MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Agenda of the BoS

(Approved by the Academic Development Cell for all BoS Meetings Scheduled in November 2020)

Item 1:	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in ***online mode under Departmental Elective (DE) category,*** for credit transfer in the ***VIII Semester*** *(Batch admitted in 2017-18): applicable during January-June 2021 academic session*
Item 2:	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform to be offered ***(***for students of other departments) in ***online mode under Open Category(OC)*** for credit transfer in the ***VIII Semester*** *(Batch admitted in 2017-18): applicable during January-June 2021 academic session*
Item 3:	To propose the list of "Additional Courses" which can be opted for getting an ***(i) Honours (for students of the host department)*** ***(ii) Minor Specialization (for students of other departments)*** *[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the* ***VI semester (for the batch admitted in 2018-19)and for VIII semester students****(for the batch admitted in 2017-18)]applicable during January-June 2021 academic session*
Item 4:	To review and finalize the list and syllabi for all ***Departmental Elective (DE) Courses*** of ***VI Semester*** *to be offered to (****the batch admitted in 2018-19****)*under the flexible curriculum along with their COs ; {*applicable during January-June 2021 academic session}*
Item 5:	To review and finalize the list of Courses from SWAYAM/NPTEL/MOOC Platform to be offered ***(for batch admitted in 2018-19)***in online mode under ***Departmental Elective (DE) Courses*** for credit transfer in the ***VI Semester{****applicable during January-June 2021 academic session}*
Item 6:	To review and finalize the Courses & Syllabi to be offered ***(for batch admitted in 2018-19)***under the ***Open Category (OC) Courses*** for ***VI semester*** students of other departments along with their COs
Item 7:	To review and finalize the *Courses & Syllabi* to be offered *(to the batch admitted in 2018-19)*under *Departmental Core (DC)* Courses for the *IV*&*VI semester* students along with their COs
Item 8:	To review and finalize the ***Scheme & Syllabi (I & II semester)*** **of the NEW *B. Tech.* programme(s)** to be started by the departments w.e.f. the batch admitted in 2020-21
Item 12:	To identify ***gaps in CO attainment levels*** for ***Jan-June 2020 semester*** and propose corrective measures for improvement
Item 13:	To prepare and propose the equivalence list of courses for B. Tech programmes (for 2017-18, 2018-2019, 2019-2020 & the 2020 admitted batch)
Item 14:	Any other matter

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Item 1:

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in ***online mode under Departmental Elective (DE) category,*** for credit transfer in the ***VIII Semester.***

S.No	Category	Course Code	Course Name
1	Departmental Elective (DE-5)	200851	Modern Digital Communication techniques
2		200852	Mathematical methods and techniques in Signal Processing
3		200853	Power Management Integrated Circuits

For Semester	Name of The course	Duration of the Course in weeks	Course Registration		Name of the Mentor Faculty
			Start Date	End Date	
Electronics/Electronics & Telecommunication Engineering					
1	Modern Digital Communication techniques	12	09-11-2020	25-01-2021	Awadhesh Gupta
2	Mathematical methods and techniques in Signal Processing	12	09-11-2020	25-01-2021	Dr Ashish Gupta
3	Power Management Integrated Circuits	12	09-11-2020	25-01-2021	Dr Vikas Mahor

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Item 2

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform to be offered ***(***for students of other departments) in ***online mode under Open Category(OC)*** for credit transfer in the ***VIII Semester*.**

S.No	Category	Course Code	Course Name
1	Open category (OC-4)		An introduction to Information Theory
2			Sensors and Actuators
3	Open category (OC-5)		Electronics equipment integration and Prototype building
4			Computer Vision and Image Processing - Fundamentals and Applications

