SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS)

POSTGRADUATE COURSES

St. Joseph’s College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five “Schools of Excellence” from this academic year 2014 – 15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives.

• Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
• Students experience or enjoy their choice of courses and credits for their horizontal mobility.
• The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.
• Human excellence in specialized areas
• Thrust in internship and / or projects as a lead towards research and
• The multi-discipline nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the correlation between credits and hours. However, there could be some flexibility because of practicals, field visits, tutorials and nature of project work.

For PG courses a student must earn a minimum of 110 credits. The total number of courses offered by a department is given above. However within their working hours few departments / School can offer extra credit courses.

<table>
<thead>
<tr>
<th>Part</th>
<th>Semester</th>
<th>Specification</th>
<th>No. of Courses</th>
<th>Hours</th>
<th>Credits</th>
<th>Total Credits</th>
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<tbody>
<tr>
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<td>III-IV</td>
<td>Core Electives</td>
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<td>Additional Core Courses</td>
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<td>TOTAL</td>
<td></td>
<td>120</td>
<td>110</td>
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</table>

IDC – Inter Departmental Courses
BS – Between School
WS – Within School
Total Hours : 120
Total Credits : 110

However, there could be some flexibility because of practicals, field visits, tutorials and nature of project work. For PG courses a student must earn a minimum of 110 credits. The total number of courses offered by a department is given above. However within their working hours few departments / School can offer extra credit courses.
Course Pattern
The Post Graduate degree course consists of five vital components. They are core courses, core electives, additional core courses, IDC’s and SHEPHERD. Additional Core courses are purely optional on the part of the student. SHEPHERD, the extension components are mandatory.

CORE COURSE
A core course is the course offered by the parent department related to the major subjects, components like theories, practicals, self-paced learning, common core, comprehensive examinations, dissertations & viva voce, field visits, library record form part of the core courses.

CORE ELECTIVE
The core elective course is also offered by the parent department. The objective is to provide choice and flexibility within the School. There are three core electives. It is offered in different semester according to the choice of the school.

ADDITIONAL CORE COURSES (If any)
In order to facilitate the students gaining extra credit, the additional core courses are given. The students are encouraged to avail this option of enriching with the extra credits.

INTER DEPARTMENTAL COURSES (IDC)
IDC is an interdepartmental course offered by a department / School for the students belonging to other departments / school. The objective is to provide mobility and flexibility outside the parent department / School. This is introduced to make every course multi-disciplinary in nature. It is to be chosen from a list of courses offered by various departments. There are three IDC’s. Among three, one is the Soft-Skill course offered by the JASS in the II Semester for the students of all the Departments. The other one is offered “With-in the school” (WS) and the third one is offered “Between the school” (BS). The IDC’s are of application oriented and inter disciplinary in nature.

Subject Code Fixation
The following code system (9 characters) is adopted for Post Graduate courses:

For Example:
1 M.Sc. Electronics, first semester, Design of Analog and Digital Circuits
The code of the paper is 14PEL1101.
Thus, the subject code is fixed for other subjects.

Specification of the Part
1. Core Courses: (Theory, Practical, Self-paced Learning, Common Core, Comprehensive Examination, Dissertation and Viva-voce)
2. Core Electives
3. Additional Core Courses (if any)
4. Inter Departmental Courses (WS, Soft Skill & BS)
5. SHEPHERD & Gender Studies

EXAMINATION
Continuous Internal Assessment (CIA):

<table>
<thead>
<tr>
<th>PG - Distribution of CIA Marks</th>
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<tr>
<td>Passing Minimum: 50 Marks</td>
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<td>Library Referencing</td>
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<tr>
<td>3 Components</td>
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<td>Mid-Semester Test</td>
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<tr>
<td>End-Semester Test</td>
</tr>
<tr>
<td>CIA</td>
</tr>
</tbody>
</table>

MID-SEM & END–SEM TEST
Centralised – Conducted by the office of COE
1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A; PART-B; and PART-C
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS; TRUE / FALSE; and FILL-IN BLANKS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
SEMESTER EXAMINATION
Testing with Objective and Descriptive questions

Part-A: 30 Marks
Objective MCQs only
Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected.

Part-B + C = 70 Marks
Descriptive
Part-B: 5 x 5 = 25 marks; inbuilt choice;
Part-C: 3 x 15 = 45 marks; 3 out of 5 questions, open choice.

The Accounts Paper of Commerce will have
Part-A: Objective = 25
Part-B: 25 x 3 = 75 marks.

Duration of Examination must be rational; proportional to teaching hours
90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

EVALUATION
Percentage Marks, Grades & Grade Points
UG (Passing minimum 40 Marks)

<table>
<thead>
<tr>
<th>Qualitative Assessment</th>
<th>Grade Points</th>
<th>Grade</th>
<th>Mark Range (%)</th>
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<tr>
<td>Exemplary</td>
<td>10</td>
<td>S</td>
<td>90 &amp; above</td>
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<tr>
<td>Outstanding</td>
<td>9</td>
<td>A+</td>
<td>85-89.99</td>
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<tr>
<td>Excellent</td>
<td>8</td>
<td>A</td>
<td>80-84.99</td>
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<tr>
<td>Very Good</td>
<td>7</td>
<td>B</td>
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<td>6</td>
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<td>0</td>
<td>RA</td>
<td>&lt; 50</td>
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</tbody>
</table>

CGPA - Calculation
Grade Point Average for a semester is calculated as indicated here under:

\[
\text{Sum total of weighted Grade Points} \div \text{Sum of Credits}
\]

Weighted Grade Points is Grade point x Course Credits. The final CGPA will only include: Core, Core Electives & IDCs. A Pass in SHEPERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.

