordan and Balmain "Electro Magnetic Waves and Radiating Systems" PHI Reprint 2003.

3 R.E.Collins 'Antennas and Radio Propagation" McGraw-Hill 1987

4 D.Ganeshrao, B.Somanathan Nair, Deepa Reghunath, "Antennas and Radio-Wave Propagation" Sanguine technical publishers 1st edition, 2007

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

**16EC612 WIRELESS AND CELLULAR COMMUNICATION**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

***Prerequisites:*** *Computer Networks.*

***Objectives:***

- *To learn about the evolution of wireless systems.*
- *To understand the principles of radio concepts and propagation models.*
- *To understand various medium access schemes.*
- *To know about various diversity schemes and spread spectrum techniques.*
- *To familiarize the concept of wireless LAN and its architecture.*

**UNIT - I WIRELESS COMMUNICATION SYSTEMS [9]**

Generation of wireless communication systems: 2G, 3G & 4G - Examples of wireless systems: Cordless, Paging system & Cellular telephone system - Comparison of wireless system - Personal communication system.

**UNIT - II CELLULAR FUNDAMENTALS [9 ]**

Frequency reuse - Handoff - Channel assignment - Interference - Improving coverage and capacity in cellular systems - Radio propagation mechanisms: Free space propagation and two ray ground reflection model

**UNIT - III WIRELESS ACCESS SYSTEMS [9]**

Access methods: TDMA, FDMA, CDMA & CSMA - Packet radio - Pure ALOHA - Slotted ALOHA - Capacity of CDMA and SDMA - OFDM - MIMO - Future wireless systems: Introduction to Front Haul and Back Haul .

**UNIT - IV ANTENNA DIVERSITY AND SPREAD SPECTRUM [9]**

Diversity: Space, Time, Polarization and Frequency - Selection diversity improvement - Combining techniques: Selective diversity combining, maximal ratio, equal gain combining, feed forward and feedback combining - Spread spectrum: Basic principles, direct sequence spread spectrum, frequency hopping spread spectrum.

**UNIT - V WIRELESS LAN [9]**

Fundamentals of WLAN - IEEE 802.11 WLAN standard, architecture and services, physical layer - MAC sub layer - MAC management sub layer - IEEE standards - HIPER LAN - Bluetooth - Overview of Wi-fi - Wi-max - LTE.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Acquire knowledge in the evolution of wireless systems.*
- *Understand the fundamentals of cellular concepts*
- *Analyze the types of accessing techniques*
- *Gain knowledge on various diversity schemes and spread spectrum.*
- *Discuss about the architecture and services of Wireless LAN*

**Text Books :**

1 Rappaport. T.S., "Wireless communications", Pearson Education, 7th impression, 2012.

2 W.C.Y.Lee Mobile, "Communication Engineering", McGraw Hill, 2nd edition, 2012.

**Reference Books :**

1 Jochen Schiller, "Mobile Communications", Pearson Education, 2nd edition, 2011.

2 Kaveth Pahlavan and Prashant Krishnamurthy, "Principles of Wireless Networks", PHI, 2005.

3 Simon Haykin and Michael Moher, "Modern wireless Communication", Pearson Education, 2007.

4 Kazi Mohammed Saidul Hug and Jonathan Rodriguez, "Back hauling/Front hauling for future wireless systems", John Wiley, 2017.

5 Hung Yu Wei, Jarongriew Rykowski, Sudhir Dixit, "WIFI, WIMAX and LTE – Multihop mesh networks", John Wiley publications, 2013.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| **16EC613** | **EMBEDDED SYSTEMS** | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Microprocessors and Microcontrollers*

***Objectives:***

- *To understand the concept of embedded systems.*
- *To familiarize the concept of devices and buses.*
- *To gain knowledge about embedded programming.*
- *To study the concepts of RTOS.*
- *To familiarize the types of RTOS and case studies.*

**UNIT - I INTRODUCTION TO EMBEDDED SYSTEMS [9]**

Embedded system: Definition - Categories - Recent trends - Design considerations and requirements - Overview of architecture - Purpose - Major application area - design life cycle.

**UNIT - II EMBEDDED DEVICES AND BUSES [9]**

IO types and examples - Serial communication devices - Parallel device ports - Sophisticated interfacing features in device ports-Wireless devices - Timer and counting devices - Watchdog timer - Real time clock - Networked embedded systems - Serial bus communication protocols - Parallel bus device protocols - Internet enabled systems - Wireless and mobile system protocols - ISR concept - Interrupt sources - Interrupt service handling mechanism.

**UNIT - III EMBEDDED PROGRAMMING [9]**

Software programming in assembly and high level language - Program elements: Macros and functions, data types, data structures, modifiers, statements, loops and pointers - Object oriented programming - Embedded programming in C++ - Embedded programming in JAVA - Program models - DFG models - State machine programming models for event controlled program flow - Modeling of multiprocessor systems - UML modeling.

**UNIT - IV REAL TIME OPREATING SYSTEMS [9]**

Multiple processes, Threads in an application - Tasks - Task states - Semaphore - Shared data - Interprocess communication - Signal function - Semaphore functions - Message queue functions - Mailbox functions - Pipe functions- Socket functions - OS services - Process management - Timer functions - Event functions - Memory management - Device, File and IO subsystems management - Interrupt routines in RTOS environment and handling of interrupt source calls.

**UNIT - V CASE STUDIES [9]**

Types of RTOS - Introduction and features of MUCOS II, VxWorks, Windows CE, OSEK, Linux 2.6 and RTLinux - Case studies: Automatic chocolate vending machine - Sending application layer byte streams on a TCP/IP network - Adaptive cruise control.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe hardware and software architectures of embedded Systems.*
- *Understand the I/O interface devices and buses.*
- *Analyze the embedded programming concepts..*
- *Illustrate the various concepts in RTOS.*
- *Design the embedded system application using RTOS.*

**Text Book :**

1 Raj Kamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw Hill, New Delhi, 2011.

**References :**

1 K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech Press, 2009

2 David E Simon "An Embedded Software Primer", Pearson Education, 2007.

3 Daniel .W Lewis, "Fundamentals of Embedded Software", Pearson Education, 2001.

4 Jean J. Labrosse, " MicroC/OS – II The Real Time Kernel", CMP Books, 2nd edition, 2002.

5 http://nptel.ac.in/courses/108102045 .

6 http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Embedded%20systems.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

**16EC614** **VLSI DESIGN**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

***Prerequisites:*** *Electronic Devices and Circuits, Digital Electronics*

***Objectives:***

- *To gain knowledge about MOS technology*
- *To learn about operation and characteristics of MOSFET*
- *To understand the concept of CMOS logic gate design and layout*
- *To gain knowledge about storage elements and different types of dynamic logic circuits*
- *To familiarize Verilog programming concepts and coding types*

**UNIT - I VLSI FABRICATION TECHNIQUES [12]**

Chip design hierarchy - IC layers - Photolithography and pattern transfers - CMOS fabrication processes: nWell - pWell - Twin tub - Silicon on insulator - Submicron CMOS process - Masks and layout - CMOS design rules: SCMOS design rule set - Lambda based layout.

**UNIT - II MOSFET [12]**

Basic MOS transistors - MOSFET operation - MOSFET switch model - Square law model - MOSFET parasitics - MOSFET SPICE modeling - CMOS inverter voltage transfer curve - Body effect - Threshold voltage - Latch up problem in CMOS circuits - Latch up prevention.

**UNIT - III CMOS LOGIC GATE DESIGN AND LAYOUT [12]**

NAND and NOR gates - Complex logic gates - Stick diagram - CMOS Layout -Tri state circuits - Large FETs - Transmission gate and pass transistor logic - Standard cell design: Cell hierarchies - Cell libraries.

**UNIT - IV STORAGE ELEMENTS AND DYNAMIC LOGIC CIRCUITS [12]**

SR latch - Bit level register - D flip flop - Dynamic D flip flop - Static RAM cell - Clocked CMOS - Dynamic logic - Domino logic - SR logic - Dynamic memories.

**UNIT - V VERILOG HDL [12]**

Basic concepts - Modules and ports - Operators - Structural modeling - Data flow modeling - Behavioral modeling - Switch level modeling - Test benches - Verilog code for: adders, subtractors, multiplexer, demultiplexer, encoder, decoder, priority encoder, comparator, D-Latch, D flip flop, shift register and counter.

**Total (L: 45 T:15) = 60 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe the basics of CMOS process technology*
- *Explain the operation of MOSFET and effect of parasitics*
- *Express the Layout of simple CMOS circuits*
- *Describe various memory elements and types of logic design*
- *Model the digital system using Verilog HDL*

**Text Books :**

1 John P. Uyemura, "Chip Design for Submicron VLSI: CMOS layout and simulation", Cengage Learning India Private Ltd, 11th Indian Reprint 2013.

2 Neil H.E. Weste and Kamran Eshraghian, "Principles of CMOS VLSI Design", Pearson Education Asia, 2nd edition, 2005.

3 Samir Palnitkar, "Verilog HDL A Guide to Digital Design and Synthesis", Pearson Education, 2nd edition, 2010.

**References :**

1 Kamran Eshraghian, Douglas A. Pucknell and Sholeh Eshraghian, "Essentials of VLSI Circuits and Systems", Prentice Hall of India Pvt Ltd, 2013.

2 Wayne Wolf, "Modern VLSI Design System-On-Chip", PHI, 3rd edition, 2007.

3 John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, reprint 2009.

4 J.Bhasker, "Verilog HDL Primer", BS publication, 3rd edition 2005.

5 http://nptel.ac.in/courses/108101089/

6 http://nptel.ac.in/syllabus/syllabus.php?subjectId=117108041

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC621** | **VLSI DESIGN LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisites:*** *Digital Electronics, Electronic Devices and Circuits, Basic concept of C programming*

***Objectives:***

- *To understand the use of front-end ASIC/FPGA tools*
- *To gain practical exposure in modeling a digital system using Hardware Description Language*
- *To understand back-end design developing simple circuits using SPICE Tool*
- *To develop a code and test the digital circuits on FPGA*

**List of Experiments:**

- Design and simulation of combinational logic circuit using verilog.

1. Adder
2. Multiplexer and demultiplexer
3. Encoder and decoder
4. Multiplier

- Design and simulation of sequential logic circuit using verilog.

5. Flip flops
6. Counters
7. Shift registers
8. Frequency divider

- CMOS circuit design using SPICE.

9. CMOS inverter
10. CMOS NAND and NOR gates
11. Complex logic gates

- FPGA implementation with synthesis report.

12. Combinational and sequential circuits

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Model a digital circuit using verilog HDL and validate its functionality*
- *Apply lambda based design rules & solve problems in the design of CMOS logic circuits*
- *Import the logic modules into FPGA boards*
- *Synthesize, place and route the digital modules*
- *Functional verification of the digital circuits with the help of FPGA*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC622** | **EMBEDDED SYSTEMS LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisite:*** *Microprocessors and Microcontrollers Lab*

***Objectives:***

- *To learn the Embedded C programming for 8051 microcontrollers.*
- *To develop the programming knowledge in MPLAB and Keil software.*
- *To gain practical exposure in Firebird V Robot*

**List of Experiments:**

1. 8051 Microcontroller programming in Embedded C using Keil
   a. Flash.
   b. LCD interfacing.
2. PIC Microcontroller programming using MPLAB
   a. Implementation of Elevator controller.
   b. Implementation of Alarm clock controller.
   c. Implementation of model train controller.
3. ARM processor programming in Embedded C using Keil
   a. Musical Tone Generator Interface.
   b. 4x4 Matrix Hex Keypad Interface.
   c. 6 – Digit, 7 – segment Display with calculator type keyboard Interface.
   d. Graphical LCD Interface.
4. Atmega processor programming in Firebird V Robot,
   a. Interfacing LCD for debugging.
   b. DC motor control and PWM generation for velocity control.
   c. Analog-to-Digital conversion and white line following.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Illustrate the programming concepts of microcontroller.*
- *Design and develop the programming using IDE.*
- *Illustrate the various concepts in Firebird V Robot.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HR645** | **CAREER DEVELOPMENT SKILLS - V** | - | 2 | - | - |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To assist individuals in making appropriate educational and occupational choices.*
- *To discuss the importance of using effective action words, keywords, and positioning for a resume, describe how to showcase one's professional skill sets in a cover letter and perform these tasks.*

**UNIT - I WORLD OF TEAMS [6]**

Self enhancement – Importance of developing assertive skills – Developing self confidence – Developing emotional intelligence, Importance of teamwork – Team Vs Group – Attributes of a successful team – Barriers involved – Working with groups – Dealing with people – Group decision making

**UNIT - II INTERVIEW,GD & PRESENTATION SKILLS [6]**

Interview handling skills – Self preparation checklist – Grooming tips: do"s and don"ts – Mock interview & feedback, GD skills – Understanding the objective and skills tested in a GD – General types of GD – Roles in a GD: do"s and don"ts – Mock GD & Feedback – Practices.

**UNIT - III RESUME WRITING [6]**

Introduction to the resume – Types of resumes – The chronological resume - The functional resume – The combination resume – Curricula vitae – Preparing to write your resume – Common resume errors – Presentation – Professional objective and education section – Experience / Fresher – Skills section – Honors and awards – Activities and interests – Polishing your resume – Cover letters

**UNIT - IV BUSINESS ETIQUETTE AND ETHICS [6]**

Grooming etiquette – Telephone & email etiquette – Dining etiquette - do"s and don"t"s in formal setting – How to impress ethics – Importance of ethics and value – Choice and dilemmas faced – Discussion form news headlines

**UNIT - V DOMAIN PROFICIENCY [6]**

**Electromagnetics -** Divergence, Curl & Gradient, Gauss" and Stokes" theorems, Maxwell"s equations, Wave equation, Poynting vector, Plane waves: propagation through various media, phase and group velocity, skin depth.

**Transmission Lines -** Characteristic impedance - Impedance transformation - Smith chart - Impedance matching - S parameters - Pulse excitation - Waveguides: Modes in rectangular waveguides - Boundary conditions - Cut-off frequencies - Dispersion relations.

**Antenna** - Dipole antennas - Radiation pattern - Antenna gain.

**Signals and Systems** - Continuous-time and discrete-time Fourier series & Fourier Transform, DFT and FFT, z-transform, causality, stability, impulse response, convolution, poles and zeros, frequency response, group delay, phase delay.

**DSP -** FIR and IIR filter design - Multirate signal processing.

**Total = 30 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Enhance the team spirit and work in a team effectively*
- *Organize better and perform well in HR interview*
- *Tailor their own resume according to job needs*
- *Understand business etiquette and work globally*
- *Enhance the comprehension Skills in core subjects*

**Reference Books :**

1 Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.

2 Abhijit Guha, "Quantitative Aptitude", TMH, 3rd edition

3 Objective Instant Arithmetic by M.B. Lal & Goswami Upkar Publications.

4 Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HS751** | **PROFESSIONAL ETHICS (Common to all Branches)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objective:***

- *To enable the student to understand the ethical principles and practices to resolve the ethical conflict situations that arises in their professional lives.*

**UNIT - I ENGINEERING ETHICS [9]**

Senses of 'engineering ethics' - Variety of moral issued - Types of inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - Consensus and controversy - Models of professional roles - Professional ideals and virtues - Uses of ethical theories.

**UNIT - II ENGINEERING AS SOCIAL EXPERIMENTATION [9]**

Engineering as experimentation - Engineers as responsible experimenters - Codes of ethics - Industrial standards - Balanced outlook on law - The challenger case study.

**UNIT - III ENGINEER'S RESPONSIBILITY FOR SAFETY [9]**

Safety and risk - Assessment of safety and risk - Risk benefit analysis - Reducing risk - Liability - The Chernobyl and Bhopal case studies.

**UNIT - IV RESPONSIBILITIES AND RIGHTS [9]**

Collegiality and loyalty - Respect for authority - Collective bargaining - Confidentiality - Conflicts of interest - Occupational crime - Professional rights - Employee rights - Intellectual Property Rights (IPR) - Discrimination.

**UNIT - V GLOBAL ISSUES [9]**

Multinational corporations - Environmental ethics - Computer ethics - Weapons development - Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors - Honest - Moral leadership - Sample code of conduct.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basic perceptions of ethics, moral and values.*
- *Aware the current industrial standards*
- *Identify and access the risk and safety benefits in the industry*
- *Aware of professional rights and responsibilities of an engineers*
- *Acquire knowledge in global issues and able to apply ethical principles in professional life.*

**Text Books :**

1 Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, 3rd edition, New York, 2014.

2 Dr.K.R.govindan and S.Senthilkumar, "Professional Ethics", Anuradha Agencies, Revised edition, Chennai, 224.

**Reference Books :**

1 Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India,2nd edition, New Delhi, 2012

2 Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey,4th edition, 2009

3 Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Thompson Learning,4th edition, 2011

4 John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 5th edition, New Delhi, 2009.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| 16EC711 | RF AND MICROWAVE ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Electronic Devices & Circuits*

***Objectives:***

- *To inculcate understanding of the basics required for circuit representation of RF networks*
- *To deal with the issues in the design of microwave amplifier.*
- *To instill knowledge on the properties of various microwave components.*
- *To know the different microwave sources*
- *To understand the various microwave measurement techniques*

**UNIT - I TWO PORT NETWORK THEORY [9]**

Review of low frequency parameters: Impedance, admittance, hybrid and ABCD parameters - Different types of interconnection of two port networks - High frequency parameters - Formulation of S parameters - Properties of S parameters - Reciprocal and lossless network - Transmission matrix - RF behavior of resistors, capacitors and inductors.

**UNIT - II RF AMPLIFIERS AND MATCHING NETWORKS [9]**

Characteristics of amplifiers - Amplifier power relations - Stability considerations - Stabilization methods - Noise figure - Constant VSWR - Broadband, high power and multistage amplifiers - Impedance matching using discrete components - Two component matching networks - Frequency response and quality factor - T and Pi matching networks - Microstrip line matching networks.

**UNIT - III PASSIVE AND ACTIVE MICROWAVE DEVICES [9]**

Passive devices: Terminations,attenuators, phase shifters, power dividers, circulator, isolator, impedance matching devices - S Matrix: Directional coupler, waveguide Tees and Rat race coupler - Active devices: Crystal and Schottkey diode detector, PIN diode switch, Gunn diode oscillator, Read, IMPATT diode oscillator and amplifier.

**UNIT - IV MICROWAVE GENERATION [9]**

Two cavity klystron amplifier: Transit time effect, velocity modulation, current modulation and bunching - Reflex klystron - Slow wave structures - Helix traveling wave tubes: Bandwidth, power and gain considerations - Cross field device: Magnetron.