For Semester	Name of The course	Duration of the Course in weeks	Course Registration		Name of the Mentor Faculty
			Start Date	End Date	
Electronics/Electronics & Telecommunication Engineering					
1	An introduction to Information Theory	12	09-11-2020	25-01-2021	Dr Karuna Markam
2	Sensors and Actuators	12	09-11-2020	25-01-2021	Deepak Batham
3	Electronics equipment integration and Prototype building	08	09-11-2020	25-01-2021	Arpita Singhal
4	Computer Vision and Image Processing - Fundamentals and Applications	12	09-11-2020	25-01-2021	Shambhu Kumar

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Item 3

To propose the list of "Additional Courses" which can be opted for getting an

(i) Honours (for students of the host department)

(ii) Minor Specialization (for students of other departments)

*[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the **VI semester (for the batch admitted in 2018-19) and for VIII semester students**(for the batch admitted in 2017-18)]applicable during January-June 2021 academic session.*

Category	Semester	Name of The course	Duration of the Course in weeks	Course Registration		Name of the Mentor Faculty
				Start Date	End Date	
Electronics/Electronics & Telecommunication Engineering (VI Semester)						
Hons	VI	Electromagnetic Waves in Guided and Wireless Media	08	09-11-2020	15-02-2021	Pooja Sahoo
	VI	Integrated Circuits, MOSFETs, Op-Amps and their Application	12	09-11-2020	25-01-2021	Rishabh Shukla
	VI	High Power multilevel converter	12	09-11-2020	25-01-2021	Praveen K Singh
Minors	VI	Integrated Circuits, MOSFETs, Op-Amps and their Application	12	09-11-2020	25-01-2021	Rishabh Shukla
	VI	High Power multilevel converter	12	09-11-2020	25-01-2021	Praveen K Singh
Electronics/Electronics & Telecommunication Engineering (VIII Semester)						
Hons	VIII	Architectural Design of Digital Integrated Circuits	12	09-11-2020	25-01-2021	Madhav Singh
	VIII	Cloud Computing and Distributed Systems	08	09-11-2020	25-01-2021	Arpita Singhal
	VIII	Biomedical Signal Processing	12	09-11-2020	25-01-2021	Awadhesh Gupta
Minors	VIII	Microwave Integrated Circuits	08	09-11-2020	25-01-2021	Santosh Sharma
	VIII	Digital Signal Processing and its Applications	12	09-11-2020	25-01-2021	Dr R Dubey
	VIII	Computer Vision and Image Processing - Fundamentals and Applications	12	09-11-2020	25-01-2021	Shambhu Kumar

Item 4

To review and finalize the list and syllabi for all ***Departmental Elective (DE) Courses*** of ***VI Semester*** *to be offered to (**the batch admitted in 2018-19**)* under the flexible curriculum along with their COs ; {*applicable during January-June 2021 academic session}*

S.No	Category	Course Code	Course Name
1	Departmental Electives (DE-1)	200611	Optical Communication
2		200612	Antenna and Wave Propagation
3		200613	Telecom Switching and Networks

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B.Tech. VI Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200611	DE-1	Optical Communication	70	20	10	-	-	100	4	-	0	4

Optical Communication (200611)

Course objectives: This course gives information to the students about the basics of signal propagation through optical fibers, fiber fabrication, fiber losses, device components of optical fiber communication and optical networks.

Unit I - Overview of Optical Fiber Communications: Optical laws and definitions, Optical fiber modes and configurations, Mode theory, Step Index and Graded Index (GI) fibers ,Single mode and Multimode, Derivation for numerical aperture, V number and modes supported by step index fiber, Mode field diameter, Modes supported by GI fibers.

Unit II - Fabrication and Coupling of Optical Fiber: Fiber materials: Glass fiber, Active glass fiber, Plastic optical fiber, Fiber fabrication techniques: Outside vapour phase oxidation, Vapour phase axial deposition, Modified chemical vapour deposition, Plasma activated chemical vapour deposition, Fiber splicing techniques, Optical fiber connectors and couplers.