<table>
<thead>
<tr>
<th>POSTGRADUATE</th>
<th>Mark Range (%)</th>
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</thead>
<tbody>
<tr>
<td>CLASS ARTS</td>
<td>SCIENCE</td>
</tr>
<tr>
<td>Distinction</td>
<td>75 &amp; above, first attempt</td>
</tr>
<tr>
<td>First</td>
<td>60 - 74.99</td>
</tr>
<tr>
<td>Second</td>
<td>50 - 59.99</td>
</tr>
</tbody>
</table>

Declaration of Result:
Mr./Ms. ________________ has successfully completed the Post Graduate in ________________ programme. The candidate’s Cumulative Grade Point Average (CGPA) is ___________ and the class secured _______________ by completing the minimum of 110 credits.

The candidate has also acquired ___________ (if any) additional credits from courses offered by the parent department.
### DESIGN OF ANALOG AND DIGITAL CIRCUITS

**Objectives**
- To learn the design concept of analog circuits.
- To discuss about the designing concept of digital circuits.
- To deal the digital circuit with LABVIEW environment.

#### Unit-I: TRANSISTOR, JFET AND MOSFET
Conduction in semiconductors - Drift and diffusion current, suitability of CC - CB and CE configuration in multistage amplifiers - JFET: JFET operation - JFET low frequency ac equivalent circuit - Parameters - MOSFET: Background - Depletion type - Enhancement.
MOSFET - Non ideal current voltage characters - MOSFET biasing - Introduction to MOSFET as VLSI device - NMOS - PMOS and CMOS device - Power MOSFET - MESFET.

#### Unit-II: OPERATIONAL AMPLIFIER AND ITS APPLICATION
The ideal op-amp - Equivalent circuit - Summing - Scaling and averaging amplifier - Instrumentation amplifier - Integrator - Differentiator - Active filters - First order low pass and high pass butter worth filter - Band pass filter - Band reject filter - All pass filter - Oscillator principle - Square wave - Triangular wave generator - Comparator - Zero crossing detector - Schmitt trigger - Sample and Hold circuit - V to I with floating & grounded load - R and 2R ladder method - Binary weighted resistors.

#### Unit-III: SEQUENTIAL CIRCUIT COMPONENTS

#### Unit-IV: SYNCHRONOUS SEQUENTIAL MACHINES AND DESIGN
Basic concept - State assignment - General design procedure - State equivalence and machine minimization - Machine with finite spans - Synchronous counters - Algorithmic state machines - Asynchronous input - PAL.

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### Course Pattern - 2014 Set

<table>
<thead>
<tr>
<th>Sem</th>
<th>Code</th>
<th>Subject Title</th>
<th>Hrs</th>
<th>Credits</th>
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<td>Design of Analog and Digital Circuits</td>
<td>6</td>
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<tr>
<td>I</td>
<td>14PELI102</td>
<td>Microprocessors and Programming</td>
<td>6</td>
<td>5</td>
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<tr>
<td>I</td>
<td>14PELI103</td>
<td>Signals and Systems</td>
<td>6</td>
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<tr>
<td>I</td>
<td>14PELI104</td>
<td>Electronics Practical - I</td>
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<td>14PELI1401</td>
<td>IDC (WS) – Electronics media</td>
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<td>I</td>
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<td>Embedded systems I - Microcontrollers and Programming with IDEs</td>
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<td>I</td>
<td>14PELI206</td>
<td>Digital Signals Processing</td>
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<td>5</td>
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<td>I</td>
<td>14PELI207</td>
<td>Power Electronics</td>
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<td>Electronics Practical – II</td>
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<td>VLSI design and VHDL programming</td>
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<td>Programmable digital signal processor and CCS</td>
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<td>SHEPHERD and Gender Studies</td>
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**Total Credits for all Semesters: 120**
Unit-V: LABVIEW FOR DIGITAL CIRCUITS

Books for Study

Books for Reference

SECTIONS

<table>
<thead>
<tr>
<th>Unit</th>
<th>Book</th>
<th>Sections</th>
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MICROPROCESSORS AND PROGRAMMING

Objective
• To learn the Concepts of 8085 and 8086 microprocessors and to develop assembly language programs.

Unit-I: INTEL 8085 ARCHITECTURE AND INSTRUCTION SET
Introduction to INTEL8085 - Register structure - Pin details and functions - Instruction cycle - Timing diagram - Instruction set - Addressing modes - Status flags - Data transfer group - Arithmetic group - Logical group - Branch - Stack, I/O and machine control group.

Unit-II: MEMORY AND I/O INTERFACING TECHNIQUES
Address space partitioning - Memory and I/O interfacing - DMA controller 8257 - Data transfer schemes - Interrupts of INTEL 8085 - interfacing and programming 8255 - 8259 programming and interfacing - 8251 programming and interfacing - 8253 programming and interfacing - Programmable interval timer interfacing - 8279 keyboard interfacing.

Unit-III: INTEL 8086 ARCHITECTURE & DATA TRANSFER INSTRUCTION
Introduction to 8086 microprocessor - Internal architecture - Execution unit - General purpose registers - Instruction pointers - Addressing modes - Instruction set - Constructing the machine codes for 8086 instructions - Segment registers - Memory segmentation.