**UNIT - V MICROWAVE MEASUREMENTS [9]**

Measuring instruments: Principle of operation and application of VSWR meter, power meter, spectrum analyzer, network analyzer, measurement of impedance, frequency, power, VSWR, Q-factor, dielectric constant, scattering coefficients, attenuation, S-parameters.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze the two port RF networks*
- *Design RF transistor amplifiers and matching networks*
- *Explain the active and passive microwave devices used in microwave communication systems*
- *Generate microwave signals and design microwave amplifiers*
- *Measure and analyze the microwave signal parameters*

**Text Books :**

1 Reinhold Ludwig and Gene Bogdanov, “RF Circuit Design: Theory and Applications”, Pearson Education, 2011.

2 Samuel Y.Liao, “Microwave Devices and Circuits”, Prentice Hall of India, 3rd edition 2012.

**Reference Books :**

1 David M. Pozar, “Microwave Engineering”, Wiley India (P) Ltd, New Delhi, 2008.

2 Thomas H Lee, “Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits”, Cambridge University Press, 2004.

3 Mathew M Radmanesh, “RF and Microwave Electronics”, Prentice Hall, 2000.

4 Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata McGraw Hill, New Delhi, 2005.

5 Robert E Colin, “Foundations for Microwave Engineering”, John Wiley & Sons Inc, 2005.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| 16EC712 | FIBER OPTICAL COMMUNICATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Engineering Physics, Engineering Electromagnetics*

***Objectives:***

- *To learn the optical fiber waveguide modes, configurations and structures.*
- *To understand different kinds of losses in optical fibers.*
- *To be familiar with the various optical sources, power launching and coupling.*
- *To acquire knowledge about different types of optical receiver and different sources of noise in detectors.*
- *To gain knowledge about point to point link, WDM, EDFA and solitons.*

**UNIT - I OPTICAL FIBER WAVEGUIDES [9]**

Ray theory transmission: Total internal reflection, acceptance angle, numerical aperture, skew rays - Electromagnetic mode theory of optical propagation: EM wave, modes in planar guide, phase and group velocity - Cylindrical fibers - SM fibers - Fiber attenuation measurements - Fiber numerical aperture measurements - Fiber diameter measurements.

**UNIT - II SIGNAL DEGRADATION IN OPTICAL FIBERS [9]**

Attenuation - Material absorption losses in silica glass fibers - Linear and nonlinear scattering losses - Fiber bend loss - Mid-band and far-band infrared transmission - Intra and intermodal dispersion - Overall fiber dispersion - Polarization - Nonlinear effects - Optical fiber connections: Fiber alignment and joint losses, fiber splices, fiber connectors, fiber couplers.

**UNIT - III OPTICAL SOURCES [9]**

LEDs - LASER diodes: Semiconductor laser diode, fabry-perot laser, distributed feedback lasers, modulation of laser diodes, temperature effects - Power launching and coupling: Source to fiber power launching, lensing scheme for coupling improvement, LED coupling to single mode fibers.

**UNIT - IV OPTICAL RECEIVER [9]**

Optical detectors: PIN photo detector, avalanche photodiodes, construction, characteristics and properties - Photo detector noise: Noise sources, signal to noise ratio, detector response time, comparison of photo detector - Fundamental receiver operation: Digital signal transmission, error sources -Front end amplifier - Probability of error - Quantum limit.

**UNIT - V DIGITAL TRANSMISSION SYSTEMS [9]**

Point to point link: System considerations, link power budget, rise time budget - Noise effects on system performance - Operational principles of WDM - Solitons - EDFA - Basic concepts of SONET/SDH.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basic concepts of optical fiber waveguide modes, configurations, structures and the measurement of various optical fiber parameters.*
- *Analyze the signal degradation in optical fibers and study of optical connections.*
- *Understand the characteristics of various optical sources, power launching and coupling.*
- *Evaluate the characteristics of various fiber optic detectors and front end amplifiers in optical receivers.*
- *Analyze the Point to point link and understand the concepts of WDM, Solitons, EDFA and SONET.*

**Text Books :**

1 Gerd Keiser, “Optical Fiber Communication”, McGraw Hill, 5th edition, 2013.

2 John M. Senior, “Optical Fiber Communication”, Pearson Education, 3rd edition, 2014.

**References :**

1 Govind P.Agrawal, “Fiber-optic communication systems”, John Wiley & sons. 4th edition, 2010.

2 Harry J.R Dutton, “Understanding Optical Communications”, IBM Corporation, International Technical Support Organization, 2012.

3 J.Gower, “Optical Communication System”, Prentice Hall of India, 2nd edition, 2003.

4 R.P. Khare, “Fiber Optics and Optoelectronics”, Oxford University Press, 2007.

5 http://nptel.ac.in/courses/117101054/13

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| **16EC713** | **DIGITAL IMAGE PROCESSING** | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Signal Processing*

***Objectives:***

- *To learn the fundamental representation of an images*
- *To be familiar with the concept of various transforms using images*
- *To understand the various techniques of image enhancement and restoration*
- *To be exposed to image segmentation and representation*
- *To learn about image compression techniques*

**UNIT - I DIGITAL IMAGE FUNDAMENTALS [9]**

Elements of digital image processing systems - Elements of visual perception - Basic relationship between pixels: Connectivity, Distance measure - Brightness - Contrast - Hue - Saturation - Mach band effect - Color image fundamentals: RGB - HSI models - Conversion from RGB to HSI - Image sampling - Quantization - Dither.

**UNIT - II IMAGE TRANSFORMS [9]**

2D transforms - DFT - DCT- DST - Walsh - Hadamard - Slant - Haar transform - DWT: Haar wavelet, Daubechies wavelet - CWT: Hermitian wavelet, Poisson wavelet.

**UNIT - III IMAGE ENHANCEMENT AND RESTORATION [9]**

Spatial domain enhancement: Gray level transformations - Histogram modification and specification techniques - Image averaging - Directional smoothing - Median - Geometric mean - Harmonic mean - Contra harmonic mean filters - Homomorphic filtering - Color image enhancement - Image restoration: Degradation model - Unconstrained restoration and constrained restoration - Inverse filtering - Wiener filtering - Geometric transformations.

**UNIT - IV IMAGE SEGMENTATION AND REPRESENTATION [9]**

Line and point detection, Edge detection, Edge linking via Hough transform - Morphological operations - Thresholding - Region based segmentation - Region growing - Region splitting and merging - Representation: Chain codes, Signatures, Boundary segments, Skeletons.

**UNIT - V IMAGE COMPRESSION [9]**

Need for data compression - Lossless compression: Huffman coding, Run length coding, Bit plane coding, LZW coding. Lossy compression: Vector quantization, Block truncation coding - Applications: Satellite image processing - Image forensic science.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the fundamentals in digital imaging*
- *Analyze and understand the various image transforms*
- *Discuss the image enhancement and restoration techniques*
- *Understand the image segmentation and representation techniques*
- *Know the image compression techniques and image processing applications.*

**Text Books :**

1 Rafael C Gonzalez, Richard E Woods, "Digital Image Processing", Pearson Education- Inc- 3rd edition, Third Impression,2011.

2 Jayaraman .S, Esakkirajan.S, Veerakumar T, "Digital Image Processing", TMH, 2010.

**References :**

1 Anil K- Jain, "Fundamentals of Digital Image Processing", Pearson/Prentice Hall of India, 2002.

2 Kenneth R.Castleman, "Digital Image Processing**",** Pearson**,** 2nd reprint**,** 2008.

3 William K Pratt, "Digital Image Processing", John Wiley, 2002.

4 David Salomon, "Data Compression – The Complete Reference", Springer - Verlag, 2nd edition, PHI, 2011.

5 http://nptel.ac.in/courses/117105079/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC721** | **RF AND MICROWAVE LABORATORY** | 0 | 0 | 3 | 2 |

***Prerequisites:*** *Analog Communication systems, Digital Communication systems and Communication Systems Laboratory*

***Objectives:***

- *To perform the characteristics of Klystron and Gunn oscillator.*
- *To gain the knowledge on working principles of directional couplers.*
- *To learn the various methods of microwave and optical devices measurement.*
- *To understand the measurement of optical sources and fiber.*
- *To perform RF amplifier and filter experiments*

**List of Experiments:**

**Microwave Experiments:**

1. Characteristics of Reflex klystron and Gunn diode oscillator.
2. Directional coupler - Directivity and Coupling coefficient measurement.
3. VSWR Measurements - Determination of terminated impedance.
4. Radiation pattern and Gain measurement of Horn antenna.
5. Guide wavelength, frequency measurement.

**Optical Experiments:**

1. Fiber optic analog and digital link.
2. Measurement of Numerical aperture of fibers.
3. Measurement of bending losses.
4. DC characteristics of LED and VI characteristics of LASER diode.
5. BER and Eye pattern measurement using a high bandwidth oscilloscope.

**RF Experiments:**

1. RF amplifier circuit design and analyze using spectrum analyzer.
2. RF band pass filter design

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the operation of fiber for transmission of analog and digital signals.*
- *Analyze the characteristics of laser and LED.*
- *Analyze the characteristics of klystron and gunn diode.*
- *Perform various characteristics measurements of microwave devices.*
- *Design RF amplifier and filters.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16HS001** | **PRINCIPLES OF MANAGEMENT (Common to CE, EC & EE)** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *No prerequisites needed for enrolling into the course*

***Objectives:***

- *To enable the student in understanding management functions, its complexity and various issues in management.*

**UNIT - I OVERVIEW OF MANAGEMENT [9]**

Definition of Management – Importance of management – Management functions – Levels of management – Role of managers – Management a science or an art – Evolution of management thought: Scientific management and administrative principles of management – Ethical issues in management.

**UNIT - II PLANNING [9]**

Planning: Meaning, purpose, steps and types of plans - Management by objectives (MBO) – Decision making: Types of decisions, Steps in rational decision making, Common difficulties in management decision making.

**UNIT - III ORGANISING [9]**

Nature and purpose of organizing : Organization structure, process and principles of organizing – Line & staff authority – Departmentation – Span of control – Centralization and decentralization – Delegation of authority – Staffing : Sources of recruitment, Selection process – Training methods – Performance appraisal methods.

**UNIT - IV DIRECTING [9]**

Creativity and innovation – Motivation and satisfaction: Motivation theories – Leadership: Leadership theories and styles – Communication: Barriers to communication, Principles of effective communication.

**UNIT - V CONTROLLING [9]**

Steps in a control Process: Need for control system, budgetary and non-budgetary control techniques, Problems of the control system, Essentials of effective control system and Benefits of control.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the role and current practices of management systems.*
- *Understand the basic concepts of planning and decision making*
- *Explain various methods of organizing, recruitment and training and adopted in an organization.*
- *Handle employees using various motivational and leadership styles.*
- *To know the budget and non-budgetary controlling process.*

**Text Book :**

1 L.M.Prasad, "Principles and Practices of Management", Sultan Chand & Sons, New Delhi, 8th edition,2013.

**Reference Books :**

1 P.C.Tripathi and Reddy, "Principles of Management", McGraw Hill, New Delhi, 5th edition 2012.
2 Hellriegel, Slocum & Jackson, „Management a Competency Based Approach", Thomson South Western, 10th edition, 2007.
3 Harold Koontz, Heinz Weihrich and mark V Cannice, „Management – A global Entrepreneurial Perspective", Tata Mc Graw Hill, 12th edition, 2007
4 Andrew J. Dubrin, „Essentials of Management", Thomson Southwestern, 7th edition, 2007.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC561** | **MEDICAL ELECTRONICS**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To learn the methods of recording various bio-potentials.*
- *To understand the design and working of various diagnostic equipment.*
- *To be familiar with the design and working of various therapeutic equipment.*
- *To be exposed to the principles and working behind various imaging techniques.*
- *To gain knowledge about the recent trends in medical instrumentation.*

**UNIT - I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING [9]**

The origin of bio-potentials - Bio-potential electrodes - Carrier, chopper and isolation amplifiers -Transducers for biomedical applications: Strain gauge, piezoelectric transducer, thermocouple, thermistor, biosensors - ECG, EEG, EMG, PCG, ERG and EOG: Lead systems, recording methods, typical waveforms and signal characteristics.

**UNIT - II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT [9]**

Blood gas analyzers - Electrophoresis - Colorimeter & Photometer - Auto analyzer - Blood flow meter - Cardiac output - Respiratory measurement - Blood pressure measurement - Temperature measurement - Pulse measurement -Blood cell counters: Coulter counters.

**UNIT - III THERAPEUTIC EQUIPMENT [9]**

Cardiac pacemakers - DC defibrillator - Dialyzers - Surgical diathermy - Physiotherapy and electrotherapy equipment - Oxygenators - Heart lung machine.

**UNIT - IV MEDICAL IMAGING [9]**

X-Ray - Computer Axial Tomography - Positron Emission Tomography - MRI and NMR - Ultrasonic Imaging systems.

**UNIT - V RECENT TRENDS IN MEDICAL INSTRUMENTATION [9]**

Thermograph - Endoscopy unit - LASER in medicine - Biomedical telemetry - Radio-pill - Cardiac catheterization laboratory - Electrical safety of medical equipment.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the recording methods of various bio-potentials*
- *Analyze the design and working of various equipment that deal with bio-chemical and non-electrical parameter measurement*
- *Discuss the different types of therapeutic equipment*
- *Understand the principles of various medical imaging modalities*
- *Know the recent trends in medical instrumentation*

**Text Books :**

1 R.S.Khandpur, “Handbook of Biomedical Instrumentation”, Tata McGraw Hill, 3rd edition, 2014.

2 Leslie Cromwel, Fred J.Weibel, Erich A.Pfeiffer, “Biomedical Instrumentation and Measurements”, Pearson/Prentice Hall India, 2nd edition, 2011.

**Reference Books :**

1 John G.Webster, “Medical Instrumentation Application and Design”, John Wiley & Sons Inc, 4th edition,2009.

2 Joseph J.Carr and John M.Brown, “Introduction to Biomedical Equipment Technology”, John Wiley &Sons, 4th edition, 2008.

3 M. Arumugam, “Biomedical Instrumentation”, Anuradha Publications, 2nd edition, Reprint 2009.

4 R.L. Reka & C. Ravikumar, “Biomedical Instrumentation/ Medical Electronics”, Lakshmi Publications, 2nd edition, Reprint 2010.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC562** | **ADVANCED MICROPROCESSORS AND MICROCONTROLLERS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Microprocessors and Microcontrollers*

***Objectives:***

- *To learn the architecture of advanced processors.*
- *To gain knowledge about the pentium processors.*
- *To expose the fundamentals of PIC Architecture and programming.*
- *To study of interfacing techniques of the PIC microcontroller.*
- *To equip with practical techniques for application development on real PIC hardware.*

**UNIT – I ADVANCED MICROPROCESSOR ARCHITECTURE [9 ]**

Microprocessor architecture – Real mode memory addressing – Protected mode memory addresses – Memory paging – Data addressing modes – Addressing modes: Program memory – Stack memory – Data movement instructions – Arithmetic and logic Instructions - Program control instructions.

**UNIT – II PENTIUM PROCESSORS [9 ]**

Introduction to pentium microprocessor – Special pentium registers - Pentium memory management – New pentium instructions – Pentium processor – Special pentium pro features – Pentium 4 processor.

**UNIT – III PIC MICROCONTROLLER [9 ]**

Architecture – Memory organization – Addressing modes – Instruction set – PIC programming in assembly and C – I/O port – Data conversion – RAM and ROM allocation – Timer programming.

**UNIT – IV PERIPHERAL INTERFACING OF PIC MICROCONTROLLER [9 ]**

Timers – Interrupts, I/O ports – $I^2C$ bus – A/D converter – UART – CCP modules – ADC, DAC and sensor interfacing – Flash and EEPROM memories.

**UNIT – V CASE STUDIES FOR PIC MICROCONTROLLER [9 ]**

Weather monitoring – Real time clock – DC motor speed control – Relays and opto isolators – PWM motor control – Industrial applications.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand advanced processor architecture.*
- *Analyze the types of pentium processors.*
- *Understand the architecture of PIC.*
- *Illustrate the use of peripheral devices.*
- *Design the hardware for microcontroller based system.*

**Text Books :**

1 B.B.Brey, "The Intel Microprocessor 8086/8088 /80186/80188, 80286, 80386, 80486 PENTIUM, PENTIUM Pro, PII, PIII IV Archietecture, Programming Interfacing", Pearson Education, 7th edition, 2010.
2 John B Peatman "Design with PIC Microcontroller", Pearson Education, 2009.

**References :**

1 John Paul Shen, Mikko H.Lipasti, "Modern Processor Design", Tata Mcgraw Hill, 2013.
2 Douglas V.Hall, "Microprocessors and Interfacing", Tata McGraw Hill, 2nd edition, 2012.
3 Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey "PIC Microcontroller and Embedded Systems using Assembly and C for PIC18", Pearson Education, 2008.
4 Tim Wilmshurst, "Designing Embedded Systems with PIC Microcontrollers: Principles and Applications", Newness Publisher, 2009.
5 http://nptel.ac.in/courses/117104072/35.
6 http://www.microchip.com.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC563** | **TELEVISION ENGINEERING** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Electronic Circuits*

***Objectives:***

- *To study about scanning mechanism and various types of camera tubes.*
- *To understand the principles of monochrome TV transmitter and receiver systems.*
- *To gain knowledge of the fundamentals of colour television.*
- *To learn various colour television standards.*
- *To familiarize the recent television systems.*

**UNIT - I FUNDAMENTALS OF TELEVISION [9]**

Aspect ratio - Image continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tube types: Silicon diode array vidicon, solid-state image scanners - Monochrome picture tube - Composite video signal: Video signal dimension, horizontal and vertical sync details - Scanning sequence details - Picture signal transmission - Positive and negative modulation - Vestigial sideband transmission - Sound signal transmission - Standard channel bandwidth.

**UNIT - II MONOCHROME TELEVISION SYSTEM [9]**

TV transmitter block diagram - TV signal propagation - Interference - Monochrome receiver block diagram - RF tuner - UHF and VHF tuner - Digital tuning techniques - Automatic Frequency Tuning (AFT) - Automatic Gain Control (AGC) - Noise cancellation - Video and sound intercarrier signal detection - DC reinsertion - Sync separation - EHT generation - TV transmission and receiving antennas.

**UNIT - III ESSENTIALS OF COLOUR TELEVISION [9]**

Compatibility - Fundamentals of colour signals - Colour television display tubes: Delta-gun and trinitron colour picture tubes - Purity and convergence - Pincushion correction techniques - Automatic degaussing circuit - Colour signal transmission - Bandwidth - Modulation of colour difference signals - Weighting factors - Formation of chrominance signal.