Unit III - Optical Sources and Detectors: Introduction to optical sources, LED'S, LASER diodes, Model reflection noise, Power launching and Coupling, Population inversion, Photo-detectors, PIN, Avalanche detector, Response time, Avalanche multiplication noise.

Unit IV - Signal Degradation in Optical Fibers: Signal degradation in optical fibers, Attenuation losses, Signal distortion in optical wave guides, Material dispersion, Wave guide dispersion, Chromatic dispersion, Inter-modal distortion, Pulse broadening in Graded index fibers, Mode coupling.

Unit V - Optical Communication and Networks: Coherent optical fiber communication, Modulation techniques for Homodyne and Heterodyne systems, Rise time budget and link power budget, eye pattern, optical network elements and topologies, SONET / SDH.

Reference Books:

1. Optical Fiber Communication – By G. Keiser , Tata McGraw-Hill Education
2. Optical Fiber Communication- By John M. Senior, Prentice Hall

Course Outcomes:

After the completion of this course students will be able to:

CO1: Explain the basic elements of optical fiber transmission.
CO2: Discuss fiber fabrication, splicing and optical connectors.
CO3: Describe the working ofoptical sources and optical detectors.
CO4: Calculate the channel impairments like losses and dispersion.
CO5: Discuss Coherent optical transmission system and optical networks.

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Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200612	DE-1	Antenna & wave Propagation	70	20	10	-	-	100	4	-	0	4

ANTENNA AND WAVE PROPAGATION (200612)

Course objectives: To develop the students' basic understanding of antenna operation and develop the students' ability to calculate and interpret basic antenna performance parameters.

Unit I Introduction to antenna: Definition of antenna parameters – Radiation Density, Radiation Intensity, Gain, Directivity, Radiation Resistance, Band width, Beam width, Input Impedance, Effective Height, Effective aperture, Network theorems applied to antenna, Self and mutual impedance of antenna.

Unit II Radiation Fields of Wire Antennas: Radiation from current element, Short dipole, Quarter wave Monopole and Half wave Dipole, Loop antenna, Helical antenna.

Unit III Antenna Arrays: Antenna arrays of point sources, Two element array, End fire and Broad side arrays,Principle of Pattern multiplication, Uniform linear arrays of N-elements, Linear arrays with non-uniform amplitude distribution (Binomial distribution and Chebyshev optimum distribution). Arrays of two-driven half wave length elements (Broad side and end fire case).

Unit III Aperture and special Antennas: Radiation from rectangular apertures, Horn antenna, Reflector antenna, Babinet's principles and complimentary antennas, Slot antennas, Log periodic antenna, Yagiuda antenna, Travelling wave antenna, Image antenna.

Unit V Propagation of radio wave: Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation, Flat earth and Curved earth concept, Sky wave propagation – Virtual height, Critical frequency , Maximum usable frequency – Skip distance, Fading , Multi hop propagation.

Reference Books:

1. Antenna theory- J.D. Kraus, 4th edition, Tata Mc-Graw Hill
2. Electromagnetic Fields & Radiating System - Jordan &Balmain, 2nd edition, PHI
3. Antennas(for all applications)-Kraus, Marshfka, khan, Tata Mc-Graw Hill
4. Antenna Wave Propagation-K D Prashad,New Delhi : SatyaPrakashan

Course Outcome:

After the completion of this course students will be able to:

CO1. Evaluate various parameters of the antenna.
CO2. Analyze the design parameters and radiation mechanism of wire antennas.
CO3. Design antenna array for the given radiation characteristics.
CO4. Analyze the design parameters and radiation characteristics of Aperture and special antennas.
CO5. Describe effects of earth and its atmosphere on radio wave propagation.

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B.Tech. VI Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200613	DE-1	Telecom Switching and Networks	70	20	10	-	-	100	4	-	0	4

Telecommunication Switching and Networks (200613)

Course Objectives: To introduce fundamentals functions of a telecom switching office, namely, digital multiplexing, digital switching and digital subscriber access and to introduce a mathematical model for the analysis of telecommunication traffic.