Unit-IV: ASSEMBLY LANGUAGE PROGRAMMING MINIMUM AND MAXIMUM MODE

Unit-V: ADVANCED MICROPROCESSORS
Introduction to 80386 - Pentium processors - APIC - MMX - SMM - P6 family of processors - SSE2 - SSE3 - HT technology - Pentium M processors - RISC machine - Parallel processing - Introduction to Multicore - Dual core - Core duo processor technology.
BOOKS FOR STUDY

BOOKS FOR REFERENCE

SECTIONS

<table>
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<tr>
<th>UNIT</th>
<th>BOOK</th>
<th>SECTION</th>
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Sem. I Hours/Week: 6
14PEL1103 Credits: 5

SIGNALS AND SYSTEMS

Objective
• To acquire the basics of Signals, Systems and Transformations.

Unit - I: LAPLACE TRANSFORM
Definition of Laplace transform- Problems-Piecewise or sectional continuity- Sufficient condition for the existence of Laplace transform-Some properties of Laplace transform-Some methods for finding Laplace transforms-Laplace transform of some special function.

Unit - II: Fourier series
Definition and expansion of a function - Dirichlet conditions - Parseval’s identity for Fourier series- Fourier’s integral- Remark on convergence of Fourier series- Physical applications of Fourier series.

Unit - III: FOURIER TRANSFORM

Unit - IV: Z-TRANSFORM
Z-Transforms (Double and Single sided) - Relationship between the Z-transform and discrete-time Fourier transform - Relationship between the Z-plane and S-plane - Methods of inverse Z-transforms - Power series method (long-division) - Partial-fraction method - Residual method.

Unit - V: MATLAB PROGRAMMING
Introduction to MATLAB-Matrices - Working with matrices - Basic plotting - Example Programs: Representation of basic signals - Discrete convolution - Stability test - Fast Fourier transform - Butterworth analog filter: Low-pass filter - Butterworth digital IIR filter: Low-pass filter - FIR filter design using Window techniques - IIR filter design using- Bilinear transformation - Up sampling a sinusoidal signal - Down sampling a sinusoidal sequence.

Books for Study
1. B.D Gupta, Mathematical Physics, 3rd repring, Vikas publishing House Pvt Limited, New Delhi.

Books for Reference
Sem. I  Hours/Week: 8  Credits: 5
14PEL1104

Electronics Practicals-I:
ANALOG AND DIGITAL EXPERIMENTS

Any 12 Experiments:
1. Construct and study of power supply with Single and Dual - High Current regulator & Short circuit protection.
2. Construct and study of an Op-Amp applications-I (Non-inverting, Inverting, Integrator, Differentiator, Unity gain amplifier)
3. Construct and study of an Op-Amp applications-II (Instrumentation Amplifier, V to I, I to V (4-20mA))
4. Construct and study of an Op-Amp applications-III (Clipper and Clamper)
5. Construct and study of an Op-Amp applications-IV (Comparator, Zero crossing detector, Window detector, Peak detector Precision rectifier)
6. FET amplifier design.
7. Construct and study the 555 Applications (One Shot multivibrator, Square, VCO, FSK modulator & demodulator)
8. Construct and study the Power control rectifier using SCR, TRIAC and UJT.
9. Study of sensor (Thermal, optical and mechanical).
10. Design of power amplifier (Class B and C).
11. K-map design for a three variable boolean expression.
12. Design of counters based on state machine.
13. Study of Adder, subtractor and IC based BCD adder and subtractor.
15. Study of Buffer, Latch, Transceiver.
16. Study of Shift register (SISO, SIPO, PISO & PIPO) and Universal shift register IC.
17. Study of multiplexer and de-multiplexer (Construction and chip study)
18. Design an active filer and study the performance using PSPICE (LP, HP BP, Notch, AP using Op-amp)
19. Design an oscillator and study the performance using PSPICE (Hartley, Colpit’s, Wein bridge, Phase shift oscillators)

21. Data acquisition system using Parallel port in Labview.
22. Construct and study the counter using Modelsim software (Synchronous and Asynchronous).
24. Construction of variable DC power supply using Voltage regulator ICs.

Sem. I  Hours/Week: 4  Credits: 4
14PEL1401

IDC (WS): ELECTRONICS MEDIA

Objective
• To learn about technological innovation of electronic media

Unit I: PUBLIC ADDRESSING MEDIA

Unit II: AUDIO SYSTEM AND BROADCASTING SYSTEM

Unit III: VIDEO SYSTEM
Unit-IV VIDEO PRODUCTION AND TELECASTING
Introduction to digital production studio: basic studio structure and equipment - roles of the production - production process - video editing systems and their components - video mixers - Telecasting of audio and video signal - role of satellite in tv system - satellite and terrestrial broadcasting - different transmission bands - multimedia projector.

Unit V: TABS AND SMART PHONES IN MEDIA

Books for Study
Material prepared by the Department.

Sem. II
14PEL2105
Hours/Week: 6
Credits: 5

Embedded System-I
MICROCONTROLLERS AND PROGRAMMING WITH IDEs

Objective
• To provide basic concepts on two typical microcontrollers and develop skill in programming.

Unit - I: 8051 MICROCONTROLLER
Introduction to 8051 microcontroller - flag bits and PSW - Register banks and stack - Jump - loop - call instructions - I/O port programming - Addressing modes - Arithmetic and logic

Instructions.

Unit - II: PERIPHERALS OF 8051 AND KEIL IDE
8051 Timer and counter programming - Serial communication - Interrupts - Introduction to Keil - Working with keil IDE - Development flow for the keil IDE: Interfaces offered by keil IDE - Choosing the best memory model for your C51 program - Data types - Variables - Conditional and looping statements - Arrays and string manipulation - Functions - Passing values to a function - Pointers - Passing array and string to function - Program to interface LED and Switches - C program for timer based delay - Writing ISR in C - UART programming in C.