**UNIT - IV COLOUR TELEVISION SYSTEM [9]**

Colour TV receiver block diagram - NTSC colour TV system - SECAM system - Colour TV systems: Cancellation of phase errors, PAL coder, PAL Decoder - Comparison of colour television standards - Chromo signal amplifier - Separation of U and V signals - Colour burst separation - Burst phase discriminator - ACC amplifier - Ident and colour killer circuits - U and V demodulators - Colour signal matrix.

**UNIT - V ADVANCED TELEVISION SYSTEMS [9]**

Satellite TV technology - Cable television systems - Teletext - Digital television: Transmission and reception - DTH - Plasma display - Flat panel display - OLED TV - 3DTV - HDTV - Video conferencing.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge about the fundamentals of television systems.*
- *Able to interpret the functions of TV transmitter and receiver.*
- *Able to understand the colour fundamentals.*
- *Identify the principles and functions of colour television systems.*
- *Understand the concepts of recent television system.*

**Text Books :**

1 R.R.Gulati, “Modern Television Practice, Transmission, Reception and Applications”, New Age International (P) Ltd., 5th edition, 2015.

2 R.R.Gulati, “Monochrome and Color Television”, New Age International (P) Ltd., 3rd edition, 2014.

**References :**

1 A.M Dhake, “Television and Video Engineering”, Tata McGraw-Hill, 2nd edition, Reprint 2013.

2 R.P.Bali, “Color Television, Theory and Practice”, Tata McGraw-Hill, 2nd edition, 2007.

3 Bernard Grob, “Basic Television Principles and Servicing”, New Age International (P) Ltd., 6th edition, 2004.

4 R.G.Gupta, “Television Engineering and Video Systems”, Tata McGraw-Hill, 2nd edition, 2011.

5 http://nptel.ac.in/courses/117102059/26 .

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC564** | **INFORMATION THEORY AND CODING** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Communication Systems*

***Objectives:***

- *Learn the fundamentals of information theory*
- *Familiarize the various types of source coding methods*
- *Understanding the different methods of channel coding.*
- *Able to formulate error control codes in block codes*
- *Gain knowledge about the error control codes in convolutional codes*

**UNIT - I INFORMATION THEORY [9]**

Information - Information rate - Entropy - Classification of codes - Kraft McMillan inequality - Source coding theorem – Shannon Fano coding - Huffman coding - Extended Huffman coding - Joint and conditional entropies - Mutual information - Discrete memory less channels: BSC, BEC and channel capacity - Shannon limit

**UNIT - II SOURCE CODING [9]**

Text: Adaptive Huffman coding, arithmetic coding and latex format - Audio: Perceptual coding, masking techniques, psychoacoustic model, MPEG audio layers - I,II & III - Dolby AC3 - Image and video formats: GIF, TIFF, BMP,PNG , SIF, CIF & QCIF - Image compression: JPEG - Video compression: Principles-I,B,P frames and motion estimation.

**UNIT - III CHANNEL CODING [9]**

Characteristics of speech signals - Quantization techniques - Channel vocoder - Linear predictive coding -Information capacity theorem - Implication of the information capacity theorem - Information capacity of colored noise channel - Rate distortion theory - Data compression.

**UNIT - IV BLOCK CODES [9]**

Hamming codes: Hamming weight, hamming distance, minimum distance decoding - Single parity codes - Repetition codes: Linear block codes, cyclic codes - Syndrome calculation, encoder and decoder - CRC.

**UNIT - V CONVOLUTIONAL CODES [9]**

Convolutional codes - Code tree, trellis, state diagram - Encoding - Decoding: Sequential search and Viterbi algorithm - Principle of turbo coding - Other codes: RS code, Golay code and Burst error correcting code.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Identify the transmission of information.*
- *Analyze the source coding methods used in image and video broadcasting.*
- *Infer the methodology of channel coding methods.*
- *Able to understand error control code in block codes.*
- *Able to implement the error control method in convolutional codes*

**Text Books :**

1 R.Bose, “Information Theory, Coding and Cryptography”, Tata McGraw Hill, 2nd edition 2008.

2 Fred Halsall, “Multimedia Communications: Applications, Networks, Protocols and Standards”, Pearson Education Asia, 4th edition 2009.

**Reference Books :**

1 K.Sayood, “Introduction to Data Compression” 4th edition, Elsevier 2012.

2 S.Gravano, “Introduction to Error Control Codes”, Oxford University Press 2007.

3 Amitabha Bhattacharya, “Digital Communications”, Tata McGraw Hill, 2006, Re-print 2013.

4 Theodore Rappaport “Wireless Communications - Principles and Practice”, Pearson Education, 2nd edition, 2012.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS002** | **JAVA PROGRAMMING** | | | | |
| | **ELECTIVE - (Common to CS & EC)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Fundamentals of Object Oriented Programming Concepts*

***Objectives:***

- *To understand the fundamentals of Java programming language.*
- *To equip students with comprehensive knowledge on core concepts of java like overloading, inheritance, packages, interfaces and exception handling.*
- *To gain knowledge on threads and multithreaded programming, also to understand the I/O operations and string manipulations and concepts of database connectivity.*

**UNIT – I JAVA FUNDAMENTALS [9]**

The Java buzzwords – Data types – Variables – Arrays – Operators – Control statements – Class fundamentals – Declaring objects – Methods – Constructors – this keyword – Garbage collection.

**UNIT – II METHOD OVERLOADING AND INHERITANCE [9]**

Method overloading – Constructor overloading – Objects as parameters – Returning objects – Recursion – Access control – static – final – Nested and inner class – Inheritance: Basics – super – Multilevel– Hierarchical – Method overriding – Abstract class – Final with inheritance.

**UNIT – III PACKAGES, INTERFACES AND EXCEPTION HANDLING [9]**

Packages – Access protection – Importing packages – Interfaces – Default interface methods – Static methods in interface – Exception handling fundamentals – Types – Uncaught exceptions – Try and catch – Multiple catch – Nested try – Throw – Throws – Finally.

**UNIT – IV MULTITHREADED PROGRAMMING AND I/O OPERATIONS [9]**

Java thread model – Main thread – Creating a thread – Creating multiple threads – isAlive and join methods – Thread priorities – Synchronization – Interthread communication – Suspending, resuming, and stopping threads – Obtaining a thread‟s state – Using multithreading – I/O basics – Reading console input – Writing console output – The print writer class – Reading and writing files – Automatically closing a file – Scanner class.

**UNIT – V STRING AND DATABASE CONNECTIVITY [9]**

The string constructors – String length – Character extraction – String comparison – Searching strings – Modifying a string – Data conversion using same valueof method – Methods in String Buffer – JDBC product components – JDBC API – JDBC driver manager – JDBC test suite – JDBC – ODBC bridge – JDBC architecture – Establishing connection – Handling SQL exceptions.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand and apply java programming fundamentals to solve real world problem.*
- *Understand the concept of overloading and inheritances.*
- *Learn important features of java like packages, interfaces and exception handling.*
- *Understand the features of multithreaded programming and I/O operations.*
- *Understand the concepts of string manipulations and database connectivity.*

**Text Book :**

1 Herbert Schildt, “Java – The Complete Reference”, Oracle Press, McGraw-Hill Education, 9th edition, 2014.

**References :**

1 Cay S. Horstmann, “Core Java Volume 1 – Fundamentals”, Prentice Hall, 10th edition, 2015.
2 Herbert Schildt, “Java – A Beginner Guide”, Oracle Press, McGraw-Hill Education, 6th edition, 2014.
3 Joshua Bloch, “Effective Java: A Programming Language Guide”, Addison-Wesley Professional, 2nd edition, 2008.
4 Kathy Sierra and Bert Bates, “Head First Java”, O'Reilly, 2nd edition, 2005.
5 Allen B. Downey and Chris Mayfield, “Think Java: How to Think Like a Computer Scientist”, O'Reilly, 1st edition, 2016.
6 https://www.youtube.com/watch?v=oqnLQVFaqYI

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS005** | **COMPUTER ARCHITECTURE**<br>**ELECTIVE - (Common to CS,EC & EE)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of Digital Electronics*

***Objectives:***

- *To understand the basic structure and operation of a digital computer.*
- *To study the concepts of pipelining.*
- *To learn the hierarchical memory system including cache and virtual memories.*

**UNIT – I BASIC STRUCTURE OF COMPUTERS [9 ]**

Functional units – Basic operational concepts – Performance – Instruction set architecture: Instructions and instruction sequencing – Addressing modes – RISC and CISC – Fixed point and floating point operations.

**UNIT – II BASIC PROCESSING UNIT [9 ]**

Fundamental concepts – Instruction execution – Hardware components – Instruction fetch and execution steps – Control signals – Hardwired control – CISC style processors – Micro programmed control – Nano programming.

**UNIT – III PIPELINING [9 ]**

Basic concepts – Pipeline organization – Pipelining issues – Data dependencies – Memory delays – Branch delays – Resource limitations – Performance evaluation – Superscalar operation.

**UNIT – IV MEMORY SYSTEM [9]**

Basic concepts – Semiconductor RAM memories – Read Only Memories – Memory hierarchy – Cache memories – Performance considerations – Virtual memory – Memory management requirements – Secondary storage devices.

**UNIT – V I/O ORGANIZATION [9]**

Accessing I/O devices – Programmed I/O – Interrupt initiated I/O – Direct memory access – Buses – Bus arbitration – Interconnection standards: SCSI – USB – Firewire – SATA – PCI express – I/O devices and processors.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Demonstrate the instruction sets with various addressing modes.*
- *Know how to generate control signals using control units.*
- *Understand pipelining concepts.*
- *Determine the performance of memory in commercial processor.*
- *Know how to organize I/O devices.*

**Text Book :**

1 Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, McGraw Hill, 6th edition, 2012.

**References :**

1 M.Morris Mano, “Computer System Architecture”, McGraw Hill Reprint, 3rd edition, 2012.
2 William Stallings, “Computer Organization and Architecture – Designing for Performance”, Prentice Hall, 8th edition, 2010.
3 David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, Elsevier, 5th edition, 2014.
4 www.nptel.ac.in/courses/106102062.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER –V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS586** | **DESIGN AND ANALYSIS OF ALGORITHMS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic Knowledge in Data Structures*

***Objective:***

- *To learn various algorithm design techniques and analyses the efficiency for real world problems*

**UNIT – I DIVIDE AND CONQUER TECHNIQUE [ 9]**

Algorithm analysis framework – Asymptotic notations – Efficiency classes – Analysis of non-recursive and recursive algorithms – Divide and conquer: Merge sort – Quick sort – Strassen"s matrix multiplications.

**UNIT – II DECREASE AND CONQUER TECHNIQUE [ 9]**

Depth first search and breadth first search – Decrease and conquer: Insertion sort – Binary search – Selection problem – Transform and conquer: Presorting – Balanced search trees: AVL tree – 2-3 Tree.

**UNIT – III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE [ 9]**

Dynamic programming: Knapsack problem – Optimal binary search trees – Warshall"s algorithm – Floyd"s algorithm – Greedy technique: Prim"s algorithm – Kruskal"s algorithm – Dijkstra"s algorithm – Huffman trees and codes.

**UNIT – IV BACKTRACKING,BRANCH AND BOUND TECHNIQUES [ 9 ]**

Backtracking: 8-Queens – Hamiltonian circuits – Sum of subsets – Graph coloring – Branch and bound: Assignment problem – Knapsack problem – Traveling salesman problem.

**UNIT – V NP PROBLEMS AND APPROXIMATION ALGORITHMS [ 9]**

P and NP problems – NP complete problems – Approximation algorithms for NP hard problems – Travelling salesman problem: Nearest neighbor algorithm – Multifragment heuristic algorithm – Knapsack problem.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze the efficiency of algorithms.*
- *Design and analysis problems using decrease, transform and conquer techniques.*
- *Be familiar with dynamic programming and greedy techniques.*
- *Analyze various backtracking, branch and bound techniques.*
- *Gain the knowledge about P and NP Problems.*

**Text Book :**

1 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Addition-Wesley Professional, 3rd edition, 2011.

**References :**

1 Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", Prentice Hall of India, 2nd edition, 2007.
2 Sara Baase and Allen Van Gelder, "Computer Algorithms – Introduction to Design and Analysis", Pearson Education, 3rd edition, 2010.
3 A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.
4 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Universities Press, 2nd edition, 2008.
5 http://www.nptelvideos.in/2012/11/design-analysis-of-algorithms.html

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC661** | **ADVANCED DIGITAL COMMUNICATION TECHNIQUES** **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital communication systems*

***Objectives:***
- *Understand the basic digital modulation schemes*
- *Learn about OFDM and reduction mechanism for OFDM*
- *Understand the architecture of block codes*
- *Familiarize on viterbi algorithm and convolutional codes*
- *Know about equalization techniques and algorithms*

**UNIT - I DIGITAL MODULATION TECHNIQUES [9]**

Advantages of constant envelope modulation - Binary frequency shift keying - Coherent and non-coherent detection of BFSK - Minimum shift keying - Gaussian minimum shift keying - M-ary phase shift keying - M-ary quadrature amplitude modulation - M-ary frequency shift keying.

**UNIT - II OFDM [9]**

Generation of subcarriers uses the IFFT - Guard time and cyclic extension - Windowing - OFDM signal processing - Peak power problem - PAP reduction schemes: Clipping - Filtering - Coding and scrambling.

**UNIT - III BLOCK CODEDS [9]**

Architecture and performance - Binary block codes - Orthogonal, biorthogonal, transorthogonal - Shannon's channel coding theorem - Channel capacity - Matched filter - Linear block codes - Hamming, Golay, Cyclic, BCH, Reed-Solomon codes.

**UNIT - IV CONVOLUTIONAL CODES [9]**

Representation of codes using polynomial, state diagram, tree diagram, and trellis diagram - Decoding techniques using maximum Likelihood, Viterbi algorithm - Sequential and threshold methods - Turbo coding.

**UNIT - V EQUALIZATION TECHNIQUES [9]**

Band limited channels - ISI - Nyquist criterion - Controlled ISI - Partial response signals - Equalization algorithms - Viterbi algorithm - Linear equalizer - Decision feedback equalization - Adaptive equalization algorithms.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***
- *Familiarize on fundamental digital modulation mechanisms.*
- *Understand OFDM concepts and applications*
- *Analyze and apply different block codes*
- *Design convolutional codes with error probability*
- *Apply equalization techniques in communication systems*

**Text Books :**

1 M.K.Simon, S.M.Hinedi and W.C.Lindsey, " Digital communication techniques; Signaling and detection", Prentice Hall India, New Delhi.1995, Reprint edition 2003.

2 Richard Van Nee & Ramjee Prasad., "OFDM for Multimedia Communications" Artech House Publication 2001.

**Reference Books :**

1 Simon Haykin, "Digital communications", John Wiley and sons1998.

2 John G. Proakis., "Digital Communication", , McGraw Hill Publication, 2nd edition 2001.

3 Theodore S.Rappaport., "Wireless Communications", Pearson Education, 2nd edition 2002.

4 Stephen G.Wilson., "Digital Modulation and Coding", Pearson Education, First Indian Reprint, 2003.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC662** | **CRYPTOGRAPHY AND NETWORK SECURITY** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Computer Networks*

***Objectives:***

- *To gain knowledge about symmetric ciphers and encryption standards*
- *To know the various algorithms in asymmetric ciphers*
- *To learn various types of hash functions and MAC in cryptography*
- *To acquire knowledge about key management and authentication mechanisms*
- *To understand the electronic mail and IP security over internet*

**UNIT - I SYMMETRIC CIPHERS [9]**

OSI security architecture - Classical encryption techniques - Block cipher principles - Data encryption standard - Block cipher design principles - Advanced encryption standard: Structure, transformation function, key expansion.

**UNIT - II ASYMMETRIC CIPHERS [9]**

Introduction to number theory - Public key cryptography and RSA: Principles of public key cryptosystems, RSA algorithms - Diffie-Hellman key exchange - Elgamal cryptographic system - Elliptic curve arithmetic and elliptic curve cryptography.

**UNIT - III CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS [9]**

Cryptographic hash functions: Applications, two simple hash function, secure hash algorithm, SHA-3 - Message authentication codes: Requirements, functions, security of MAC, HMAC, CMAC - Digital signatures.

**UNIT - IV NETWORK AUTHENTICATION [9]**

Key management: Symmetric key distribution using symmetric and asymmetric encryption, X.509 certificates - Authentication: Remote user authentication principles, remote user authentication using symmetric and asymmetric encryption, kerberos - Secure socket layer and transport layer security.

**UNIT - V INTERNET SECURITY [9]**

Electronic mail security: Pretty good privacy, S/MIME, domain keys identified mail - IP Security: IP security overview, IP security policy and encapsulating security payload - Intrusion detection - Viruses and related threats - Firewall design principles - Wireless network security: Wireless application security overview, wireless transport layer security.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the concepts of symmetric ciphers and encryption standards*
- *Acquire knowledge about public key cryptography and RSA in asymmetric ciphers*
- *Discuss various cryptographic hash functions and MAC*
- *Examine the security at the network and transport layer*
- *Analyze electronic mail and IP security over internet*

**Text Books :**

1 William Stallings, "Cryptography and Network Security - Principles and Practices", Pearson Education, 6th edition, 2014.

2 Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw Hill, 2nd edition, 2011.

**References :**

1 Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding theory", Pearson Education, 2nd edition, 2007.

2 Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson Education, 2007.

3 Thomas Calabrese, "Information Security Intelligence: Cryptographic Principles and Applications", Thomson Delmar Learning, 2006.

4 Charles B. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", Pearson Education, 3rd edition, 2003.

5 NPTEL Link:http://nptel.ac.in/syllabus/syllabus.php?subjectId=106105031

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC663** | **SOFT COMPUTING TECHNIQUES**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To familiarize with soft computing concepts.*
- *To introduce the ideas of fuzzy logic, genetic algorithm and neural networks*
- *To learn about the different types of hybrid systems. .*
- *To be exposed to various applications of soft computing.*

**UNIT - I FUZZY SET THEORY [ 9]**

Introduction - Fuzzy Sets: Basic definition and terminology, set-theoretic operations, membership function formulation and parameterization - Fuzzy rules and fuzzy reasoning: Extension principle and fuzzy relations, Fuzzy if-then rules and Fuzzy reasoning - Fuzzy inference systems: Mamdani, Sugeno fuzzy models - Input space partitioning and fuzzy modeling

**UNIT - II GENETIC ALGORITHMS [9]**

Introduction - Biological background - Search space - GA operators - Genetic programming: Primitives, attributes, steps and applications - GA optimization problems: Fuzzy, scheduling problems, transportation location - Allocation problems with euclidean distances - Comparison of GA with other techniques - Application of GA in image processing

**UNIT - III NEURAL NETWORKS [9]**

Basic concepts - Biological neuron - Artificial neuron - Supervised learning neural networks: Perceptrons, ADALINE, Back propagation, Mutilayer perceptron and Radial basis function networks - Unsupervised learning neural networks: Competitive learning networks, Kohonen self-organizing networks,Hebbian learning, Principal component analysis and Hop field network - Adaptive Resonance Theory: Architecture of ART1, Algorithm.