Unit 1 Introduction: Evolution of Telecommunications, Simple Telephone Communication, Manual switching system, Strowger Switching System, Crossbar Switching System, major telecommunication Networks (PSTN, ISDN, WLAN, Ad Hoc Network).

Unit 2 Switching: Circuit Switching, Store and Forward Switching, Electronic Space Division Switching, Stored Program Control, Centralized SPC, Distributed SPC, Enhanced Services, Two stage networks, three stage network n-stage networks. Time multiplexed Space Switching, Time Multiplexed time switching, combination Switching, Three stage combination switching, n-stage combination switching.

Unit 3 Traffic Engineering: Network Traffic load and parameters, Grade of service and blocking probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking Models and Loss Estimates, Delay systems

Unit 4 Telephone Networks: Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In channel signaling, common channel signaling, Cellular mobile telephony.

Unit 5 Data networks: Data transmission in PSTNs, Modems, ISO-OSI/TCP-IP Reference Model,Satellite based data networks, Data network standards (ISDN, DSL / ADSL, Token Ring, Token BUS , Bluetooth , WLAN, ZigBee, SONET / SDH).

Text Book :

1. ThiagarajanVishwanathan, "Telecommunication Switching Systems and Networks"; PHI Publications.

Reference Books:

1. J. E. Flood, "Telecommunications Switching, Traffic and Networks", Pearson Education.
2. John C. Bellamy, "Digital Telephony", Third Edition; Wiley Publications

Course Outcomes

After the completion of this course students will be able to:

- **CO1. Describe** fundamentals of telecommunication systems and associated technologies
- **CO2. Design** multi stage switching structures involving time and space switching stages
- **CO3. Analyze** and evaluate the fundamental telecommunication traffic models.
- **CO4. Examine** the working of Telephone Networks.
- **CO5. Demonstrate** broad knowledge of fundamental principles and technical standards underlying Data Networks.

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Item 5

To review and finalize the list of Courses from SWAYAM/NPTEL/MOOC Platform to be offered ***(for batch admitted in 2018-19)***in online mode under ***Departmental Elective (DE) Courses*** for credit transfer in the ***VI Semester{****applicable during January-June 2021 academic session}*

S.No	Category	Course Code	Course Name
1	Departmental Elective (DE-4)	200651	Spread Spectrum Communications and Jamming
2		200652	Digital IC Design
3		200653	Fuzzy Sets, Logic and Systems & Application

For Semester	Name of The course	Duration of the Course in weeks	Course Registration		Name of the Mentor Faculty
			Start Date	End Date	
Electronics/Electronics & Telecommunication Engineering					
1	Spread Spectrum Communications and Jamming	12	09-11-2020	25-01-2021	Deep Kishore Parsedia
2	Digital IC Design	12	09-11-2020	25-01-2021	Dr Vikas Mahor
3	Fuzzy Sets, Logic and Systems & Application	12	09-11-2020	25-01-2021	Dr Vandana Vikas Thakare

Item 6

To review and finalize the Courses & Syllabi to be offered ***(for batch admitted in 2018-19)*** under the ***Open Category (OC) Courses*** for ***VI semester*** students of other departments along with their CO's.

S.No	Category	Course Code	Course Name
1	Open Course (OC-1)	900104	Intelligent Control
2		900105	Embedded Systems

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B.Tech. VI Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
900104	OC-1	Intelligent Control	70	20	10	-	-	100	2	1	0	3

Intelligent Control (900104)

Course Objectives: The main objective of this course is to develop the basic understanding of an Intelligent control i.e. control system with optimization and prediction using Artificial Neural Network to the students.

Unit 1 - Adaptive Control: Introduction, Close loop and open loop adaptive control. Self-tuning controller, Parameter estimation using least square and recursive least square techniques, Gain Scheduling, Model Reference Adaptive Control, Self Tuning Regulators, Adaptive Smith predictor control, Auto tuning and self tuning smith predictor.