Unit-III: INTRODUCTION TO AVR MICROCONTROLLERS
Introduction to AVR microcontrollers - Microcontroller’s series in AVR family - Salient features of AVR controllers - AVR CPU core architecture - Features of atmega8 - Architecture of atmega8 - Registers - Program memory - SRAM - Power management and sleep mode - Methods of resetting microcontroller - Principles of watch dog timer & brown out detector - I/O port structure & associated registers - Instruction set summary.

Unit - IV: ATMEGA8 PERIPHERALS & AVR STUDIO
Unit-V: MICROCONTROLLER REAL-TIME APPLICATIONS
8051 MICROCONTROLLER: Assembly language program: Interfacing a stepper Motor. C language programming: Interfacing an ADC 0809 - Key board interfacing - DAC 0808 interfacing - Temperature sensor interfacing

Books for Study
2. ATMega 8L Datasheet from ATMEL.

Books for Reference

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Sem. II
14PEL2106

DIGITAL SIGNAL PROCESSING

Objective
• To impart the algorithms of Signal Processing.

Unit-I: DISCRETE FOURIER TRANSFORMS AND FAST FOURIER TRANSFORM
Frequency analysis of discrete-time signal - Properties of DFT- Problems.

Unit - II: FINITE IMPULSE RESPONSE (FIR) FILTERS

Unit - III: INFINITE IMPULSE RESPONSE (IIR) FILTERS

Unit-IV: DISCRETE-TIME SYSTEMS IMPLEMENTATION AND MULTIRATE DSP

Unit - V: APPLICATIONS OF DSP
Speech Processing - Speech analysis - Speech coding - Subband coding - Channel vocoder - Homomorphic vocoder - Digital processing of audio signals - Radar signal processing - DSP based measurement system -
Application of Multirate: Sub band coding of speech signals - Transmultiplexers.

**Books for Study**

**Books for Reference**

**SECTIONS**

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**POWER ELECTRONICS**

**Objective**
- To discuss about the power electronics circuits in modern electronics devices.

**Unit - I: FUNDAMENTAL OF POWER ELECTRONICS**
Introduction to thyristors - Performance parameter of rectifiers - Phase control using SCR: Single phase half wave circuit with RL load and flywheel diode, Single phase full wave controlled rectifier with RL load, Three phase half controlled bridge with resistive load. - IGBT Fundamentals: Basic structure, Operation modes, output characteristics, Transfer characteristics, Switching characteristics, Latch up.

**Unit - II: TRIGGERING CIRCUITS FOR PHASE CONTROLLED RECTIFIERS**

**Unit - III: CHOPPERS**

**Unit - IV: INVERTERS AND CYCLOCONVERTERS**
Unit - V: DC AND AC MOTOR CONTROL

BOOKS FOR STUDY

Books for Reference

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Sem. II
14PEL2108
Credits: 5

Electronics Practicals-II:
EMBEDDED EXPERIMENTS

Any 16 Experiments
1. Interfacing of traffic light controller with 8085 microprocessor.
2. Interfacing printer with 8085 microprocessor.
3. 8086 microprocessor programming -I (Code conversion and segment register manipulation with 8086 microprocessor)
4. 8086 microprocessor programming -II (Largest, smallest, ascending and descending order)
5. Study of I/O ports in 8051 microcontroller -DIP switch, LED pattern generation, Matrix display and relay.
6. Interfacing LCD with 8051 microcontroller.
7. Interfacing push button switch and matrix keypad with 8051 microcontroller.
8. Study of Timers (delay program) and counters (photo-interrupter) in 8051 microcontroller.
9. Study of interrupts in 8051 microcontroller (External, timer and serial)
10. Study of serial communication in 8051 microcontroller and developing Labview based data acquisition system using serial communication.
11. Study of I/O ports in AVR microcontroller -DIP switch, LED pattern generation, Matrix display and relay.
12. Interfacing PWM in AVR microcontroller to control the speed of a DC motor.
13. Interfacing of I2C in AVR microcontroller.
15. Study of timers and counters in AVR.
16. Study of serial communication with AVR.
17. Study of I/O ports in PIC microcontroller -DIP switch, LED pattern generation, Matrix display and relay.
18. Study and interfacing SPI protocol in PIC microcontroller.
19. Communicating through USB with PIC microcontroller input/output.
20. Study of timers and counters in PIC.
21. Study of serial communication with PIC.
22. Interfacing of DTMF IC with microcontroller.
23. Interfacing of RF-ID module with microcontroller.
24. Interfacing of Zigbee module with microcontroller.
25. Interfacing of GSM module with microcontroller.
SELF PACED LEARNING

Objective
- To improve self learning ability in novel trends in electronics.

SCADA and power electronics

PROTEUS and embedded simulation
Actual use of proteus - Creating a new design - Function of icons in design window - Knowing the components available in proteus ISIS - Use of libray to pick device/symbol and place - Icons of pick device window and its explanation -Use of virtual terminal - Use of oscilloscope - DC motor drive circuit - Stepper motor drive circuit - Servo motor driver- Component designing - PCB designing in proteus ARES - Steps to design single and double side PCB.