**UNIT - IV NEURO FUZZY MODELING [9]**

Adaptive Neuro - Fuzzy Inference systems: Architecture, hybrid learning algorithm, learning methods that cross-fertilize ANFIS and RBFN - Coactive neuro fuzzy modeling: Framework, neuron functions for adaptive networks and neuro fuzzy spectrum

**UNIT - V APPLICATIONS [9]**

ANFIS applications: Printed character recognition, Inverse kinematics problems, automobile fuel efficiency prediction - Soft computing for color recipe prediction: CANFIS modeling, Color paint manufacturing intelligence.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Find the solution using different fuzzy logic techniques*
- *Write genetic algorithm to solve optimization problem*
- *Design the various neural networks.*
- *Integrate the various soft computing techniques*
- *Know the different applications of soft computing*

**Text Books :**

1 J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing-A Computational Approach to Learning and Machine Intelligence", Pearson Education 2004.

2 S, Rajasekaran and G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st edition, 2009.

**Reference Books :**

1 S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", Wiley Publications, 2nd edition, 2011.

2 David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" PE India, 2013.

3 Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley,3rd edition, 2010

4 Laurence Fauselt, "Fundamentals of Neural Networks Architecture, Algorithm and Applications", Pearson Education, Reprint 2005.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC664** | **ADVANCED DIGITAL SYSTEM DESIGN** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Electronics*

***Objectives:***

- *To expose the students to analyze and design synchronous sequential circuits*
- *To introduce methods to analyze and design asynchronous sequential circuits*
- *To gain knowledge about different fault diagnosis and testing methods*
- *To introduce the logics for design of programmable devices*
- *To introduce design and implementation of digital circuits using programming tools*

**UNIT - I SEQUENTIAL CIRCUIT DESIGN [9]**

Analysis and modeling of Clocked Synchronous Sequential Network (CSSN): State diagram, state table, state table assignment and reduction - Design of synchronous sequential circuit - Design of iterative circuit - ASM chart and realization using ASM.

**UNIT - II ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN [9]**

Analysis of Asynchronous Sequential Circuit (ASC) - Flow table reduction - Races in ASC - State assignment and transition table - Design of ASC - Static, dynamic and essential hazards - Data synchronizers - Mixed operating mode asynchronous circuits - Design of vending machine controller.

**UNIT - III FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS [9]**

Fault table method - Path sensitization method - Boolean difference method - Kohavi algorithm - Tolerance techniques - The Compact Algorithm - Fault in PLA - Test generation - Masking cycle - DFT schemes - Built in self test.

**UNIT - IV SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES [9]**

Programmable logic device families - Designing a synchronous sequential circuit using PLA/PAL - Realization of finite state machine using PLD - FPGA - Xilinx FPGA - Xilinx 4000.

**UNIT - V SYSTEM DESIGN USING VERILOG HDL [9]**

Hardware modeling with Verilog HDL - Data types and operators for modeling in Verilog HDL - Behavioural descriptions in Verilog HDL - HDL based synthesis - Synthesis of finite state machines - Structural modeling - Compilation and simulation of Verilog code - Test bench - Realization of combinational and sequential circuit using Verilog.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze and design synchronous sequential circuits*
- *Analyze and design asynchronous sequential circuits*
- *Know about different fault models and fault diagnosis*
- *Study the architecture of programmable logic devices and design digital circuits using programmable devices*
- *Design and use programming tools for implementing digital circuits of industry standards*

**Text Books :**

1 Charles H. Roth Jr., “Fundamentals of Logic design”, Thomson Learning, 5th edition 2011.

2 Nripendra N Biswas, “Logic Design Theory”, Prentice Hall of India, 2010.

**References :**

1 Donald G. Givone, “Digital principles and Design”, Tata McGraw Hill, 21st Reprint, 2012.

2 Stephen Brown and Zvonk Vranesic, “Fundamentals of Digital Logic with VHDL Design”, TMH, 2004.

3 S. Palnitkar , Verilog HDL – A Guide to Digital Design and Synthesis, Pearson , 2003.

4 Parag K Lala, “Digital System design using PLD”, BS Publications, 2003.

5 John M Yarbrough, “Digital Logic applications and Design”, Thomson Learning, 9th Reprint, 2012.

6 https://www.ee.usyd.edu

7 https://www.cse.iitb.ac.in

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC665** | **ARCHITECTURE OF DSPs** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Signal Processing, Microprocessor and microcontroller*

***Objectives:***

- *To understand the basic architectural elements of DSP hardware.*
- *To learn the issues of computational accuracy of DSP's.*
- *To familiarize with the programmable digital signal processors*
- *To gain knowledge of interfacing memories and I/O to the DSP devices.*
- *To know various PDSP applications.*

**UNIT - I ARCHITECTURES FOR PDSP DEVICES [9]**

Introduction - Basic architectural features - DSP computational building blocks - Bus architecture and memory - Data addressing capabilities - Address generation unit - Programmability and program execution - Features for external interfacing.

**UNIT - II COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS [9]**

Number formats for signals and coefficients in DSP systems - Dynamic range and precision - Sources of error in DSP implementations - A/D conversion errors - DSP computational errors - D/A conversion errors - Compensating filter.

**UNIT - III PROGRAMMABLE DIGITAL SIGNAL PROCESSORS [9]**

Introduction - Commercial digital signal processing devices - TMS320C54X: Data addressing modes, Memory space of processors, Program control, Instructions and programming, On- chip peripherals, Interrupts of processors, Pipeline operation of processor.

**UNIT - IV INTERFACING MEMORY AND I/O PERIPHERALS TO PDSP DEVICES [9]**

TMS320C54X: Memory space organization, External bus interfacing signals, Memory Interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access, Synchronous serial interface, CODEC interface circuit.

**UNIT - V APPLICATIONS OF PDSP DEVICES [9]**

DSP Based Bio-telemetry receiver - Speech processing system - Echo cancellation - Spectrum analyzer - Image processing system.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Acquire knowledge of DSP computational building blocks and knows how to achieve speed in DSP processor.*
- *Infer about numbering formats and errors in DSP processors for real time signals.*
- *Illustrate the features of on-chip peripheral devices and its interfacing along with the programming in DSP TMS320C54XX.*
- *Learn about Memory organization in TMS320C54X processor and interfacing of input and output devices*
- *Identify the importance of real-time DSP for a broad class of engineering applications.*

**Text Books :**

1 Avtar Singh and S.Srinivasan ,"Digital Signal Processing, Implementations using DSP Microprocessors with Examples from TMS32054xx",Cengage Learning, Reprint 2011.
2 B Venkataramani and M Bhaskar, "Digital Signal Processors Architectures, Programming and Applications", Tata-McGraw Hill, 2nd edition, 2011.

**Reference Books :**

1 Sen M. Kuo and Woon-Seng S. Gan, "Digital Signal Processors, Architectures, Implementations, Applications", Pearson Education, 2012.
2 Lapsleyand Jeff Bier , "DSP Processor Fundamentals, Architectures & Features", Wiley India Pvt Ltd, 2009.
3 John G Proakis- Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", Pearson/PHI, 4th edition, 2007.
4 Sanjit K. Mitra, "Digital Signal Processing: A Computer-Based Approach" , Tata McGraw-Hill Education, 2013

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| 16EC666 | ARM SYSTEM ARCHITECTURE<br>ELECTIVE | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Advanced Microprocessors and Microcontrollers*

***Objectives:***

- *To understand the concepts of ARM SoC architecture.*
- *To study the instruction set of ARM processor.*
- *To learn the concepts of various ARM processor cores.*
- *To gain knowledge about system development tools.*
- *To familiarize the applications of ARM processors.*

**UNIT - I PROCESSOR ARCHITECTURE AND DESIGN [9]**

Introduction: Processor architecture and organization - Abstraction in hardware design - MU0 a simple processor - Instruction set design - Processor design and trade-offs - Reduced Instruction Set Computer (RISC) - Design for low power consumption - ARM architecture: Acorn RISC machine - Architectural inheritance - ARM programmer's model - ARM development tools.

**UNIT - II ARM INSTRUCTION SET [9]**

Introduction - Exceptions - Conditional execution - Branch, branch with link and exchange - Software interrupt - Data processing instructions - Multiply instructions - Single word and unsigned byte data transfer instructions - Half word and signed byte data transfer instructions - Multiple register transfer instructions - Swap memory and register instructions - Coprocessor instructions - Thumb instruction set.

**UNIT - III ARM PROCESSOR CORES ORGANIZATION AND IMPLEMENTATION [9]**

Cores: ARM7TDMI - ARM8 - ARM9TDMI - ARM10TDMI - ARM Organization: 3 stage pipeline - 5 stage pipeline - Instruction execution - Implementation - Coprocessor interface.

**UNIT - IV ARCHITECTURAL SUPPORT FOR SYSTEM DEVELOPMENT [9]**

ARM memory interface - Advanced Microcontroller Bus Architecture (AMBA) - ARM reference peripheral specification - Hardware system prototyping tools - ARMulator - JTAG boundary scan test architecture - ARM debug architecture - Embedded trace - Signal processing support.

**UNIT - V EMBEDDED APPLICATIONS OF ARM [9]**

VLSI Ruby II advanced communication processor - VLSI ISDN subscriber processor - One C™VWS22100 GSM chip - VLSI bluetooth baseband controller - ARM 7500 and ARM 7500FE - ARM 7100 - SA 1100.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the processor architecture.*
- *Develop the programming on ARM.*
- *Understand the concepts of various ARM processor cores.*
- *Identify development tools for architectural support.*
- *Develop the applications of ARM.*

**Text Books :**

1 Steve Furber, "ARM System-on-Chip Architecture", Pearson Education, 2012.

2 Andrew N.Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide, Designing and Optimizing System Software", Morgan Kaufmann, 2008.

**References :**

1 David Seal, "ARM Architecture Reference Manual", Pearson Education, 2007.

2 J. R. Gibson, "ARM Assembly Language - An Introduction", Lulu Enterprises Incorporated, 2011.

3 Stephen Bo Furber, "ARM System on ship Architecture", Addison-Wesley 2000.

4 Dave Jaggar, "ARM Architecture Reference Manual", Prentice Hall PTR, 2005.

5 http://nptel.ac.in/courses/108102045/5 , w*ww.arm.com*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC667** | **ADVANCED SIGNAL PROCESSING**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Signals and Systems, Digital Signal Processing*

***Objectives:***

- *To review the fundamentals of stochastic signals and system.*
- *To modeling of spectrum analysis using nonparametric and parametric approaches*
- *To explore the concepts of multirate signal processing and filter banks.*
- *To understand the design of wavelets using Lifting scheme.*

**UNIT - I DISCRETE RANDOM PROCESS [9]**

Introduction to discrete random process - Ensemble averages, stationary and ergodic processes, autocorrelation and auto covariance matrices, white noise, bias and consistency, power spectral density, spectral factorization.

**UNIT - II SPECTRAL ESTIMATION [9]**

Nonparametric methods: Periodogram, modified periodogram, Barlett's method, Welch method - Performance comparison for nonparametric methods - Parametric methods: Autoregressive, moving average and autoregressive moving average - Levinson recursion.

**UNIT - III LINEAR ESTIMATION AND PREDICTION [9]**

Forward and Backward linear prediction, Filtering - FIR Wiener filter: Filtering, linear prediction and noise cancellation - IIR Wiener filters: Non causal and causal filter, discrete Kalman filter.

**UNIT - IV MULTIRATE SIGNAL PROCESSING [9]**

Decimation - Interpolation - Multi-stage implementation of multirate system - Filter design and implementation for sampling rate conversion - Direct form FIR filter structures - Implementation of digital filter banks - Sub band coding - Quadrature mirror filter.

**UNIT - V WAVELET TRANSFORM AND ITS APPLICATION [9]**

Filter banks and wavelets - Properties of wavelets and scaling functions - Construction of wavelets - Applications of wavelet: Speech and audio coding, multirate techniques with sensors.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze the fundamentals of random process*
- *Understand linear prediction and analyze the different types of optimum linear filters*
- *Estimate the power spectrum using parametric methods and nonparametric methods*
- *Ability to understand the concepts of sampling rate conversions as a part of signal processing techniques.*
- *Acquire knowledge about wavelet transforms and the applications in various signal processing applications.*

**Text Books :**

1 Monson H Hayes, "Statistical Digital Signal processing and Modeling", Wiley Student Edition, 2009.

2 Fliege N. J., "Multirate digital signal processing: Multirate systems filter banks, wavelets", Wiley, 2007.

**References :**

1 John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, 4th edition, 2007.

2 R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Pearson, 2nd edition, 2004.

3 Dimitris G.Manolakis et al., "Statiscal and Adaptive Signal Processing", McGraw Hill, New York, 2005.

4 Online course: http://nptel.ac.in/courses/117101001/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16MA091** | **NUMERICAL METHODS**<br>**ELECTIVE - (Common to EC & IT)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *No prerequisites needed for enrolling into the course.*

***Objectives:***

- *To study the concepts and applications in solving polynomial and transcendental equations, simultaneous linear equations numerically and to acquire the knowledge in Interpolation techniques, numerical differentiation and integration.*
- *To understand the concepts of numerical solutions to ordinary differential equations and numerical solutions of boundary values problems*

**UNIT - I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS [9]**

Solutions to polynomials and transcendental equations – Newton‟s method, Regula-falsi method – Solutions to simultaneous linear equations – Gauss Elimination method – Gauss Jordon method - Gauss-Seidel method.

**UNIT - II INTERPOLATION AND APPROXIMATION [9]**

Newton‟s forward and backward difference interpolation techniques (equal intervals) – Lagrange‟s interpolation – Inverse Lagrange‟s‟ interpolation and Divided difference method (for unequal intervals).

**UNIT - III NUMERICAL DIFFERENTIATION AND INTEGRATION [9]**

Numerical differentiation using Newton‟s forward and backward interpolation methods – Numerical integration by trapezoidal and Simpson‟s 1/3rd and 3/8$^{th}$ rules – Double integrals using trapezoidal rule.

**UNIT - IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS [9]**

Solving first order Ordinary Differential Equations by Taylor series**–** Euler‟s and Modified Euler‟s Method – fourth order Runge-Kutta Method – Milne‟s predictor and corrector method.

**UNIT - V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS [9]**

Solution of one dimensional heat equation by Bender - Schmidt and Crank - Nicolson method – Solution of One dimensional wave equation – solution of Poisson equations.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Solve polynomial, transcendental equations and simultaneous linear equations numerically.*
- *Apply the interpolation techniques*
- *Developing their skills in numerical differentiation and integration*
- *Solve ordinary differential equations numerically*
- *Understand and apply the concepts of numerical solution to boundary value problems.*

**Text Books :**

1 Dr.B.S.Grewal. “ Numerical Methods in Engineering and Science” , Khanna Publishers, New delhi, 9$^{th}$ edition, 2010.

2 Burden R.L & Faires J.D , “ Numerical Methods” , 9$^{th}$ edition, cengage learning 2016.

**Reference Books :**

1 Sukhendu dey and Shishir gupta, “ Numerical methods” , Tata McGraw Hill Publishing Company, 2013.

2 Dr.M.K.Venkataraman, “ Numerical Methods in science and Engineering”, National Publishing Company, 2$^{nd}$ edition, 2012.

3 V.Gerald, “ Applied Numerical Analysis” , Pearson Education, 6$^{th}$ edition, 2012.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS001** | **.NET FRAMEWORK TECHNOLOGIES** | | | | |
| | **ELECTIVE - (Common to CS & EC)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of Object oriented programming.*

***Objectives:***

- *To impart the fundamental concepts of C# and .NET framework.*
- *To learn the basic object oriented aspects of c#*
- *To create and populate windows forms.*
- *To use various controls in a windows forms application.*
- *To create ASP .Net application.*

**UNIT - I .NET FRAMEWORK AND C # [ 9]**

.Net strategy – Origins of .Net strategy – .Net framework – Base classes – User and program interfaces – Visual studio .Net – .Net languages – Benefits – Characteristics of C# – Applications of C# – Difference between C# and other Object Oriented Languages – Literals – Data types – Operators – Expressions – Statements – Looping: For each – Methods – Arrays – Strings.

**UNIT - II OBJECT ORIENTED ASPECTS OF C# [ 9]**

Class – objects – Inheritance – Polymorphism – Operator overloading – Delegates – Events and exceptions.

**UNIT - III APPLICATION DEVELOPMENT ON .NET [ 9]**

Controls – Menus and context menus – Forms – Building windows application – Relational databases and SQL – ADO .Net object model – Getting started with ADO .Net – ADO managed providers – Data bound controls – Changing database records – ADO .Net and XML.

**UNIT - IV WEB BASED APPLICATION DEVELOPMENT ON .NET [ 9]**

Introduction to ASP .Net – Creating ASP .Net Site – ASP .Net working with page – ADO .Net data provider – ADO .Net data containers – Data binding model – Creating bindable grids of data – ASP .Net catching – Programming web services.

**UNIT - V DEPLOYING .NET APPLICATION [ 9]**

Assemblies – Versioning – Attributes – Reflection – Viewing metadata – Type discovery – Reflecting on a type – Marshalling – Remoting – Server object types – Specifying with an interface – Building a server – Building a client – Using single call threads.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Solve the basic problems using object and classes in C#.*
- *Demonstrate the concepts of OOPs.*
- *Design application programs using .Net Components.*
- *Understand and design of ASP .Net websites*
- *Build a server and client with an interface*

**Text Books :**

1 E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, 3rd edition, 2010.(Unit I and II)

2 J. Liberty, Ian Griffiths and Mathew Adams, “Programming C# 4.0”, O'Reilly, 2010.(Unit III,IV and V)

**References :**

1 Andrew Troelsen, “Pro c# 5.0 and the .net 4.5 frameworks”, 6th edition, A press, 2010.

2 Herbert Schildt, “The complete reference C# 4.0”, Tata McGraw- Hill, 2010.

3 Art Gittleman, “Computing with C# & .Net Framework”, Jones & Bartlett Publishers, 2011.

4 nptel.ac.in/courses/105108081/module9/lecture39/lecture.pdf

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS003** | **OPERATING SYSTEMS**<br>**ELECTIVE - (Common to CS, EC & EE)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of Computer Architecture.*

***Objective:***

- *To gain the knowledge about the operating systems concepts such as process, CPU scheduling, deadlocks, process synchronization, memory management, disk and file.*

**UNIT – I BASIC OPERATING SYSTEMS CONCEPTS [ 9]**

Introduction to operating systems – Computer system architecture: Single processor systems – Multiprocessor systems operating system structure – Process memory and storage management – Protection and security – Computing environments – Operating system services – System calls: Types of system calls – System programs – Process: process concept – Process scheduling – Operation on processes – Cooperating process - Inter process communication.

