SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Electronics & Communication)
Semester: III
Syllabus with Effect from: June - 2023 - 24

Paper Code: PS03CELC51	**Total Credit: 4**
Title Of Paper: Satellite Communication	

Unit	Description in detail	Weightage (%)
I	Kepler's law, Satellite Period and Velocity, Calenders, julian days, Some important terms, Orbits, Geostationary Orbits and Satellite Spacing, International and Domestic Satellite Communication Systems, System link model and parameters, Link Budget calculation of satellite system.	25%
II	Baseband transmission system concept, Introduction to Power Efficient Techniques, Equivalence of low pass and band pass channel models, Coherent and Differentially Coherent BPSK and QPSK System, Minimum shift keying. Entropy, Mutual information and Channel capacity, Source encoding, Coding for reliable communications.	25%
III	Introduction, Basic TDMA Architectures, TDMA control Architectures, TDMA Terminal Implementation, Ancillary TDMA Processing, Terrestrial Interfaces.	25%
IV	Introduction to Frequency Division Multiple Access (FDMA), Digital Satellite Systems, SCPC-FDMA Digital Satellite Systems, System Capacity and Trade-offs In SPADE and SCPC Systems	25%

Basic Text & Reference Books:-

- Satellite Communication: Dennis Roody, McGraw Hill.
- Digital Communications-Satellite/Earth Station Engineering: Kamilo Feher, Prentice-Hall Inc.,
- Satellite Communications: T. Pratt and C.W. Bostian, John Wiley & Sons.
- Satellite Communications: Gagliardi, CBS Publishers & Distributors, Delhi

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Paper Code: PS03CELC52	**Total Credit: 4**
Title Of Paper: Digital Signal Processing	

Unit	Description in detail	Weightage (%)
I	Introduction to Discrete-time signals, sequences, Discrete time systems, Block diagram representation, Convolution representation of LTI systems, Analysis of Discrete time systems described by difference equations (except particular solution), Implementation of Discrete Time systems, Correlation of discrete time signals.	25%
II	Review of Z Transform, Properties of Z transform, Inverse Z transform, Analysis of LTI systems in Z domain, Fourier series and Power density spectrum of discrete time periodic signal. Fourier transform and Energy density spectrum of discrete time aperiodic signals. Relationship of the Fourier transform to the Z transform.	25%
III	Discrete time Fourier transform (DTFT), Discrete Fourier transform (DFT), Properties of DFT, Circular convolution, Linear convolution using DFT, Linear filtering methods based on the DFT. IDFT.	25%
IV	The Fast Fourier transform (FFT) algorithms : Decimation in time FFT, Introduction to radix-2FFTs, Decimation in time FFT, Decimation in frequency FFT. Digital Filters - Infinite Impulse Response (IIR) Filters, Finite Impulse Response (FIR) filters	25%

Basic Text & Reference Books:-

- Digital Signal Processing: Principles, Algorithms, and Applications: John G Proakis & Dimitris G Manolakis, Prentice Hall India.
- Digital Signal Processing: A computer Based Approach: Sanjit K Mitra, TMH.
- Digital Signal Processing: S Salivahanan, TMH.

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Paper Code: PS03CELC53	**Total Credit: 4**
Title Of Paper: Control System	

Unit	Description in detail	Weightage (%)
I	Open loop and closed loop control, Examples of control systems, Laplace transformation, Laplace transform theorems, Inverse Laplace transformation, Solution of linear differential equations using Laplace transformation.	25%
II	Linear and nonlinear systems, transfer functions for mechanical, electrical systems, Block diagram representation of control system, Block diagram reduction, potentiometers and synchros as error sensing devices, transfer function of armature control and field controls.	25%
III	Typical test signals, response of first order systems, transient response of second order system due to step input, time domain specification, impulse and ramp response of a second order system, Routh's stability criteria, steady state errors, static errors constants, error series and dynamic error coefficients.	25%
IV	Steady state response of a system due to sinusoidal input, Frequency response, Logarithmic plots or Bode Diagrams, Log magnitude v/s phase plots, Resonance peak and resonance frequency of a second order system, Polar plots, Nyquist stability criteria, stability analysis, Relative stability, Gain margin and Phase margin, closed loop frequency response, M circles and N circles, Nichol's chart.	25%

Basic Text & Reference Books:-

- Control system engineering: I.J. Nagarath and M. Gopal, Wiley Eastern Limited, 1992.
- Automatic Control Systems: B.C. Kuo, Prentice Hall India, 1990.
- Modern control engineering: K. Ogata, Prentice Hall India, 1990.
- Control system Analysis and Design: K.K. Agarwal, Khanna Publishers, 1994.