Reference
- http://www.theengineeringprojects.com/2013/03/a-complete-tutorial-on-how-to-use.html

Multi Sim and circuit simulation
Multisim opening screen - Principle icons on the three main tool bars of workbench - Parts bin - Instruments - mode and simulation - Opening and saving the file - Placing the components - Building a circuit - Wiring the circuit - Editing a component - adding instrumentation in the circuit - Simulation - Virtual instrumentation - Analysis - The grapher - The postprocessor - Examples - Simple resistor network - An RC network using the oscilloscope and Bode plotter - Sequential Logic - D-Type and JK Flip Flops

Reference
- http://www.me.psu.edu/rahn/me462/Multisim.pdf

Cloud computing and data acquisition
Trends of computing- Introduction to distributed computing - Cloud computing - Properties and characteristics-Service Models-Deployment models-Infrastructure as a service (IaaS)-Platform as a service (PaaS)-Software as a service (SaaS)-Web 2.0-Web OS-Cloud issues and challenges-cloud provider lock in-Security-Connecting data logger online-complete data logging using cloud computing.

PSpice and analog circuit simulation
Introduction to PSPICE- Project creation- Libraries- Creating a schematic parts library- Preparing for layout: Annotation-Creating footprint libraries-Assigning footprints to parts-Creating a netlist- Creating a board template file- Layout-Creating a new board-Getting around and placing part - autorouting - Manual routing- Cleaning up the design-Documenting the design-place ground- Display properties-place net alias-Simulation settings.

Embedded Design using MSP430
Introduction to MSP430- Pin Description- Functional Block Diagram- CPU Description- Instruction set- Interrupt Vector addresses- Operation Mode-Special function register- Boot Strap Loader - Memory Organization- Flash Memory-Watch Dog Timer -Absolute Maximum Rating - Basic Programming: LED Blinking— Concepts of Interrupt- Serial port communication- Serial port Echo - ADC -ADC in serial port- Pulse Width Modulation.

References
- MSP430 Data Sheet

Android and data acquisition
Introduction to Android - Starting with android - The Android emulator - Development environment - Creating database - Designing - SQLite-Programming - SQLite databases.- Develop user - Friendly Android applications.

Book for Study
1. Material prepared by the Department.
Sem. II 14PSS2401

**Idc-I:**

**SOFT SKILLS**

**Objectives**

* Introducing learners to the relevant soft skills at the territory level in order to make them gain competitive advantage both professionally and personally.

**Module I: Basics of communication and Effective communication**


**Module II: Resume writing and Interview skills**


**Module III: Group discussion and team building**


**Module IV: Numerical Ability**

Average, Percentage, Profit and Loss, Simple Interest, Compound Interest, Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams Calendar, Rations and Proportions.

**Module V: Test of reasoning**

Verbal Reasoning: Series Completion, Analogy, Data Sufficiency, Assertion and Reasoning, Logical Deduction. Non-Verbal Reasoning: Series, Classification

**References**

1. Aggarwal, R.S. 2010 Quantitative Aptitude, S.Chand & Sons
Sem. III  
14PEL3110

**Embedded System-II:**

‘PIC’ CONTROLLER AND ‘RTOS’

**Objective**

- To impart knowledge about the protocols and interfacing techniques using PIC microcontroller and RTOS.

**Unit I - PIC18FXX2 Architecture & C Programming Language:**


**Unit II - Functions and Libraries in mikroC**

- MickroC Functions: Function Prototypes - Passing Arrays to Functions - Passing Variables by Reference to Functions - Variable Number of Arguments - Function Reentrancy - mikroC Built-in Functions - mikroC Library Functions: EEPROM - LCD - UART - USART - Sound - Miscellaneous library.

**Unit III - Applications of PIC18FXX2**


**Unit IV - Real-Time Operating System:**


**Unit V - Debugging Techniques and application of RTOS**

- Debugging Techniques - Role of development system - Emulation techniques - Benchmark examples - creating software state machines - Design examples: Burglar alarm system - Digital echo unit.

**Books for Study**

1. Dogan Ibrahim, “Advanced PIC Microcontroller Projects in C from USB to RTOS with the PIC18F Series”, Newnes Publication.

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Sem. III  
14PEL3111

**‘VLSI’ DESIGN AND ‘VHDL’ PROGRAMMING**

**Objective**

- To learn the basics of VLSI technology and VHDL programming.

**Unit I - SEMICONDUCTOR DEVICES FOR VLSI TECHNOLOGY**

- Basic MOS transistor - Enhancement and depletion mode transistor action - NMOS fabrication - CMOS fabrication - BICMOS technology - Pass transistor - NMOS inverter, CMOS and BICMOS inverter - latch-up in CMOS & BICMOS circuits - MOS layer - Design rules and layout diagram - Lambda based design rules - Contact cuts - Double metal MOS process rules - CMOS lambda based design rules - symbolic diagram.

**Unit II - SCALING AND TESTING FOR VLSI SYSTEM**

- Basic circuit concepts - Sheet resistance - Capacitance - Delays - Driving large capacitive loads - Propagation delays - wiring capacitance - Scaling factor for device parameter factors - Limitation of scaling - switch logic —Pass transistors and transmission gates - Gate logic - The inverter - CMOS logic - Pseudo nMOS logic - Dynamic CMOS logic - Clock CMOS - CMOS domino logic - n-p CMOS logic - real world VLSI design - Design styles and philosophy - The interface with the fabrication house - CAD tools for design and simulation - Aspects of design tools - Graphical entry layout - Design verification prior to fabrication - DRC - circuit extractors - Test and test ability - System partitioning.
Unit - III: BASIC CONCEPTS OF VHDL


Unit - IV: DATA TYPES AND SYNTHESIS CONCEPTS OF VHDL

Object types - Data types - File type caveats - subtypes Register transfer level description - Constraints - Attributes - technology libraries - synthesis - simple gate - IF control flow statements - case control flow statements - Simple sequential statements - Asynchronous reset - Asynchronous preset and clear - More complex sequential statements - State machine example - RTL simulation - VHDL synthesis - function Gate-level verification - Place and Route - post layout timing simulation - Static timing.