**UNIT – II THREADS AND CPU SCHEDULING [ 9]**

Threads: Overview – Multithreading models – Thread issues – CPU scheduling: Basic concepts – Scheduling criteria – Scheduling algorithms – Multiple processor scheduling – Real-Time CPU scheduling – Process synchronization: The critical section problem – Peterson‟s solution – Synchronization hardware – Semaphores – Classic problems of synchronization.

**UNIT – III DEADLOCKS AND MEMORY MANAGEMENT [ 9]**

Deadlocks :System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock – Memory management: background – Swapping – Contiguous memory allocation – Segmentation – Paging – Structure of the page table.

**UNIT – IV VIRTUAL MEMORY AND FILE SHARING INTERFACE [ 9 ]**

Virtual memory: Demand paging – Copy-on-Write – Page replacement – Allocation of frames – Thrashing – File Concepts: Access methods – Directory structure – File system mounting – File sharing – Protection.

**UNIT – V FILE SYSTEM STRUCTURE AND STORAGE STRUCTURE [ 9]**

File system structure – File system implementation: Directory implementation – Allocation methods – Free space management – Mass storage structure : Disk structure – Disk scheduling – Disk management – Swap-space management – RAID structure – I/O systems: I/O hardware – Kernel I/O subsystem – Case study: The linux system.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Identify the components and their functionalities in the operating system*
- *Determine the efficiency of CPU scheduling algorithms.*
- *Evaluate the performance of various memory management techniques.*
- *Be familiar with virtual memory and file access methods.*
- *Study the performance of disk management and file system*

**Text Book :**

1 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons,9th edition, 2013.

**References :**

1 Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall, 3rd edition, 2008.

2 D. M. Dhamdhere, “Operating Systems”, Tata McGraw-Hill Education India, 2nd edition, 2006.

3 Paul J. Deitel and David R. Choffnes, “Operating Systems”, Prentice Hall, 3rd edition, 2003.

4 http://nptel.ac.in/courses/106108101 .

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC761** | **TELECOMMUNICATION AND SWITCHING NETWORKS** **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Analog communication systems*

***Objectives:***

- *To gain knowledge about telecommunication systems.*
- *To learn the concepts of space switching, time switching and combination switching*
- *To understand the concepts in network synchronization*
- *To familiarize with blocking probability, holding service time distributions in speech and data networks*

**UNIT - I TELECOMMUNICATION OVERVIEW [ 9]**

Introduction: Evolution of telecommunication, basics of switching system, manual switching system, Telecommunication networks - Strowger switching systems: Signaling tones, strowger switching components, step-by-step switching, design parameters - Cross bar switching: Touch tone dial telephone, principles of cross bar switching and cross bar switch configurations, Centralized and distributed stored program control, software architecture, application software, enhanced services offered by stored program control.

**UNIT - II DIGITAL SWITCHING [ 9]**

Introduction to switching functions: Space division switching - Time division switching - Two dimensional switching: STS switching, TST switching, No-4 ESS Toll switch - Digital cross-connect systems - Digital switching in an analog environment.

**UNIT - III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT [ 9]**

Timing: Timing recovery, phase locked loop, clock instability, Jitter measurements, systematic jitter - Timing inaccuracies: Slips, asynchronous multiplexing - Network synchronization - Network control - Network management.

**UNIT - IV TELEPHONE OPERATIONS [ 9 ]**

Introduction: Subscriber loop system, switching hierarchy and routing, transmission plan, transmission systems, numbering plan, charging plan, signaling techniques - Digital subscriber access: Digital loop carrier systems, universal digital loop carrier systems, integrated digital loop carrier systems, next-generation digital loop carrier systems - Local microwave distribution service - Digital satellite services.

**UNIT - V TRAFFIC ANALYSIS [ 9]**

Traffic characterization: Arrival distributions, holding time distributions - Loss systems - Network blocking probabilities: End-to-End blocking probabilities overflow traffic - Delay systems: Exponential service times, constant service times, finite queues.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe the different types of switching systems.*
- *Recognize different types digital switching.*
- *Recall network synchronization control and management.*
- *Study the different types telephone operations*
- *Identify the traffic characterization and analysis.*

**Text Books :**

1 Bellamy John, “Digital Telephony”, John Wily & Sons, 3rd edition, 2009.

2 Thiagarajan Viswanathan, “Telecommunication Switching Systems and Networks”, PHI, 2nd edition, 2015.

**Reference Books :**

1 J.E.Flood, “Telecommunication Switching, Traffic and Networks”, Pearson Education Ltd, 2007.

2 Syed R Ali, “Digital Switching Systems”, McGraw-Hill, 2008.

3 W. Stalling, “Data and Computer Communications”, Prentice Hall, 2013.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC762** | **CMOS ANALOG CIRCUITS**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *VLSI Design*

***Objectives:***

- *To gain knowledge about fundamentals of analog ICs*
- *To understand the concept of CMOS device modeling*
- *To familiarize the concept of CMOS amplifiers*
- *To learn about comparators and switched capacitor circuits*
- *To understand the operation of DAC and ADC converters*

**UNIT - I FUNDAMENTALS OF ANALOG ICs [9]**

Analog integrated circuit design - Notation, symbology and terminology - Analog signal processing - Example of analog VLSI mixed signal circuit design - PN junction - MOS transistor - Passive components - Other considerations of CMOS technology - Integrated circuit layout.

**UNIT - II CMOS DEVICE MODELING [9]**

Simple MOS large signal model - Parameters - Small signal model - Computer simulation models - Subthreshold MOS model - SPICE simulation - MOS switch - Diode/Active resistor - Current sinks and sources - Current mirrors - Current and voltage references.

**UNIT - III CMOS AMPLIFIERS [9]**

Inverters - Differential amplifiers - Design of CMOS op amps - Compensation of op amps - Design of two stage op amps - Power supply rejection ratio of two stage op amps.

**UNIT - IV COMPARATORS AND SWITCHED CAPACITOR CIRCUITS [9]**

Characterization of a comparator - Two stage, open-loop comparators - Other open-loop comparators - Switched capacitor circuits - Amplifiers - Integrators.

**UNIT - V DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS [9]**

Characterization of digital to analog converters - Parallel digital to analog converters - Extending the resolution - Serial digital to analog converters - Characterization of analog to digital converters: Serial, medium and high speed.

**Total = 45 Periods**

***Course Outcomes On completion of this course, the student will be able to***

- *Analyze the concept of analog ICs*
- *Understand the different types of CMOS device modeling*
- *Design various types of CMOS amplifiers*
- *Know the fundamentals of comparator and capacitor circuits*
- *Analyze the concept about DAC and ADC converters*

**Text Books :**

1 Phillip E.Allen, Douglas R.Holberg, "CMOS Analog Circuit Design", Oxford University Press, 3rd edition, 2011.

2 Gray, Meyer, Lewis, Hurst, "Analysis and design of Analog IC's", Willey International, 4th edition, 2002.

3 Behzad Razavi, "Design of Analog CMOS Integrated Circuits", McGraw Hill Higher Education, International edition,2001.

**References :**

1 Liu Kramer, Indiveri, Delbruck, Douglas, "Analog VLSI: Circuits and Principles", Pearson Education, 2004.

2 Weste and Harris, "CMOS VLSI Design", Pearson Education, 3rd edition, 2005.

3 D.A.Pucknell and K.Eshraghian, "Basic VLSI Design", PHI, 3rd edition, 2003.

4 NPTEL Course Link:http://nptel.ac.in/courses/117101105/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER -VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC763** | **FUNDAMENTALS OF NANO TECHNOLOGY** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Engineering physics*

***Objectives:***

- *To learn the evolution of nanotechnology.*
- *To understand the different diversity techniques in nano systems.*
- *To familiarize the different types of nano particles and its characterization.*
- *To familiarize the application of nano technology in biotechnology.*
- *To gain knowledge about the uses of nano technology in industrial applications.*

**UNIT - I INTRODUCTION [9]**

Nano science - Evolution - Electron microscopes - Scanning probe microscopes - Optical microscopes for nano technology - X ray diffraction - Associated techniques.

**UNIT - II DIVERSITY IN NANO SYSTEMS [9]**

Fullerenes - Synthesis and purification - Mass spectrometry and ion/molecule reactions - Chemistry of fullerenes - Endo-hedral chemistry - Conductivity and super conductivity in doped fullerenes - Carbon nanotubes - Synthesis and purification - Electronic structure - Transport - Mechanical - Physical properties applications - Semiconductor quantum dots - Synthesis and applications.

**UNIT - III METAL NANO PARTICLES AND NANO SHELLS [9]**

Method of preparation - Characterization - Functions and applications - Core shell nanoparticles: Types of system - Characterization - Functions and applications - Nano shells: Types, characterization, properties and applications.

**UNIT - IV EVOLVING INTERFACES IN NANO [9]**

Nano biology - Interaction between bio molecules and nano particle surfaces - Applications of nano in biology - Microprobes for medical diagnosis and biotechnology - Current status - Nano sensors - Order from chaos - Applications - Smart dust sensors - Nano medicines various kinds - Future directions.

**UNIT - V IMPACT OF NANOTECHNOLOGY ON SOCIETY [9]**

Introduction - Industrial revolution to Nano revolution - Implications of Nano sciences and Nano technology on society - Issues - Nano policies and institutions - Nanotech and war - Nano arms race - Harnessing nano technology for economic and social development.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the evolution and associated techniques of nano science.*
- *Learn the diversities in nano systems.*
- *Study of nano particles, shells and their Characterization.*
- *Understand the importance of nanotechnology in biotechnology.*
- *Able to know the applications of nanotechnology in industry and society.*

**Text Books :**

1 PradeepT,"Nano: The Essentials, Understanding Nano Science and Nano technology",TMH,1st edition, 2007.
2 Mick Wilson, Kamali Kannargare., Geoff Smith, "Nano technology: Basic Science and Emerging technologies", Overseas Press, 2005.

**Reference Books :**

1 Nalwa H S, "Encyclopedia of Nanoscience and Nanotechnology",Vol1-10, American Scientific Publishers, 2004.
2 Rao C N R and Govindaraj A, "Nanotubes and Nanowires", Royal Society of Chemistry, 2005.
3 Richard A L Jones, "Soft Machines: Nanotechnology and Life", Oxford University Press, 2008
4 Charles P. Poole, Frank J. Owens, "Introduction to Nanotechnology", Wiley Inter science, 2003.
5 Mark A. Ratner, Daniel Ratner, "Nanotechnology: A gentle introduction to the next Big Idea", Pearson Education, 2003

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC764** | **COMPUTER HARDWARE AND INTERFACING**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Computer Architecture*

***Objectives:***

- *To learn the fundamental concepts of CPU and memory.*
- *To study the various types of input and output devices.*
- *To gain knowledge about different storage media.*
- *To learn the different functions of Motherboard.*
- *To understand the basic concepts of system bus.*

**UNIT - I CPU AND MEMORY [9]**

CPU essentials - Processor modes - Modern CPU concepts - Architectural performance features - CPU overclocking - Overclocking the system - Overclocking the Intel processors - Essential memory concepts - Memory organizations - Memory packages - Modules - Logical memory organizations - Memory types - Memory techniques - Selecting and installing memory.

**UNIT - II INPUT OUTPUT DEVICES AND PERIPHERALS [9]**

I/O devices - Keyboard and mouse interfaces - CRT controller - Display - Video and LCD displays - Graphics controller - Audio / Video cards - Printers - Interface standards.

**UNIT - III STORAGE DEVICES [9]**

Introduction - Magnetic tapes - Standards - Floppy disk - Controllers and standards - Optical disk - CDROM disk and drive formats - High capacity magnetic storage techniques: RAID - Hard disk – Formats - Controllers and interface standards.

**UNIT - IV PC ARCHITECTURE [9]**

Operating systems and boot process - BIOS - Personal computer architecture - Motherboard - Chipsets - Interfacing peripheral devices - Device drivers - Introduction: Personal computers, workstations, network computers.

**UNIT - V SYSTEM BUS [9]**

Buses - Industry Standard Architecture (ISA), Peripheral Component Interconnect (PCI) - Accelerated Graphics Port (AGP) - Plug and play systems - SCSI concepts.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the concepts of central processing unit and memory.*
- *Gain knowledge about the various input/output devices and audio/ video cards.*
- *Learn various data storage concepts and its standards.*
- *Identify the steps to verify the system resources and core components to improve the system process in PC architecture.*
- *Analyze the concept of various system bus standards.*

**Text Books :**

1 Stephen J.Bigelow, “Troubleshooting Maintaining & Repairing of PCs”, TMH, 2008.

2 B.Govindarajulu, “IBM PC and Clones hardware trouble shooting and maintenance”, Tata McGraw-Hill, 2008.

**Reference Books :**

1 Mike Meyers, “Introduction to PC Hardware and Troubleshooting”, Tata McGraw-Hill, 2005.

2 Craig Zacker & John Rourke, “The complete reference: PC hardware”, Tata McGraw-Hill, 2007.

3 D.V.Hall, “Microprocessors and Interfacing Programming and Hardware”, McGraw Hill, 2006.

4 Mueller.S, Upgrading and repairing PCS, Pearson Education, 21st edition, 2013.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC765** | **HIGH PERFORMANCE NETWORKS**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Computer networks*

***Objectives:***

- *To learn the network elements and its architecture.*
- *To learn about Asynchronous Transfer Mode and its functionalities.*
- *To familiarize the concept of optical network.*
- *To know the integrated and differentiated architecture.*
- *To learn the concepts of advanced networks.*

**UNIT - I NETWORK CONCEPTS [ 9]**

Introduction - Principles - Applications - Services: Network elements- Network mechanisms - Layered architecture: layered network - Limitations.

**UNIT - II ATM [ 9]**

Features of ATM: Connection oriented services, Fixed cell size, Statistical multiplexing, Allocating resources - Addressing, signaling and routing - ATM header structure - ATM adaptation layer - Management and control.

**UNIT - III OPTICAL NETWORKS [ 9]**

Overview of optical networks - Basic optical network devices - Optical links - WDM systems - Large scale optical switches - Optical routers - Optical LANs - Optical paths and networks.

**UNIT - IV INTEGRATED AND DIFFERENTIATED SERVICES [ 9]**

Integrated services architecture: Approach, components, services - Queuing discipline: Fair queuing, processor sharing, bit-round fair queuing, generalized processor sharing, weighted fair queuing - Random early detection - Differentiated services.

**UNIT - V ADVANCED NETWORK CONCEPTS [ 9]**

VPN: Remote access, site-to-site, tunneling and point to point protocol -Security in VPN - MPLS: Operation, routing, tunneling and use of FEC, traffic engineering and MPLS based VPNs - Overlay networks: Peer to peer connection - Network Performance analyzer.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Analyze the performance of computer networks.*
- *Understand the functionalities of ATM network.*
- *Understand the concept of optical network protocols and connecting devices.*
- *Understand the various queuing disciplines and differentiated services.*
- *Compare the connection-oriented services with reference to MPLS & VPN.*

**Text Books :**

1 Jean Warland, Pravin Varaiya, “High Performance Communication Networks”, Morgan Kaufmann Publishers, 2nd edition, 2011.
2 Nader F. Mir, “Computer and Communication Networks”, Dorling Kindersley, 3rd edition, 2009.

**Reference Books :**

1 Lenon Garcia Widjaja, “Communication Networks”, Tata McGraw-Hill, 2nd edition, 2007.
2 Othmarkyas, “ATM Networks”, International Thomson Computer Press, 2nd edition, 1993.
3 Ranier Handel Manfred N Huber, Stefan Schroder, “ATM Networks - Concepts, Protocols Applications", Addison Wesley, 3rd edition, 2006.
4 Irvan Pepelnjk, Jim Guichard & Jeff Apcar, “MPLS and VPN Architecture”, Cisco Press, Volume 1 and 2, 2007.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC766** | **WIRELESS SENSOR NETWORK** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Wireless Networks*

***Objectives:***

- *To learn the fundamentals of wireless sensor networks.*
- *To familiarize with the architecture of sensor nodes.*
- *To familiarize about different protocols and power saving techniques.*
- *To understand the infrastructure establishment.*
- *To learn the fundamentals of wireless sensor networks platform and tools.*

**UNIT - I OVERVIEW OF WIRELESS SENSOR NETWORKS [ 9]**

Introduction - Issues and challenges - Characteristics requirements - Advantages - Applications of sensor networks - Difference between mobile Ad-hoc and sensor networks.

**UNIT - II SENSOR NODE ARCHITECTURES [ 9]**

Single node architecture: Layered, clustered - Hardware components - Energy consumption of sensor nodes, operating systems and execution environments - Network architecture: Sensor network scenarios - Optimization goals and figure of merit - Gateway concepts.

**UNIT - III NETWORKING OF SENSORS [ 9]**

Data dissemination and gathering - MAC protocols for wireless sensor networks - Low duty cycle protocols and wakeup concepts - S-MAC - Wakeup radio concepts - Assignment of MAC addresses - Routing protocols: Energy efficient unicast, broadcast and multicast - Low energy adaptive clustering hierarchy - Power efficient data gathering.

**UNIT - IV SENSOR INFRASTRUCTURE [ 9]**

Topology control - Clustering - Time synchronization - Localization and its services: Ranging techniques, range based localization algorithms - Sensor tasking and control: Task driven sensing, roles of sensor nodes and utilities, information based sensor tasking.

**UNIT – V SENSOR NETWORK PLATFORMS AND TOOLS [ 9]**

Operating systems for wireless sensor networks - Sensor node hardware - Berkeley motes, programming challenges - Node-level software platforms - Node-level simulators - State-centric programming.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basics of wireless sensor networks.*
- *Discuss the capabilities and limitations of nodes in a sensor network.*
- *Discuss the MAC protocols and routing protocols for WSN.*
- *Explain the various tasks to be performed to establish the necessary infrastructure.*
- *Understand the sensor network hardware, software platforms and application design methodologies.*

***Text Books :***

1 Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley, 2011.