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Paper Code: PS03CELC54	**Total Credit: 4**
Title Of Paper: Practical - I	

	Description in detail	**Weightage (%)**
1	Write a MATLAB/SCILAB program to generate the following sequence Unit Sample Sequence Unit Step Sequence Ramp Sequence Complex exponential sequence Sine, Cosine, Square wave at 5 H_z	
2	Write a MATLAB/SCILAB program to plot Impulse response computation using stem function	
3	Write a MATLAB/SCILAB program for Signal smoothing by moving-average Filter	
4	Write a MATLAB/SCILAB program for Computation of cross-correlation of a sequence	
5	Write a MATLAB/SCILAB program for Computation of Autocorrelation of a sequence	
6	Write a MATLAB/SCILAB program for Linear convolution of a two sequence	
7	Write a MATLAB/SCILAB program for Partial fraction expansion to Rational Z-transform	
8	Write a MATLAB/SCILAB program for Determination of the rational Z-transform from its poles and zeros and vice versa	
9	Write a MATLAB/SCILAB program for Determination of the factored form of a Rational Z-transform	
10	Write a MATLAB/SCILAB program for DFT (Discrete Fourier Transform) computation	
11	Write a MATLAB/SCILAB program for IDFT (Inverse Discrete Fourier Transform) computation	
12	Write a MATLAB/SCILAB program for Computation of Linear convolution with DFT	
13	Write a MATLAB/SCILAB program for Butterworth low pass filter.	
14	Write a MATLAB/SCILAB program for Chebyshev type 1 Low pass filter	
15	Write a MATLAB/SCILAB program for IIR Butterworth Band pass Filter	
16	Write a MATLAB/SCILAB program for Chebyshev type 1 IIR High pass Filter Design	
17	Write a MATLAB/SCILAB program for Generation of rectangular, hamming, hanning, blackman and kaiser window	

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Paper Code: PS03EELC51	**Total Credit: 4**
Title Of Paper: CMOS Technology and VLSI Design	

Unit	Description in detail	Weightage (%)
I	Introduction to VLSI: complete VLSI design flow (with reference to an EDA tool), Sequential, Data flow, and Structural Modeling. Functions, Procedures, attribute, Test benches, Synthesizable, and non synthesizable statements; packages and configurations Modeling in VHDL with examples of circuits such as counters, shift registers, bi-directional bus, etc	25%
II	Sequential Circuits, Meta-stability Synchronization, Design of Finite State Machines, and State minimization, FSM CASE STUDIES - Traffic Light control, Lift Control and UART STA and DTA Programmable Logic Devices: CPLDs, Study of architecture of CPLD, and Study of the Architecture of FPGA.	25%
III	One, two phase clock, Clock distribution, Power distribution, Power optimization, SRC and DRC, Design validation, Global routing, Switch box routing, Off chip connections, I/O Architectures, Wire parasitics, EMI immune design. Study of memory-Basics of memory includes types of memory cells and memory architectures, Types of memory, based on architecture specific and application specific viz. SRAM, DRAM, SDRAM, FLASH, FIFO.	25%
IV	CMOS parasitics, equivalent circuit, body effect, Technology Scaling, l parameter, Detail study of Inverter Characteristics, power dissipation, power delay product, CMOS combinational logic design and W/L calculations, Transmission gates, Introduction to CMOS layout.	25%

Basic Text & Reference Books:-

- Digital Design, Principles and Practices: John F. Wakerly, Prentice Hall Publication.
- Principles of CMOS VLSI Design: Neil H. E Weste and Kamran Eshraghian.
- Modern VLSI Design: Wyane Wolf.
- Introductory VHDL from simulation to Synthesis: Sudhkar Yalamachalli.
- Digital System Design using VHDL: Charles Ro th, McGraw hill.

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Paper Code: PS03EELE52	**Total Credit: 4**
Title Of Paper: Radar And Navigational Aids	

Unit	Description in detail	Weightage (%)
I	Radar Equation, Radar Block Diagram and operation, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Transmitter Power, PRE and Range ambiguities, Antenna parameters	25%
II	CW & FM Radar, Doppler Effect, CW, Radar, FMCW Radar, Introduction to MTI & Pulse Doppler Radar, Delay line Cancellers, Staggered or Multiple PRF. Introduction to Tracking Radar, Sequential Lobing, Comical Scan, Monopulse TR	25%
III	Basic Concepts of Phased Array Antenna, Phase Shifters, Frequency-scan arrays, Array elements, Feeds for Arrays.Other Radars: Synthetic Aperture Radar, HF over-the-horizon Radar, Air-Surveillance Radar, Height-Finder and 3-D Radars.	25%
IV	Radio Direction Finding, Radio Ranges, Hyperbolic System of Navigation, DME and TACAN, Aids to Approach and Landing, Doppler Navigation, Satellite Navigation, Global Positioning System.	25%

Basic Text & Reference Books:-

- Introduction to Radar Systems: M. I. Skolnik, McGraw Hill Pub., International edition.
- Elements of Electronic Navigation: N. S. Nagaraja, TMH Pub., Co. New Delhi.