Unit - V: CIRCUIT DESIGN AND SIMULATION USING QUARTUS-II IDE


Books for Study

Books for Reference

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Sem. III  | Hours/Week: 8  | 14PEL3112  | Credits: 5 |

Electronics Practical-III:
VLSI, DSP AND ARM EXPERIMENTS

1. Developing test bench for MUX and DEMUX and verifying the same in ModelSIM.
2. Implementing Full adder, Full subtractor, Multiplexer, divider and ALU in FPGA.
3. Implementing Decoder, priority encoder, 8-bit comparator and 8-bit latch in FPGA.
4. Implementing D flip-flop with synchronous and asynchronous inputs, 4-bit up/down counter with control input in FPGA (clock source to be switch).
5. Implementing clock divider, pulse counter (for delay program) shift register and barrel shifter in FPGA.
6. Interfacing FPGA with PC through DB9 by implementing UART.
7. Interfacing keypad with FPGA.
8. Interfacing LCD with FPGA.
9. Interfacing ADC with Xilinx Spartan-II.
10. Implement the design using FSM; (Moore & Mealy State Machine).
11. Implementing I2C protocol in FPGA.
12. Implementing SPI protocol in FPGA.
13. Implementing softcore processor in FPGA (NIOs-II, Microblaze, Picoblaze, Mic08).
15. Designing standalone CPLD system for interfacing stepper module using XC9572XC CPLD.
16. Modeling a simple microprocessor with in FPGA.
17. Waveform/signal generation (sine wave, square wave, sawtooth wave, AM wave, unit impulse, unit step, Ramp signal and exponential) in MATLAB / PDSP kit.
18. Linear convolution, circular convolution, autocorrelation and cross correlation in MATLAB / PDSP kit.
19. Sampling and aliasing in PDSP kit / MATLAB.
20. Discrete fourier and inverse discrete fourier, fast fourier and inverse fast fourier transform in MATLAB / PDSP kit.
21. Study of filters using simulink in MATLAB.
22. Implementation of IIR filter in PDSP kit.
23. Implementation of FIR filter in PDSP kit.
24. Study of I/O interfacing for ARM.
25. Study of internal RTC of ARM.
26. Study of closed loop control system using internal ADC and DAC.

Sem. III  
14PEL3201A  
Credits: 4  
Hours/Week: 4  
Elective-1A:  
SENSORS AND TRANSDUCERS

Objective
- To expose the working principle of sensors and transducers.

Unit - I: TRANSDUCERS
Introduction to measurement - Direct and indirect measuring methods - Accuracy - Errors - Transducers - Resistive transducers - Potentiometers - Non-linear potentiometers Function generators - Strain gauges - Types of strain gauges - Resistance thermometers - Variable inductance transducers - Linear variable differential transformer - Capacitive transducers - Peizo electric transducers - Hall Effect transducers - Magneto resistors.

Unit- II: MEASUREMENT OF NON-ELECTRICAL QUANTITY

Unit - III: INTEGRATED SENSORS
LM 35 temperature sensor - DS18s20 1-wire digital thermometer - TSOP 17 photo modules for PCM remote control system - MOC3041 zero cross optoisolators - TL173L linear hall effect sensor - KMZ51 magnetic field sensor - MPXV5004G pressure sensor - A1425 analog speed sensor - LM1830 water level sensor - HC610 humidity sensor - ICM105A VGA CMOS sensor.

Unit - IV: BIOSENSORS
Introduction - FET & MOSFET chemical sensor - Bio sensors - Ion exchange membrane electrodes - Oxygen electrodes - CO2 electrodes enzyme electrode - Construction - ISFET for glucose, urea etc. Electrolytic sensors - Optical sensor - Fiber optic sensors.

Unit - V: SIGNAL CONDITIONERS

Books for Study

Books for Reference

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Sem. III  Hours/Week: 4  Credits: 4
14PEL3201B

Elective-1B:
COMMUNICATION SYSTEMS

Objective
• To impart the concepts of Digital Modulation Techniques and the principles of Fiber optics communication.

Unit-I: PULSE MODULATION SYSTEMS
The sampling theorem: low pass signals, band pass signals - PAM - Channel bandwidth for a PAM signal - Natural sampling -Flat top sampling - PCM - Electrical representation of binary digits - The PCM system - Compaanding - Multiplexing PCM signal -Differential PCM - Delta modulation.

Unit-II: DIGITAL MODULATION TECHNIQUES
Phase shift keying-binary PSK - Differential PSK - Differentially encoded PSK (DEPSK) - Quadrature PSK - M-ary PSK - FSK - Binary FSK - Similarity of BFSK and BPSK - M-ary FSK.

Unit-III: PRINCIPLES OF FIBRE OPTIC COMMUNICATION
Need for optical communication - Introduction - Physical nature of optical fiber - Basic principle involved in optical fiber technology - Fiber classification - Acceptance angle, acceptance cone and numerical aperture of fiber - Optical fiber bundles and cables - Fiber splices, connector and couplers - Fiber attenuation - Dispersion in optical fiber - Manufacturing of fiber - Advantages/disadvantages of using optical fiber as communication medium - Various application area of optical fiber.

Unit IV: LIGHT SOURCES FOR OPTICAL FIBRES SYSTEM

Unit - V: PAGING & WIRELESS DATA NETWORK

Books for Study

Books for Reference

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Elective-IIA:

PROGRAMMABLE LOGIC CONTROLLERS AND PROGRAMMING

Objective
• To learn the concepts of PLC.
• To Deal with Ladder Logic programming and Simulation in IDE using OMRON and KEYENCE.