2 Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks – An Information Processing Approach” Elsevier, Reprint 2012.

***Reference Books :***

1 C.Siva Ram Murthy, B.S.Manoj, “Ad hoc Wireless Networks Architectures and Protocols”, 2nd edition, Pearson Education, 19th impression, 2012.

2 Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2009.

3 Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, Reprint 2012.

4 Bhaskar Krishnamachari, “Networking Wireless Sensors”, Cambridge Press, 2005.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC767** | **ASIC DESIGN** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Digital electronics, Electronics devices and circuits, VLSI design.*

***Objectives:***

- *To acquire knowledge about different types of ASICs design*
- *To familiar with the various logic cells and input output devices*
- *To study about various types of programmable ASICs architectures and interconnects*
- *To comprehend the low power design techniques and methodologies*
- To e*ducate on floor planning, placement and routing*

**UNIT – I INTRODUCTION TO ASIC, CMOS LOGIC AND ASIC LIBRARY [9]**

Types of ASICs – Design flow – CMOS transistors – Combinational logic cell – Sequential logic cell – Data path logic cells – Transistors as resistors – Transistor parasitic capacitance – Logical effort.

**UNIT – II LOGIC CELLS AND I/O CELLS [9]**

Antifuse – Static RAM, EPROM and EEPROM technology – Xilinx LCA – Altera FLEX – Altera MAX – DC & AC inputs and outputs – Clock and power inputs – Xilinx I/O blocks.

**UNIT – III INTERCONNECT AND DESIGN SOFTWARE [9]**

Xilinx LCA – Xilinx EPLD – Altera MAX 5000 and 7000 – Altera MAX 9000 – Altera FLEX – Design systems – Half gate ASIC – Schematic entry – Low level design languages – PLA tools – EDIF.

**UNIT – IV LOGIC SIMULATION AND SYNTHESIS, PARTITIONING [9]**

Types of simulation – Verilog and logic synthesis – VHDL and logic synthesis – System partitioning – FPGA partitioning – Partitioning methods: Examples, constructive and iterative partitioning, K-L algorithm.

**UNIT – V FLOOR PLANNING, PLACEMENT AND ROUTING [9]**

Floor planning: goals, objectives – Placement: Terms and definitions, goals, objective, placement algorithms, simple placement examples – Physical design flow – Global routing: Goals, objectives, methods, between blocks, inside flexible blocks – Detailed routing: Goals, objective, measurement of channel density, left-edge algorithm, area routing algorithm – Circuit extraction – DRC.

**Total =45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Describe the different phases of the design flow for digital ASICs*
- *Recognize need for programmable devices*
- *Recall interconnection done in various vendors of FPGA*
- *Describe the synthesis and partitioning*
- *Recall IC fabrication techniques of CMOS circuits*

**Text Books :**

1 M.J.S.Smith, “Application Specific Integrated Circuits”, Pearson, 2012.

2 Farzad Nekoogar and Faranak Nekoogar, “From ASICs to SOCs: A Practical Approach”, Prentice Hall, 2003.

**References :**

1 Wayne Wolf,“FPGA-Based System Design”, Pearson, 2009.

2 John V. Oldfield, Richard C. Dorf ,“Field Programmable Gate Arrays”, John-Wiley, 2008.

3 Rajsuman.R, “System-on-a-Chip Design and Test”, Artech House Publishers, 2009.

4 Laung-Terng Wang, Yao-Wen Chang, Kwang-Ting Cheng, Morgan, “Electronic Design Automation: Synthesis, Verification, and Test,” Kaufmann Publishers, 2009.

5 *S.Srinivasan, ―VLSI Circuits, NPTEL Course.*

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC768** | **ELECTRONIC SYSTEM DESIGN** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Electronic devices and circuits*

***Objectives:***

- To g*ain the fundamental knowledge on power supplies and amplifiers.*
- *To analyze data acquisition systems.*
- *To understand the concept of PCB design methods.*
- *To learn RF design methodologies.*
- *To familiarize with PCB technology trends.*

**UNIT - I DESIGN OF POWER SUPPLIES AND AMPLIFIERS [9]**

Voltage regulations: Introduction - O/P resistance and load regulation - Types of regulators - Voltage converters. Power amplifiers: Basic consideration - Class A, class B and class AB Power amplifier - Power MOSFET.

**UNIT - II DATA ACQUISITION SYSTEMS [9]**

Digital to analog converters: Introduction, R-2R resistor ladder networks, CMOS current switches,16-bit monolithic DAC,DAC speed and settling time, Analog to digital converters: ADC transfer characteristic and quantization error, parallel comparator ADC, successive approximation ADC.

**UNIT - III PRINTED CIRCUIT BOARD [9]**

Layout planning: General considerations - PCB sizes - Layout approaches - Layout, General rules and parameters: Resistance, capacitance, inductance, conductor spacing, cooling requirements and package density, layout check.

**UNIT - IV DESIGN RULES FOR DIGITAL & ANALOG CIRCUIT PCB's [9]**

Digital circuit PCB: Introduction – Reflection - Cross talk - Around and supply line noise - Electromagnetic interference from pulse type EM fields. Analog circuit PCB: Component placing - Signal conductor - Supply and ground conductors.

**UNIT - V PCB TECHNOLOGY TRENDS [9]**

Introduction - Fine line conductors with ultra thin copper foil - Multilayer board - Multi wire board - Subtractive additive process - Semi additive process - Additive process - Flexible PCB - Metal core circuit boards - Mechanical milling of PCB.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- Understand *the fundamental knowledge on power supplies and amplifiers.*
- *Analyze data acquisition systems.*
- *Able to understand the concept of PCB design methods.*
- *Apply RF design methodologies to construct PCB boards.*
- *Familiarize with PCB technology trends.*

**Text Books :**

1 Reinhold Luduig and Pavel Bretchko, "RF Circuit Design – Theory and Applications", Pearson Education, 2012.
2 Walter C.Bosshart, "Printed circuit Boards – Design and Technology", Tata McGraw-Hill, 2012.

**Reference Books :**

1 Keith H.Billings, "Handbook of Switched Mode Supplies" McGraw-Hill Publishing Co., 1989.
2 Michael Jaacob, "Applications and Design with Analog Integrated Circuits", PHI, 2nd edition, 1993.
3 F.H.Mitchell, "Introduction to Electronic Design", Prentice Hall of India, 1991.
4 Sydney Soclof, "Applications of Analog Integrated Circuits", Prentice Hall of India, 1990.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC769** | **EMBEDDED SYSTEM DESIGN** **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Microprocessor and Microcontroller*

***Objectives:***

- *To learn the basics of embedded architecture.*
- *To study the concepts of computing platform and design analysis.*
- *To familiarize the concepts of operating systems.*
- *To gain knowledge about the concepts of hardware accelerators and networks.*
- *To know about the system design techniques in embedded system.*

**UNIT - I INTRODUCTION TO EMBEDDED ARCHITECTURE [9]**

Complex systems and microprocessors - Embedded system design process - Formalisms for system design - Design example: Model train controller - Instruction sets preliminaries - ARM processor - CPU: Programming input and output - Supervisor mode, exception and traps - Coprocessors - Memory system mechanism - CPU performance - CPU power consumption.

**UNIT - II COMPUTING PLATFORM AND DESIGN ANALYSIS [9]**

CPU buses - Memory devices - I/O devices - Component interfacing - Design with microprocessors - Development and debugging - Components for embedded programs - Model of programs - Assembly, linking and loading - Basic compilation techniques - Program optimization - Program validation and testing.

**UNIT - III PROCESSES AND OPERATING SYSTEMS [9]**

Multiple tasks and multi processes - Preemptive real time operating systems - Priority based scheduling - Inter process communication mechanisms - Evaluating operating system performance - Power management and optimization for processes.

**UNIT - IV HARDWARE ACCELERATORS & NETWORKS [9]**

CPUs and accelerators - Multiprocessor performance analysis - Consumer electronics architecture - Distributed embedded architecture - Networks for embedded systems - Network based design - Internet enabled systems - Vehicles as networks - Sensor networks.

**UNIT - V SYSTEM DESIGN TECHNIQUES [9]**

Design methodologies - Requirement analysis - Specifications - System analysis and architecture design - Quality assurance - Software tools for embedded system development - Design example: Alarm clock, software modem, elevator controller.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the embedded architecture.*
- *Analyze the optimization and validation of programming.*
- *Understand the concept of processes in operating system.*
- *Familiarize the use of accelerators.*
- *Analyze the system design techniques.*

**Text Books :**

1 Wayne Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Morgan Kaufmann Publisher, 2nd edition, 2011.

**Reference Books :**

1 David E Simon, “An Embedded Software Primer”, Pearson Education, 2007.

2 K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dreamtech Press, 2009

3 Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata McGraw Hill, 2004.

4 Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.

5 Nptel.ac.in/courses/108102045.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC770** | **ROBOTICS ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital signal processing and Digital image processing*

***Objectives:***

- *To understand the fundamentals of robotics.*
- *To acquire the knowledge of robotics in computer based vision.*
- *To understand the various sensing methods used in robots.*
- *To learn the various algorithms and planning's and networks in Robotics.*
- *To study the design aspects of 4 axis and 6 axis Robot.*

**UNIT - I INTRODUCTION TO ROBOTICS [9]**

Motion - Potential function - Road maps - Cell decomposition sensor and sensor planning - Kinematics - Forward and inverse kinematics - Transformation matrix and DH transformation - Inverse kinematics - Geometric methods and algebraic methods - Non holonomic constraints.

**UNIT - II COMPUTER VISION [9]**

Projection - Optics, projection on the Image plane and radiometry - Image processing - Connectivity - Images - Gray Scale and binary images - Blob filling – Thresholding - Histogram - Convolution - Digital convolution and filtering and Masking techniques - Edge detection - Mono and stereo vision - Face detection.

**UNIT - III SENSORS AND SENSING DEVICES [9]**

Introduction to various types of sensor - Resistive sensors - Range sensors - LADAR (laser distance and ranging), Sonar - Radar and Infra-red - Introduction to sensing - Light sensing - Heat sensing - Touch sensing and position sensing.

**UNIT - IV ARTIFICIAL INTELLIGENCE [9]**

Uniform Search strategies - Breadth first, Depth first, Depth limited - Iterative and deepening depth first search and bidirectional search - The A* algorithm - Planning - State-space planning - Plan - space planning - Graph plan/Sat plan and their comparison - Multi-agent planning 1 and Multi-agent planning 2 - Probabilistic reasoning - Bayesian networks - Decision trees and bayes net inference.

**UNIT - V INTEGRATION TO ROBOT [9]**

Building of 4 axis or 6 axis robot - Vision system for pattern detection - Sensors for obstacle detection - AI algorithms for path finding - Decision making.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basis of Robotics.*
- *Learn the technologies applicable for Robotics in computer based vision.*
- *Able to understand the different sensing elements of robot.*
- *Understand the algorithms applicable for robotics.*
- *Able to develop 4-axis and 6-axis robot*

**Text Books :**

1 Duda, Hart and Stork, Pattern Recognition. Wiley-Inter science, 2000.

2 Mallot, Computational Vision: Information Processing in Perception and Visual Behavior" MIT Press, 2000.

**Reference Books :**

1 Stuart Russell and Peter Norvig, "Artificial Intelligence-A Modern Approach" Pearson Education Series in Artificial Intelligence, 2004

2 Robert Schilling and Craig. " Fundamentals of Robotics, Analysis and control", PHI, 2003.

3 Forsyth and Ponce, "Computer Vision, A modern Approach", Pearson Education, 2003.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC771** | **CAD FOR VLSI**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** VLSI Design

***Objectives:***

- *To study various design tools in VLSI*
- *To understand various algorithms based on graph theory*
- *To know about optimization techniques*
- *To learn the algorithms for placement, partitioning and floor planning*
- *To gain knowledge on routing*

**UNIT - I INTRODUCTION TO VLSI DESIGN AND TOOLS [9]**

VLSI Design problem - Design domains - Design action - Design methods and technologies - Algorithmic and system design - Structural and logic design - Transistor level design - Layout design - Verification methods - Design management tools.

**UNIT - II GRAPH THEORY AND ALGORITHMS [9]**

Terminology - Data structures for the representation of graphs - Computational complexity - Examples of graph algorithms: Depth first search - Breadth first search - Dijkstra"s shortest path algorithm - Prim"s algorithm for minimum spanning tree - Tractable and intractable problems: Combinatorial optimization problems - Decision problems - Complexity classes - NP completeness and NP hardness - Consequences.

**UNIT - III COMBINATORIAL OPTIMIZATION AND LAYOUT COMPACTION [9]**

Unit size placement problem - Backtracking - Branch and bound - Dynamic programming - Integer linear programming - Design rules - Symbolic layout - Problem formulation: Applications of compaction - Informal problem formulation - Graph theoretical formulation - Maximum distance constraints - Algorithms for constraint graph compaction: Longest path algorithm for DAGs - Longest path in graphs with cycles - Liao wong algorithm - Bellman ford algorithm.

**UNIT - IV PLACEMENT, PARTITIONING AND FLOOR PLANNING [9]**

Circuit representation - Wire length estimation - Types of placement problems - Placement algorithms - Constructive placement - Iterative improvement - Kernighan Lin partitioning algorithm – Floor planning concepts - Terminology and floor planning representation - Optimization problems in floor planning - Shape functions and floor planning sizing.

**UNIT - V ROUTING AND ALGORITHMS [9]**

Types of local routing problems - Area routing - Channel routing: Channel routing models - Vertical constraint graph - Horizontal constraints and left edge algorithm - Channel routing algorithms - Global routing - Standard cell layout - Building block layout and channel ordering - Algorithms for global routing - Problem definition and discussion - Efficient rectilinear steiner tree construction - Local transformations for global routing.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the concepts of VLSI design tools*
- *Analyze graph theory algorithms for optimization*
- *Identify the techniques for layout compaction*
- *Understand algorithms of placement, partitioning and floor planning*
- *Apply the algorithms on routing*

**Text Books :**

1 S.H. Gerez, “Algorithms for VLSI Design Automation”, John Wiley & Sons, 2002.
2 N.A. Sherwani, “Algorithms for VLSI Physical Design Automation” Kluwar Academic Publisher, 2002.

**References :**

1 Drechsler R., “Evolutionary Algorithms for VLSI CAD”, Kluwer Academic Publishers, 2010.
2 Christopher Michael and Mohammed Ismail, “Statistical Modeling of Computer-Aided Design of MOS VLSI Circuits”, Kulwer Academic Publishers, 1993.
3 D.Hill, D. Shugard, J. Fishburn and K. Keutzer, “Algorithms and Techniques for VLSI Layout Synthesis”, Kluwer Academic Publishers, 1989.
4 http://nptel.ac.in/courses/106106088/
5 http://nptel.ac.in/courses/106106089/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC772** | **WIRELESS NETWORKS**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Computer networks*

***Objectives:***

- *To learn the fundamentals of wireless networks and its operation*
- *To understand the voice and data oriented networks*
- *To know about various wireless LAN and WAN concepts*
- *To learn about various network operations*
- *To acquire knowledge in infrastructure less Networks*

**UNIT - I INTRODUCTION [9]**

Fundamentals of wireless communication - Spectrum overview - Air interface design - Signal propagation - Path loss modeling and signal coverage - Effects of multipath and doppler - Characteristics of the wireless channel - Optical wireless networks.

**UNIT - II NETWORK PRINCIPLES [9]**

Wireless medium access alternatives - Fixed assignment access for voice-oriented networks - Random access for data oriented networks - Integration of voice and data traffic - Wireless network topologies.

**UNIT - III WIRELESS LAN [9]**

Fundamentals of WLAN - IEEE 802.11 WLAN Standard, architecture and services, physical layer - MAC sub layer - MAC management sub layer - IEEE standards - HIPER LAN - Bluetooth - Home RF - Wireless ATM - WBRAN.

**UNIT - IV NETWORK OPERATIONS [9]**

Wireless network operation - Mobility management - Radio resources and power management - Security in wireless networks - Wireless WAN - GSM - CDMA technology - IS-95 and IMT-2000 - Mobile data networks - CDPD networks - GPRS - Wi Fi - LTE / LTEA.

**UNIT - V INFRASTRUCTURELESS NETWORK [9]**

Introduction to ad hoc networks, characteristics, issues - Medium access scheme - Routing - Multicasting - Transport layer protocols - Pricing scheme - Quality of service provisioning - Self organization - Security - Addressing and service discovery - Energy management - Scalability - Deployment considerations - Applications - Wireless sensor networks : Introduction, characteristics, issues, applications - Comparison of Adhoc and wireless sensor networks.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Acquire knowledge about wireless communication and to analyze about different propagation models*
- *Analyze integration of voice and data traffic and wireless network topologies*
- *Discuss about the architecture and services of wireless LAN*
- *Understand wireless network operation ,CDPD and mobile data networks*
- *Explain the concept of the Adhoc routing protocols, transport layer protocol and its challenges for providing QOS*

**Text Books :**

1 Kaveh Pahlavan and Prashant Krishnamurthy, “Principles of Wireless Networks”, PHI, 2005.

2 Siva Ram Murthy.C and B.S.Manoj, “Ad Hoc Wireless Networks Architectures and Protocols”, Pearson Education, 2nd edition, 2014.

**Reference Books :**

1 Rappaport. T.S., “Wireless communications”, Pearson Education, 7th impression, 2012.

2 Dharma Prakash Agarwal and Qing AnZeng, “Introduction to Wireless and Mobile Systems”, Thomson Learning, 2nd edition, 2007.

3 Jochen Schiller, “Mobile Communications”, Pearson Education, Reprint 2011.

4 William Stallings, “Wireless Communication and Networks”, Pearson Education, Delhi, 2002.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS786** | **LEARNING IT ESSENTIAL BY DOING** **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of computer programming*

***Objectives:***

- *To learn the fundamentals computer architecture and system software.*
- *To study problem solving using programming and algorithms.*
- *To explore the knowledge in relational database management systems.*
- *To describe approach to object oriented analysis and design.*
- *To learn about client-server model of computing.*

**UNIT - I COMPUTER ARCHITECTURE AND SYSTEM SOFTWARE [ 9]**

Fundamentals of computer architecture: Introduction – Organization of a small computer central processing unit – Execution cycle – Instruction categories – Measure of CPU performance – Memory Input/output device – Bus – Addressing modes. System software – Assemblers – Loaders and linkers – Compilers and interpreters - Operating system – Introduction – Memory management schemes – Process management scheduling – Threads.

**UNIT - II PROBLEM SOLVING AND USER INTERFACE [ 9]**

Problem solving with algorithms – Programming styles – Coding standards and best practices - Introduction to C programming – Testing and debugging – Code reviews – System development methodologies – Software development models - User interface design – Introduction – Process – Elements of UI design and reports.

**UNIT - III DATABASE MANAGEMENT SYSTEMS [ 9]**

Relational database management systems – Data processing – Database technology – Data models – ER modeling Concept – Notations – Extended ER features – Logical database design – Normalization – SQL – DDL statements – DML statements – DCL statements – Writing simple queries – SQL tuning techniques – Embedded SQL.

**UNIT - IV OBJECT ORIENTED ANALYSIS AND DESIGN [ 9]**

Objected oriented concepts – Object oriented programming – UML class diagrams – Relationship – Inheritance – Abstract Classes – Polymorphism – Object oriented design methodology – Common base class – Alice tool – Application of OOC using Alice tool.

**UNIT - V COMPUTER NETWORKS [ 9]**

Client server computing – Internetworking – Computer networks – Working with TCP/IP – IP address – Sub netting – DNS – VPN – proxy servers World Wide Web – Components of web application – Browsers and Web Servers – URL – HTML – HTTP protocol – Web Applications – Application servers – Web Security.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the concepts of system software like assembler, loader and linker.*
- *Design and test simple programs in C language*
- *Design simple data store using RDBMS concepts and implement*
- *Design and develop demos using Alice tool.*
- *Develop a website with all learned concepts*

**Text Book:**

1 Introduction to Information Technology, Pearson Education, ITL Education solutions Ltd., 2012.

**References:**

1 Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, “Operating System Concepts”, JW & S, 9th edition, 2013.

2 R.G.Dromey, “How to Solve it by Computer”, Pearson Education, India, 2008

3 Herbert Schildt, “C – The Complete Reference”, Tata McGraw-Hill, 2013.

4 Behrouz A.Forouzan, “Data Communications and Networking” TATA McGraw Hill Education, 5th edition, 2013.

5 Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, McGraw Hill, 6th edition, 2012.

6 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, TMH, 6th edition, 2015.

7 http://alice.org

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS787** | **DBMS AND PHP** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge in data structures.*

***Objectives:***

- *To expose the students to the fundamentals of Database Management Systems and relational model.*
- *To train the students with ER diagrams and SQL*
- *To make the students to understand the fundamentals of Transaction Processing and Concurrency control*
- *To learn Basics of PHP Programming with Database Connectivity*
- *To explore the knowledge in MySQL.*

**UNIT - I BASIC CONCEPTS OF DBMS [ 9]**

File Systems Organization – Purpose of Database System – Data models – Components of DBMS – Relational Algebra. Logical Database Design: Relational DBMS – Codd's Rule – Entity Relationship model – Normalization – First to Fifth Normal Form – Functional Dependencies.

**UNIT - II SQL AND QUERY OPTIMIZATION [ 9]**

SQL Standards – Data types – Database Objects – DDL – DML – DCL – TCL – Embedded SQL – Static Vs Dynamic SQL – Query Optimization: Query Processing and Optimization – Heuristics and Cost Estimates in Query Optimization.

**UNIT - III TRANSACTION PROCESSING AND CONCURRENCY CONTROL [ 9]**

Introduction – Properties of Transaction – Serializability – Concurrency Control – Locking Mechanisms – Two Phase Commit Protocol – Deadlock.

**UNIT - IV PHP [ 9]**

Introduction – Incorporating PHP with HTML – Variables – Constants – Data Types – Expressions – Operators – Conditionals – Looping – Statements – Functions – Arrays – OOP – String Manipulation and Regular Expression Date and Time Functions.

**UNIT - V PHP WITH MYSQL [ 9]**

Querying MySQL Using PHP – Creating a Login File – Connect to MySQL – Deleting a record – Displaying the Form – Querying the Database – Form Handling – Building Forms – Retrieving Submitted Data – Using Cookies in PHP – HTTP Authentication – Using Sessions.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Use the relational model, ER diagrams.*
- *Apply SQL to create and manipulate a relational database*
- *Demonstrate the use of normalization and apply concurrency control and recovery mechanisms for practical problems*
- *Learn basics of PHP*
- *Demonstrate purpose of PHP in web development.*

**Text Books :**

1 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, "Database System Concepts", TMG, 6th edition, 2015.

2 Robin Nixon, "Learning PHP, MySQL, JavaScript and CSS", O'REILLY, 2nd edition, 2013.

**References :**

1 Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", PE, 6th edition, 2010.

2 Raghu Ramakrishnan, "Database Management Systems", Tata McGraw Hill, 4th edition, 2010.

3 J Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2015.

4 http://freevideolectures.com/Course/2668/Database-Management-System.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC861** | **SATELLITE COMMUNICATION** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Analog Communication Systems and Digital Communication Systems*

***Objectives:***

- *To learn satellite systems in relation to other terrestrial systems and its orbits.*
- *To gain knowledge of space segment and earth segment components.*
- *To know about satellite link analysis.*
- *To learn the information of satellite access by various users.*
- *To know about the different applications of satellite.*

**UNIT - I SATELLITE ORBITS [9]**

Introduction to satellite communications: Kepler‟s laws, Newton‟s law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-geostationary orbits - Look angle determination - Limits of visibility - Eclipse - Sub satellite point - Sun transit outage - Launch vehicles and propulsion: Principles of rocket propulsion, injection into final orbit, launch vehicles for commercial satellites.

**UNIT - II SPACE AND EARTH SEGMENTS [9]**

Space segment: Structure, primary power, thermal subsystem, telemetry, tracking and command subsystem, attitude control, propulsion subsystem, transponders.

Earth segment: Transmitters, receivers, tracking systems, terrestrial interface - Receive only TV systems - Master antenna TV systems - Transmit-receive earth station.

**UNIT - III SATELLITE LINK DESIGN [9]**

Link power budget equation - Satellite link: Up link and down link, C/N ratio - Interference analysis: Intermodulation, inter symbol, cross polarization - Terrestrial - Propagation consideration - Noise consideration.

**UNIT - IV SATELLITE ACCESS [9]**

Modulation and multiplexing: Voice, data, video, analog and digital transmission systems - Single access - Multiple access: FDMA: Preassigned and demand assigned FDMA, TDMA: Preassigned and demand assigned TDMA, reference bursts, CDMA: Direct sequence spread spectrum, the code signal, acquisition and tracking, spectrum spreading and despreading.

**UNIT - V SATELLITE APPLICATIONS [9]**

INTELSAT series - INSAT - VSAT - Mobile satellite services: GSM, GPS, INMARSAT – Satellite navigational system - Direct Broadcast Satellites (DBS) - Direct to Home Broadcast (DTH) - Digital Video Broadcast (DVB) - Digital Audio Broadcast (DAB) - Business TV (BTV) - Google Earth.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the principles of the various models of orbital mechanisms and launching procedures of satellite.*
- *Gain knowledge about spacecraft sub system and earth segment used in satellite communication.*
- *Analyze the fundamental digital satellite link including link budgets, interference and noise consideration.*
- *Discuss different modulation, multiplexing techniques and multiple access techniques in satellite communication*
- *Understand the importance of satellite communications for applications like INSAT, INTELSAT, VSAT and mobile satellite services.*

**Text Books :**

1 Dennis Roddy, “Satellite Communications”, McGraw Hill International, 4th edition, Reprint 2013.

2 Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, “Satellite Communication Systems Engineering”, PHI, Reprint 2013.

**References :**

1 Tri T. Ha, “Digital Satellite Communication”, Tata McGraw Hill, 2nd edition, Reprint 2015.

2 Anil.K.Maini, Varsha Agraval, “Satellite Communications”, Wiley, Reprint 2011.

3 M.Richharia, „Satellite Communication Systems-Design Principles”, Macmillan 2003.

4 Timothy Pratt, Charles Bostian & Jeremy Allnutt, “Satellite Communications”, John Wiley, Reprint 2011.

5 http://nptel.ac.in/courses/117105131

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC862** | **MEMS TECHNOLOGY**<br>**ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Electronic devices, Electronic circuits.*

***Objectives:***

- *Know the basics of MEMS materials and its fabrication techniques.*
- *Understand the actuation mechanisms for MEMS devices.*
- *Understand the operations of MEMS components*
- *Learn the operation of MEMS switches and micro relays.*
- *Understand the concepts of MEMS phase shifters and oscillators.*

**UNIT - I MEMS MATERIALS AND FABRICATION TECHNIQUES [9]**

Metals - Semiconductors - Intrinsic characteristics of MEMS - Essential electrical and mechanical concepts - Thin films for MEMS and their deposition techniques - Materials for polymer MEMS - Bulk micromachining for silicon based MEMS - Silicon surface micro sensing for MEMS - Micro stereo lithography for polymer MEMS.

**UNIT - II ACTUATION MECHANISMS FOR MEMS DEVICES [9]**

Electrostatic sensors and actuators - Parallel plate capacitance - Inter digitated finger capacitors - Applications of comb drive devices - Thermal sensing and actuation - Piezoelectric sensing and actuation.

**UNIT - III MEMS COMPONENTS AND SYSTEMS [9]**

Electrostatic parallel plate capacitors - Inter digital capacitors - MEMS switched capacitors - Discrete position control - Inductor model - Micromachining - Thick metal layers - Substrate etching - Self-assembly techniques - Solenoid type copper inductors - Reconfigurable MEMS networks - Filters - Antennas - Matching networks - Reconfigurable antennas - Quasi-optical components - Tunable resonator fundamentals.

**UNIT - IV MEMS SWITCHES AND MICRO RELAYS [9]**

Introduction - Switch parameters - Basics of switching - Switches for RF and microwave applications - Bistable micro relays and microactuators - Dynamics of the switch operation - MEMS switch design - Modeling and evaluation -MEMS inductors and capacitors - Electro mechanical transducers - Microsensing for MEMS.

**UNIT - V MEMS FILTERS AND PHASE SHIFTERS [9]**

Introduction - Modeling of mechanical filters - Micromechanical filters - Surface acoustic wave filters - Millimeter - Wave tunable filters - Bulk acoustic wave filters - Reflection type phase shifters - Switched line phase shifters - Loaded line phase shifters - Switched networks - Antenna feeds.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the basics of MEMS materials and its fabrication techniques.*
- *Understand the actuation mechanisms for MEMS devices.*
- *Operate of MEMS components*
- *Learn the operation of MEMS switches and micro relays.*
- *understand the concepts of MEMS phase shifters and oscillators*

**Text Books :**

1 Vijay K.Varadan, K.J. Vinoy, K.A. Jose., "RF MEMS and their Applications", John Wiley and sons, LTD, 2003.

2 Chang Liu, “Foundations of MEMS” Pearson Education, 3rd edition, 2012.

**Reference Books :**

1 Mohamed Gad-el-Hak, “MEMS: Introduction and Fundamentals”, CRC press. 2005.

2 Gabriel M. Rebeiz, "RF MEMS Theory, Design &Technology", Wiley Interscience, 2003.

3 Hector J. De Los Santos, "RF MEMS Circuit Design for Wireless Communications", Artech House, 2002.

4 Ville Kaajakari, “Practical MEMS: Design of microsystems, accelerometers, gyroscopes, RF MEMS, optical MEMS, and microfluidic systems”, Willy publications, 2003.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC863** | **ADHOC NETWORKS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Wireless Communication/Networks*

***Objectives:***

- *To understand the basics of Ad hoc networks.*
- *To learn the various medium access and network protocols.*
- *To familiarize security, energy and cross layer design for Ad hoc networks.*

**UNIT - I OVERVIEW OF ADHOC NETWORKS [ 9]**

Introduction - Characteristics - Issues in ad hoc networks, Comparison of cellular, adhoc and sensor networks, applications - Adhoc mobility models: Random based mobility model, temporal dependency model.

**UNIT - II MEDIUM ACCESS PROTOCOLS [ 9]**

MAC protocols - Design issues, goals - Classification: Contention based protocols with reservation and scheduling algorithms - Other MAC protocols: Multichannel, CSMA MAC protocol.

**UNIT - III NETWORK ROUTING PROTOCOL [ 9]**

Routing protocols - Design issues - Classification: Proactive routing, reactive routing, hybrid routing - Multicast routing: Tree based routing, energy efficient multicasting - Hierarchical routing.

**UNIT - IV TRANSPORT LAYER AND SECURITY [ 9]**

Transport layer - Issues - classification - TCP over ad hoc networks - Security: Vulnerabilities, potential attacks- Prevention techniques: Intrusion detection, key management, secure routing protocols.

**UNIT - V CROSS LAYER DESIGN AND ENERGY MANAGEMENT [ 9]**

Cross layer feedback - Design goals - Cross layer optimization subsystem - Energy management: Need for energy management - Classification: Battery management scheme, system power management.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- Discuss the issues, applications and mobility models of adhoc networks
- *Recall the design issues of a MAC protocol and analyze its challenges.*
- *Understand the design and classification of routing protocols*
- *Discuss the issues of transport layer and security of adhoc networks.*
- *Understand the optimization of cross layer design and energy management.*

**Text Books :**

1 C.Siva Ram Murthy, B.S.Manoj, "Ad hoc Wireless Networks Architectures and Protocols", 2nd edition, Pearson Education, 17th impression, 2012.

2 Prasanth Mohapatra, Srikanth V.krishnamurthy," Adhoc Network Technologies and Protocols", Springer 2005.

**References :**

1 Charles E. Perkins, "Ad hoc Networking", Addison - Wesley, 6th impression 2012.

2 T. Camp, J. Boleng, and V. Davies, "A Survey of Mobility Models for Ad Hoc Network Research", Wireless Communication and Mobile Computing, Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.

3 V.T. Raisinhani and S.Iyer, "Cross Layer Design Optimization in Wireless Protocol Stacks" Elsevier, Computer Communications, vol. 27 no. 8, pp 720.-724, 2004.

4 T.G.Basavaraju, C.Puttamadappa," Adhoc Mobile Wireless Networks", Auerbach Publications- Taylor and Francis group,2008.

5 E-content: www.it.iitb.ac.in/~sri/talks/manet.ppt

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC864** | **TELECOMMUNICATION SYSTEM MODELING AND SIMULATION ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital communication systems and Probability and stochastic process*

***Objectives:***

- *To understand the random variables and random process applied to telecommunication system.*
- *To learn the methods of system modeling and simulation.*
- *To gain knowledge about performance evaluation in simulation.*

**UNIT - I SIMULATION METHODOLOGY [ 9]**

Introduction - Aspects of methodology - Performance estimation - Sampling frequency - Low pass equivalent models for band pass signals - Multicarrier signals - Non-linear and time varying systems - Post processing - Basic graphical techniques and estimations

**UNIT - II SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESSES [ 9]**

Generation of random numbers and sequence - Gaussian and uniform random numbers - Correlated random sequences - Testing of random numbers generators - Stationary and uncorrelated noise - Goodness of fit test.

**UNIT - III MODELING OF COMMUNICATION SYSTEMS [ 9]**

Radio frequency and optical sources - Analog and digital signals - Communication channel and models - Free space channels - Multipath channel and discrete channel noise interference - MIMO Channel.

**UNIT - IV ESTIMATION OF PERFORMANCE MEASURE FROM SIMULATION [ 9]**

Quality of estimator - Estimation of SNR - Probability density function and bit error rate - Monte carlo method - Importance sampling method - Extreme value theory.

**UNIT - V SIMULATION AND MODELING METHODOLOGY [ 9]**

Simulation environment - Modeling considerations - Performance evaluation techniques - Error source simulation - Validation - Case studies: Simulations of light wave communication link and satellite system

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Recall the different types of the simulation methodology.*
- *Recall random variables and random processes.*
- *Recognize modeling of communication systems.*
- *Understand the estimation of performance measure from simulation.*
- *Recognize performance evaluation techniques and validation.*

**Text Books :**

1 MC.Jeruchim, P.Balaban and Sam K Shanmugam, “Simulation of communication systems: Modeling, Methodology and Techniques”, Plenum Press, 2nd edition, 2002.
2 Averill.M.Law and W.David Kelton, “Simulation Modeling and Analysis”, McGraw-Hill Inc., 5th edition, 2014.

**Reference Books :**

1 Geoffrey Gorden, “System Simulation”, Prentice Hall of India, 2nd edition, 2007.
2 W.Turin, “Performance Analysis and Modeling of Digital Transmission Systems”, Computer Science Press, 2004.
3 Jerry banks, John S.Carson, Barry L.Nelson, David M.Nicol and S.Shahabudeen “Discrete Event System Simulation”, Prentice Hall of India, first reprint, 5th edition, 2013.
4 William H. Tranter, K. Sam shanmugam, Theodore s. Rappaport, K.Kurt L.Kosbar, “Principles of Communication Systems Simulation”, Pearson Education Pvt Ltd, 2004.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC865** | **OPTICAL NETWORKS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Fiber optical communication*

***Objectives:***

- *To know the basics of optical system components.*
- *To familiar with the concept of various network architectures.*
- *To learn the concepts of WDM network design.*
- *To understand the packet switching and various access networks.*
- *To gain knowledge about network management functions and safety measures.*

**UNIT - I OPTICAL SYSTEM COMPONENTS [9]**

Introduction - Components: Couplers, isolators, circulators, multiplexers, filters, optical amplifiers, switches and wavelength converters.

**UNIT - II OPTICAL NETWORK ARCHITECTURES [9]**

SONET/SDH - Metropolitan Area Networks - Layered architecture - Broadcast and select networks: Topologies, media access control protocols - Test beds: Lambdanet, NTT's, rainbow and starnet.

**UNIT - III WDM NETWORK DESIGN [9]**

WDM network Elements: Optical line terminal, optical line amplifiers, optical add/drop multiplexers, optical cross connects - Wavelength routing networks: Node designs, optical layer cost tradeoffs, routing and wavelength assignment, architectural variations.

**UNIT - IV PACKET SWITCHING AND ACCESS NETWORKS [9]**

Photonic packet switching: OTDM, multiplexing and demultiplexing, synchronization, header processing, buffering, burst switching - Access network: Future access networks, optical access network architectures.

**UNIT - V CONTROL AND MANAGEMENT [9]**

Network management functions - Optical layer services and interference - Configuration management - Performance management - Fault management - Optical safety - Service interface.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the fundamental of optical network elements.*
- *Discuss the various issues in SONET/SDH and learn the concept of broadcast and select network.*
- *Design and analyze the various optical networks and calculate routing, wavelength assignment for online and offline model.*
- *Analyze the concept of photonic packet switching and access network.*
- *Gain knowledge about network management functions and optical safety measures in network design.*

**Text Books :**

1 Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks: A Practical Perspective", Harcourt Asia Pt Ltd., 3rd edition, 2011.