Unit-I: INTRODUCTION TO PLC, LADDER DIAGRAM FUNDAMENTALS

Unit-II: PROGRAMMABLE LOGIC CONTROLLER & FUNDAMENTAL PROGRAMMING
PLC Configurations - System Block Diagram - Update - Solve the Ladder - Physical Components Vs Program components - Light Control - Internal Relays - Disagreement Circuit - Majority Circuits - Oscillators - Holding Contacts - Always ON & OFF Contacts - Ladder Diagrams having complex Rung.

Unit-III: ADVANCED PROGRAMMING TECHNIQUES AND OVERVIEW OF MNEMONIC PROGRAMMING CODE

Unit-IV: WIRING TECHNIQUES, ANALOG I/O & SENSORS
PLC Power Connection - Input wiring - Inputs having a single common - Isolated inputs - Output wiring - Relay outputs - Solid state outputs - Analog (A/D) inputs - Analog (D/A) output - Sensor Output classification - Connecting Discrete sensors to PLC inputs - Proximity sensors - Optical Proximity Sensors.

Unit-V: WORKING IN OMRON & KEYENCE IDE WITH LADDER LOGIC
Introduction to OMRON & KEYENCE - Creating a project - Ladder Programming - Compiling and Executing - Ladder Programs - Logic Gate functions (AND, OR, NOT, NAND, NOR, XOR) - Using Timers (ON delay timer, OFF delay timer, one shot pulse, flashing pulse), Counters - Using Calendar functions

Book for Study

Book for Reference

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Objective

• To learn the concepts of Mobile Communication.

Unit - I: TELECOMMUNICATIONS SYSTEMS

Unit - II: MOBILE NETWORK LAYER
Mobile IP: goals, assumptions and requirements - Entities and terminology - IP packet delivery - Agent discovery - Registration - tunneling and encapsulation - Optimizations - Reverse tunneling - IPv6 - IP micro-mobility support - Dynamic host configuration protocol.

Unit - III: MOBILE TRANSPORT LAYER

Unit - IV: WIRELESS APPLICATION PROTOCOL (version 1.x)

Unit - V: SYMBIAN OS FUNDAMENTALS
System structure - Hardware resource - Software basics - Processes, threads and Switches - Executable programs - Power management - The Kernel and E32 - Devices drivers - Timer - memory - files - Event handling - Perspectives even handling - Active objects - Multitasking and Preemption - Servers - API - C++ and Object orientation - Fundamental Types - Naming convention - Function - API, Templates - Casting - Classes, Design patterns Class diagrams and UML.

Books for Study

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Sem. III
14PEL3403

IDC-II: COMPUTER HARDWARE

Objectives
• To learn the basic hardware configuration of a computer System.
• To know the troubleshooting of PC and its network

Unit-I: Organization of computer

Unit-II: PC Assembling and Testing
Assembling Tools - Precautions - Power supply - SMPS - Output voltage measurement - Assembling producer - verify the computer peripheral and assembling parts - followed some step precaution - Bios level diagnosis - Beep sounds - On screen POST indication - Proper Earth.

Unit-III: OS Installation
Booting sequence setting and Booting - Installation Menu - Selection - Partitioning - Formatting - Copying and installation - Account creation - Device driver installation.

Unit-IV: Troubleshooting

Unit-V: Small office networks
Network concept: WAN - MAN - LAN - Ethernet - Wi-Fi - Server - Peer to Peer Network - Network accessories: Hub - switches - access point - Cable and cable coding - RJ45 connector - Cabling - Protocols - TCP/IP setting - Internet connectivity: Broadband modem and setting.

Book for Study
• Material prepared by the Department.

Sem. IV
14PEL4114

Embedded System-III: ARM AND EMBEDDED LINUX

Objective
• To study 32 bit microcontroller and the concept of operating system in embedded system.

Unit I: ARM 7 CPU CORE

Unit II: PERIPHERAL INTERFACING
General IO - General Purpose Timers - PWM Modulator - Real Time Clock - UART - I2C Interface - SPI interface - Analog to Digital Converter - Digital to Analog Converter - CAN Controller.

Unit III: INTRODUCTION TO EMBEDDED LINUX

Unit IV: BOARD SUPPORT PACKAGE AND EMBEDDED STORAGE

Unit V: EMBEDDED DRIVERS AND APPLICATION PORTING

BOOKS FOR STUDY
1. The Insider’s guide to the Philips ARM 7 based microcontrollers - An Engineer’s introduction to the LPC2100 series - Trevor Martin.
BOOKS FOR REFERENCE
1. ARM system Developers guide - Designing and optimizing system software - Andrew N. Sloss, Dominic Symes and Chris Wright. 

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Sem. IV Hours/Week: 6
14PEL4115 Credits: 5

PROGRAMMABLE DIGITAL SIGNAL PROCESSOR AND CCS

Objective
• To imparts the basics about the PDSP’s and to develop the Programming skills on code composer studio.

Unit- I: ARCHITECTURE OF FIXED POINT PDSP
Multiplier and multiplier accumulator (MAC) - Modified bus structure and memory access schemes - Multiple access memory - Multi ported memory - VLIW architecture - Pipelining - Special addressing modes in PDSP’s - On-chip peripheral - Architecture of TMS 320 C5X.

Unit- II: ASSEMBLY LANGUAGE INSTRUCTION AND PROGRAMMING
Syntax - Addressing modes - Load / Store instruction - Addition/Subtraction instruction - Move Instruction - Multiplication instruction - NORM instruction - Program control instruction - Peripheral control - Program for familiarization of the addressing modes - Program for familiarization of the arithmetic instruction - Real time signal processing program.