2 C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks: Concept, Design and Algorithms", Prentice Hall of India, Ist edition, 2002.

**References :**

1 Uyless Black. "Optical Networks: Third Generation Transport Systems", 1st edition PE, 2008.

2 Biswanath Mukherjee, "Optical WDM Networks", Springer, 2006.

3 John R. Vacca, **"**Optical networking Best practices Handbook" wiely publications, 2007.

4 P.E. Green, Jr., "Fiber Optic Networks", Prentice Hall, 3rd edition, NJ, 1993.

5 http://nptel.ac.in/syllabus/syllabus.php?subjectId=117102011.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC866** | **MULTIMEDIA COMPRESSION AND COMMUNICATION ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Digital Image processing*

***Objectives:***

- *To gain the knowledge of multimedia components.*
- *To learn the various compression techniques.*
- *To familiarize the concept of VoIP technology.*
- *To understand the concept of multimedia networking.*

**UNIT - I MULTIMEDIA COMPONENTS [9]**

Introduction - Multimedia skills - Multimedia components and their characteristics: Text, sound, images, graphics, animation, video, hardware.

**UNIT - II AUDIO AND VIDEO COMPRESSION [9]**

Audio compression: DPCM, Adaptive PCM, Adaptive predictive coding, Linear predictive coding, Code excited LPC, perpetual coding - Video compression: Principles - H.261, H.263, MPEG 1, 2, 4 - Eco cancellation and noise Cancellation.

**UNIT - III TEXT AND IMAGE COMPRESSION [9]**

Compression principles - Source encoders and destination encoders - Lossless and lossy compression - Entropy encoding - Source encoding - Text compression: Static Huffman coding, Dynamic coding - Arithmetic coding - Lempel Ziv-welsh compression - Image compression.

**UNIT - IV VoIP TECHNOLOGY [9]**

Basics of IP transport - VoIP challenges - H.323/ SIP - Network architecture, Protocols, Call establishment and release - VoIP and SS7 - Quality of service - CODEC methods - VoIP application**.**

**UNIT - V MULTIMEDIA NETWORKING [9]**

Streamed stored and audio - Making the best effort service - Protocols for real time interactive applications - Distributing multimedia - Beyond best effort service - Scheduling and policing mechanisms - Integrated services - Differentiated services - RSVP.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand the concept of characteristics and elements of multimedia.*
- *Classify various audio and video compression techniques.*
- *Compare the various text and audio compression techniques.*
- *Discuss various methods used in VoIP technology.*
- *Understand the issues and services that arise when designing and building multimedia Networking.*

**Text Books :**

1 Fred Halshall, "Multimedia Communication - Applications, Networks, Protocols and Standards", Pearson education, 2009.

2 Kurose and W.Ross "Computer Networking" A Top down approach, PE, 7th edition, 2017.

**Reference Books :**

1 Tay Vaughan, "Multimedia: Making it Work", Tata McGraw Hill, 8th edition, 2011.

2 K.R. Rao, Zoran. S.Bojkovic, D.A. Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Pearson education, 2012.

3 Ranjan Parekh, "Principles of Multimedia", Tata McGraw Hill, 2011.

4 Mark A. Miller. P.E, "Voice over IP Technologies", Willey, 1st edition, 2002.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC867** | **EMBEDDED NETWORKS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Computer networks*

***Objectives:***

- *To learn the basics of ethernet.*
- *To gain knowledge on embedded ethernet communications.*
- *To study the embedded ethernet protocols.*
- *To learn the basics of CAN.*
- *To understand the CAN configuration.*

**UNIT - I ETHERNET BASICS [9]**

Elements of a network - Inside Ethernet - Building a network: Hardware options - Cables, connections and network speed - Design choices: Selecting components - Ethernet controllers.

**UNIT - II EMBEDDED ETHERNET [9]**

Internet in local and internet communications - Inside the Internet protocol - Exchanging messages using UDP and TCP - Serving web pages with dynamic data, serving web pages that respond to user Input.

**UNIT - III EMBEDDED ETHERNET PROTOCOLS AND SECURITY [9]**

Sending and receiving messages - Email protocols - File Transfer Protocol (FTP): FTP clients and server - Inside the file transfer protocol- Keeping devices and network secure: Limiting access with password - Rules for securing device and local network.

**UNIT - IV EMBEDDED NETWORK REQUIREMENTS [9]**

Code requirements - Communication requirements - Introduction to CAN open: CAN open standard - Object directory - Electronic data sheets and device - Configuration files - Service data objectives - Network management CAN open messages - Device profile encoder.

**UNIT - V CAN CONFIGURATION [9]**

CAN open configuration - Evaluating system requirements, choosing devices and tools - Configuring single devices - Overall network configuration - Network simulation - Network commissioning - Advanced features and testing.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Gain knowledge on basic concepts of Ethernet.*
- *Analyze the ethernet communications.*
- *Understand the concepts of network security.*
- *Explain the Controller Area Network.*
- *Identify the configuration of CAN.*

**Text Books :**

1 Jan Axelson “Embedded Ethernet and Internet Complete”, Penram Publications, 2007.

2 Glaf P.Feiffer, Andrew Ayre and Christian Keyold, “Embedded Networking with CAN and CAN open”, Embedded System Academy, 2005.

**References :**

1 Frank Vahid, Givargis, “Embedded Systems Design: A Unified Hardware/Software Introduction”, Wiley Publications, 3rd edition, 2011.

2 Behrouz A.Forouzan, “Data Communication and Networking”, Tata McGraw Hill 2nd edition, 2008.

3 Konrad Etschberger, “Controller Area Network”, IXXAT Automation GmbH, 2001.

4 http://www.can-cia.org/can.

5 http://www.semiconductors.bosch.de/en/20/can/3-literature.asp.

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER - VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16EC868** | **VLSI SIGNAL PROCESSING** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisites:*** *Digital signal processing, VLSI design*

***Objectives:***

- *To provide a comprehensive coverage of techniques for designing efficient DSP architectures*
- *To analyze the retiming and unfolding algorithms for various DSP applications*
- *To familiar the architectural optimization, both at block level as well as logic level*
- *To analyze the concept about bit level arithmetic architecture different DSP Modules*

**UNIT - I** **INTRODUCTION TO DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING OF FIR FILTERS** **[9]**

Introduction to DSP systems: Typical DSP algorithms, dataflow and dependence graphs - Critical path - Loop bound - Iteration bound: Longest path matrix algorithm - Pipelining and parallel processing of FIR filters.

**UNIT - II** **RETIMING, ALGORITHMIC STRENGTH REDUCTION** **[9]**

Retiming: Definitions and properties - Unfolding: Algorithm, properties and applications - Algorithmic strength reduction in filters and transforms (Qualitative analysis only).

**UNIT - III** **FAST CONVOLUTION, PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS** **[9]**

Fast convolution: Cook -Toom algorithm and modified Cook - Toom algorithm-Pipelined and parallel recursive filters: Look ahead pipelining in first order IIR filters, look ahead pipelining with power of 2-decomposition and clustered look ahead pipelining - Parallel processing of IIR filters: Combined pipelining and parallel processing of IIR filters.

**UNIT - IV** **SCALING, ROUNDOFF NOISE, BIT-LEVEL ARITHMETIC ARCHITECTURES** **[9]**

Scaling operation - Round off noise - State variable description of digital filters: Scaling and round–off noise computation - Round off noise in pipelined IIR filters - Parallel multipliers: Parallel multiplication with sign extension, parallel carry ripple and carry save multipliers.

**UNIT - V** **NUMERICAL STRENGTH REDUCTION, SYNCHRONOUS, WAVE AND ASYNCHRONOUS PIPELINES** **[9]**

Numerical strength reduction: Sub expression elimination, multiple constant multiplications, iterative matching - Synchronous pipelining and clocking styles: Clock skew in edge triggered single phase clocking and two phase clocking - Wave pipelining - Asynchronous pipelining: Bundled data versus dual rail protocol.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Understand and analysis the concept of pipelining and other processing for DSP applications*
- *Analyze the concept about retiming algorithm*
- *Ability to analyze a different algorithm used for pipelining*
- *Gain the knowledge about noise modeling architecture based systems*
- *Analyze the concept of various types of pipelining process*

**Text Books :**

1 Keshab K.Parhi, “VLSI Digital Signal Processing Systems, Design and implementation”, John Wiley, Inter science, 2008.

2 U.Meyer-Baese, “Digital Signal Processing with Field Programmable Gate Arrays”, Springer, 2nd edition, 2004.

**References :**

1 Gary Yeap, “Practical Low Power Digital VLSI Design”, Kluwer Academic Publishers, 2000.

2 Mohammed Isamail and Terri Fiez, “Analog VLSI Signal and Information Processing”, McGraw– Hill, 2001.

3 S.Y.Kung, H.J.White House,T.Kailath, “VLSI and Modern Signal Processing”, PHI, 2000.

4 Jose E.France and Yannisvidis, “Design of analog – Digital VLSI circulation for telecommunication and signal processing”, Prentice Hall, 2000.

5 http://nptel.ac.in/syllabus/syllabus.php?subjectId=117101006

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS886** | **SOFTWARE ENGINEERING ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge in OOPs*

***Objectives:***

- *To understand the different steps of the software engineering life cycle and design methods.*
- *To study the concept of requirement engineering.*
- *To learn about design within the context of software engineering for implementation.*
- *To understand the role and contents of testing activities in different life cycle phases.*
- *To develop skills for working in a group on a small software project.*

**UNIT - I FUNDAMENTALS OF SOFTWARE ENGINEERING [ 9]**

Nature of software – Software engineering – Software process – Software engineering practice – Generic process model – Process assessment and improvement – Prescriptive process models – Specialized process model – Process technology – Product and process – Agile development.

**UNIT - II REQUIREMENT ENGINEERING [ 9]**

Requirement engineering – Establishing groundwork – Eliciting requirements – Developing use cases – Building the requirements model – Requirements analysis – Requirements modeling strategies – Flow oriented modeling – Creating a behavioral model.

**UNIT - III DESIGN CONCEPTS AND ARCHITECTURAL DESIGN [ 9 ]**

Design within the context of software engineering – Design process – Design concepts – Design model. Architectural Design: Software architecture – Architectural genres – Architectural styles – Architectural design – Architecture mapping using dataflow.

**UNIT - IV TESTING TECHNIQUES [ 9]**

Strategic approach for software testing – Test strategies for conventional software – Validation testing – System testing – Art of debugging. Testing conventional applications: Software testing fundamentals – Internal and external views Testing – White box testing – Basis path testing – Control structure testing – Black box testing – Model based testing.

**UNIT - V QUALITY MANAGEMENT [ 9]**

Quality concepts: Software quality – Software quality dilemma – Achieving software quality. Formal technical review – Software quality assurance – Emerging trends in software engineering.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Identify the customer requirements.*
- *Determine the appropriate life cycle model based on the project.*
- *Develop an effective design for implementation.*
- *Apply the suitable testing methodology.*
- *Ensure the quality of software product.*

**Text Book :**

1 Roger S. Pressman, Software Engineering: A Practitioner Approach, McGraw-Hill, 2014.

**References :**

1 Ian Sommerville, Software Engineering, Pearson Education, New Delhi, 6th edition, 2013.
2 Jalote P., An Integrated Approach to Software Engineering, Narosa Publishers, New Delhi, 3rd edition, 2005.
3 Ali Behforooz and Frederick J Hudson, Software Engineering Fundamentals, Second Edition, Oxford University Press, Noida, 2003.
4 Shari Lawrence Pfleeger and Joanne M.Atlee, Software Engineering Theory and Practice, Pearson Education, New Delhi, 4th edition, 2009.
5 Fairley R., Software Engineering Concepts, Tata McGraw Hill, New Delhi, 2nd edition, 2003.
6 http://nptel.ac.in/courses/106101061/1

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS887** | **INTERNET OF THINGS** | | | | |
| | **ELECTIVE** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge of microprocessors and microcontrollers.*

***Objectives:***

- *To understand the basic concepts about Internet of things.*
- *To know the programming in microcontroller for IOT.*
- *To able to know about various resource management in IOT.*
- *To gather various knowledge in business models for IOT.*
- *To know how to move from IOT to WOT.*

**UNIT - I FUNDAMENTALS OF INTERNET OF THINGS [ 9]**

Definition – Phases – Foundations – Policy – Challenges and issues – Identification – Security – Privacy. components in Internet of Things: Control units – Sensors – Communication modules – Power sources – Communication technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks – Mobile internet – Wired communication.

**UNIT - II MICROCONTROLLER PROGRAMMING [ 9]**

Basics of sensors and actuators – Examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/equivalent microcontroller platform – Setting up the board – Programming for IOT – Reading from sensors communication: connecting microcontroller with mobile devices – Communication through bluetooth and USB – Connection with the internet using Wifi / ethernet

**UNIT - III RESOURCE MANAGEMENT [ 9]**

Clustering – Software agents – Data synchronization – Clustering principles in an Internet of Things architecture – The role of context – Design guidelines – Software agents for object – Data synchronization – Types of network architectures – Fundamental concepts of agility and autonomy – Enabling autonomy and agility by the internet of things –Technical requirements for satisfying the new demands in production – Evolution from the RFID – Based EPC network to an agent based internet of things – Agents for the behavior of objects.

**UNIT - IV BUSINESS MODELS [ 9]**

Meaning of DiY in the network society – Sensor- actuator technologies and middleware as a basis for a DiY service Creation framework – Device integration – Middleware technologies needed for a DiY internet of things semantic interoperability as a requirement for DiY creation – Ontology – Value creation in the internet of things – Application of ontology engineering in the internet of things – Semantic web-Ontology – The internet of things in context of euridice – Business Impact

**UNIT - V INTERNET OF THINGS TO WEB OF THINGS [ 9]**

Resource oriented architecture and best practices – Designing restful smart things – Web enabling constrained devices – Future web of things – Set up cloud environment – Send data from microcontroller to cloud – Case study: CAM cloud assisted privacy – Other recent projects.

**Total = 45 Periods**

**Course Outcomes:** ***On completion of this course, the student will be able to***

- *Understand the components and protocol in internet*
- *Design a portable IOT using appropriate board*
- *Develop schemes for the applications of IOT in real time scenarios*
- *Understand the cloud and internet environment*
- *Model the internet of things to business*

**Text Book :**

1 Charalampos Doukas, “Building Internet of Things with the Arduino”, Create space, April 2012.

**References :**

1 Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011.
2 David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010.
3 Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2012.
4 Olivier Hersent, Omar Elloumi and David Boswarthick, “The Internet of Things: Applications to the Smart Grid and Building Automation”, Wiley, 2012.
5 http://nptel.ac.in/courses/106105081/

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)** **R 2016**

**SEMESTER – VIII**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **16CS004** | **BIG DATA AND ANALYTICS**<br>**ELECTIVE - (Common to CS & EC)** | 3 | 0 | 0 | 3 |

***Prerequisite:*** *Basic knowledge in data mining.*

***Objectives:***

- *To understand the dominant software systems and algorithms for coping with Big Data.*
- *To apply appropriate analytic techniques and tools to analyze big data.*
- *To create statistical models and identify insights that can lead to actionable results.*
- *To explore the ethical implications of big data research and particularly as they relate to the web.*
- *To learn machine learning algorithms used in big data and analytics.*

**UNIT - I BIG DATA AND ANALYTICS [ 9]**

Classification of digital data – Characteristics of data – Evaluation of data – Definition of big data – Challenges with big data – Traditional business intelligence versus big data – A typical data warehouse environment – A typical hadoop environment – Definition of big data analytics – Classification of analytics – Top challenges facing big data – Data science and scientist – Terminologies used in big data environments – Few top analytic tools.

**UNIT - II BIG DATA TECHNOLOGY LANDSCAPE AND HADOOP [ 9]**

NoSQL – Types of NoSQL database – Advantages of NoSQL – Use of NoSQL in industry – No SQL vendors – SQL versus NoSQL – NewSQL – Comparison of SQL,NoSQL and New SQL – Hadoop – Features of Hadoop – Versions of Hadoop – Overview of Hadoop ecosystems – Cloud based Hadoop solutions – RDBMS versus Hadoop – Distributed computing challenges – Hadoop overview – HDFS – Processing data with Hadoop – Managing resources and applications with Hadoop YARN – Interacting with Hadoop ecosystems.

**UNIT - III MONGODB AND CASSANDRA [ 9]**

MongoDB – Terms used in RDBMS and MongoDB – Data types in MongoDB – MongoDB query language – Cassandra: features of Cassandra – CQL data types – CQLSH – Key spaces – CRUD – Collections – Using a counter – TTL – Alter commands – Import and export – Query system tables.

**UNIT - IV MAPREDUCE PROGRAMMING AND HIVE [ 9]**

Mapreduce: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression – HIVE: Hive architecture – Hive data types – Hive file format – HQL – RCFile implementation – SerDe – UDF.

**UNIT - V PIG AND MACHINE LEARNING [ 9 ]**

Pig: Pig overview – Anatomy of Pig – Pig on Hadoop – Pig latin overview – Data types in Pig – Running pig – Execution modes of Pig – HDFS commands – Relational operators – Eval function – Complex data type – UDF – Pig versus Hive – machine learning – Introduction – Machine learning algorithms.

**Total = 45 Periods**

***Course Outcomes: On completion of this course, the student will be able to***

- *Know the basics of big data on the information industry and the external ecosystem for analytical and data services.*
- *Understand big data basics along with classifications of Analytics.*
- *Obtain knowledge about NoSQL, Hadoop Architecture.*
- *Understand the concepts MongoDB,Cassandra and analysis the large dataset by using this NoSQL Databases.*
- *Learn about Hive, Map Reduce programming PIG and jasper soft and Machine Learning.*

**Text Book :**

1 Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt.Ltd, 1st edition,2015

**References :**

1 WA Gmob, “Big Data and Hadoop”, Kindle Edition, 2013

2 Eric Miller, “A Overview of Map Reduce and its impact on Distributed Data”, Kindle Edition, 2012.

3 Kristina, “MongoDB: The Definitive Guide”, O'Reilly, 2nd edition, 2013.

4 Jason Rutherglen,Dean Wampler and Edward Carpriolo, “Programming Hive”, O'Reilly Media, 1st edition, 2012.

5 http://www.tutorialspoint.com/mongodb/index.htm