Unit- III: ARCHITECTURE OF FLOATING POINT PDSP

Unit- IV: ARCHITECTURE AND INSTRUCTION SET OF TMS320C6713

Unit - V: PROGRAMMING OF TMS320C6713 USING CODE COMPOSER STUDIO

Books for Study
3. TMS320C6000 Code Composer Studio Tutorial

BOOKS FOR REFERENCE
2. TMS320C6713 data sheet.

SECTIONS

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Elective-III A: 
MEDICAL ELECTRONICS

Objective
• To get exposure in various measuring techniques in the field of bioelectronics.

Unit - I: ELECTRODES & TRANSDUCERS
Origin of bioelectric signals - Recording electrodes - Skin contact impedance - Electrodes for ECG - Electrodes for EEG - Electrodes for EMG - Electrical conductivity of electrode jellies and cream - Transducers for biomedical parameters (table) - Pressure transducers - Pulse sensors - Respiration sensors.

Unit - II: BIOMEDICAL RECORDERS
Basic recording system - General considerations for bioelectric recorder amplifiers - Sources of noise in low level recording circuits - Preamplifiers - Main amplifier & driver stage - Writing systems - Electrocardiograph - Phonocardiograph - Electroencephalograph - Electromyograph.

Unit- III: MEASUREMENT & ANALYSIS TECHNIQUES IN BLOOD

Unit- IV: MODERN IMAGING SYSTEMS
X-ray machine - CT scanner: basic principle - Contrast scale - system components - NMR: principles of NMR imaging - Fourier transform of the FID - Bloch equation - Image reconstruction techniques - Discrimination based on relaxation rates - Basic NMR components - Applications, biological effects and advantages of NMR imaging system.

Unit-V: ADVANCES IN BIOMEDICAL INSTRUMENTATION

Books for Study
2. Dr. M. Arumugam, “Biomedical instrumentation”.

Elective-III B
MEMS AND NANO ELECTRONICS

Objective
• To develop expertise in the MEMS field through studying in depth advanced micro/nano fabrication and its application.

Unit - I: MEMS INTRODUCTION
MEMS or MST - Micromachining - Materials for MEMS-Silicon compatible - Silicon, silicon dioxide and nitride - thin metal films and polymers, other materials - Glass and fused quartz, silicon carbide and diamond - shape memory alloys - Important material properties and physical effects.

Unit - II: Micro and Nano fabrication

Unit - III: MEM STRUCTURES AND SYSTEMS IN RF APPLICATIONS
Signal integrity in RF MEMS-Micromachined passive components - Microelectromechanical Resonators, Microelectromechanical switches.

Unit-IV: NANO LITHOGRAPHY AND NANO MATERIALS
Introduction to Nano lithography-Cross cutting technologies- Emerging nano lithography-Carbon Nano tubes- Application of Nano tubes: for storage
application , for field emission , for sensor application , and for electronic application - Introduction to Quantum dots - Introduction to nano composites.

Unit-V: QUANTUM COMPUTATION AND MAGNETORESISTIVE MATERIALS AND DEVICES
Nano structures for quantum computation - Quantum computation algorithms - Requirements for physical realizations of quantum computers - Introduction to magnetic materials and devices - Acronyms for AMR, GMR, TMR, BMR and CMR semiconductor spintronics.

Books for Study

Books for Reference

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**COMPREHENSIVE EXAMINATIONS**

**Unit-I: OPERATIONAL AMPLIFIER AND ITS APPLICATION**
The ideal op-amp - Equivalent circuit - Summing - Scaling and averaging amplifier - Instrumentation amplifier - Integrator - Differentiator - Active filters - First order low pass and high pass butter worth filter - Band pass filter - Band reject filter - All pass filter - Oscillator principle - Square wave - Triangular wave generator - Comparator - Zero crossing detector - Schmitt trigger - Sample and Hold circuit - V to I with floating & grounded load - R and 2R ladder method - Binary weighted resistors.

**Unit-II: SEQUENTIAL CIRCUIT COMPONENTS**

**Unit-III: INTEL 8085 AND 8086 ARCHITECTURE AND ITS PERIPHERAL**
Introduction to INTEL8085 - Instruction set - Addressing modes - Status flags - DMA controller 8257 - Data transfer schemes - Interrupts of INTEL 8085 - Interfacing and programming 8255 - 8259 programming and interfacing - 8251 programming and interfacing - 8253 programming and interfacing - Programmable interval timer interfacing - 8279 keyboard interfacing - Introduction to 8086 microprocessor - Internal architecture - Addressing modes - Instruction set - Segment registers - Memory segmentation.

**Unit-IV: POWER ELECTRONICS**

**Unit-V: TRANSDUCERS AND SENSORS**
Introduction to measurement - Direct and indirect measuring methods - Transducers - Resistive transducers - Potentiometers - Strain gauges - Types

Unit VI: COMMUNICATION SYSTEM

The sampling theorem - PAM - Natural sampling - Flat top sampling - PCM - Companding - Multiplexing PCM signal - Phase shift keying - binary PSK - Differential PSK - FSK - Binary FSK - Similarity of BFSK and BPSK - Physical nature of optical fiber - Basic principle involved in optical fiber technology - Fiber classification - Acceptance angle, acceptance cone and numerical aperture of fiber - Fiber splices, connector and couplers - Fiber attenuation - Advantages/disadvantages of using optical fiber as communication medium - LED - Structures of LED - LASER - Types of laser - Photo Detectors - characteristics - PIN photo diode - APD photo Transistor - Repeater - MUX-DMUX - Line coding - Fibre optic switches - Bypass switches.