Unit 2– Artificial Neural Network (ANN) Based Control: Introduction to ANN, Different activation functions, Different architectures and different learning methods, Back Propagation and Radial Basis Function networks.

Unit 3- Modeling of Control System: Representation and identification, Modeling the plant, Control structures – supervised control, Model reference control, Internal model control, Predictive control, Indirect and direct adaptive controller design using neural network.

Unit 4– Fuzzy Logic Based Control: Fuzzy Controllers: Preliminaries – Mamdani and Sugeno inference methods, Fuzzy sets in commercial products – basic construction of fuzzy controller – fuzzy PI, PD and PID control, Analysis of static properties of fuzzy controller, Analysis of dynamic properties of fuzzy controller , Simulation studies and case studies , Stability issues in fuzzy control.

Unit 5– Hybrid Control: Introduction to Genetic Algorithm (GA), Neuro-Fuzzy and Fuzzy-GA based hybrid system design.

Text Books:

1. Astrom **.**K, Adaptive Control, Second Edition, Pearson Education Asia Pvt. Ltd, 2002.
2. Shivanandan**,** Introduction to Artificial Neural Network with MATLAB 6.0.1, Third Edition, Mcgraw Hill India Ltd, 2015.

Reference Books:

1. Klir G.J and Folger T.A, Fuzzy sets, Uncertainty and Information, Prentice Hall of India, New Delhi 1994.
2. Bose and Liang, Artificial Neural Networks, Tata Mcgraw Hill, 1996.
3. Kosco B, Neural Networks and Fuzzy Systems: A Dynamic Approach to Machine Intelligence, Prentice Hall of India, New Delhi, 1992.
4. Chang C. Hong, Tong H. Lee and Weng K. Ho, Adaptive Control, ISA press, Research Triangle Park, 1993.

Course Outcomes:

After successful completion of this course; students will be able to:

CO1. **Explain** the fundamental principle behind adaptive control.
CO2. **Estimate** various parameter of control system using artificial neural network.
CO3. **Apply** the concept of artificial neural network to the field of control.
CO4. **Optimize** the throughput of the system using optimization methods like Genetic algorithm.
CO5. **Design** fuzzy logic based control system.

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B.Tech. VI Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
900105	OC-1	Embedded System	70	20	10	-	-	100	2	1	0	3

Embedded System (900105)

Course objectives: To introduce the basic concepts of microcontroller and to develop assembly language programming skills along with the introduction of microcontroller applications.

Unit I Introduction: Embedded system architecture, classification, challenges and design issues, fundamentals of embedded processor and microcontrollers, Von Neumann/Harvard architectures, CISC vs. RISC, microcontrollers types and their selection, Overview of the 8051 family, architecture, pin description, Flags, Register Banks, Internal Memory Organization, I/O configuration, Special Function Registers, addressing modes.

Unit II Assembly programming and instruction of 8051: An Overview of 8051 instruction set, Introduction to 8051 assembly programming, Assembling and running an 8051 program, Data types and Assembler directives, Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming.

Unit III 8051 Timer, Serial port, interrupt Programming: Basics of Timers/Counters, Programming 8051 timers/Counter, basics of serial communication, 8051 connection to RS232, 8051 serial port programming, basics of 8051 Interrupts, 8051 interrupts programming: Timer interrupts, external hardware interrupts and serial communication interrupt, 8051 Interrupt priority.

Unit IV Interfacing real world devices with 8051 microcontroller: Memory address decoding, 8051 interfacing with memory, 8051 interface with 8255 PPI and various interfacings like: LCD and Matrix Keyboard interfacing with 8051 microcontroller, ADC, DAC and Temperature Sensor interfacing with 8051 microcontroller, Stepper motor interfacing.

Unit V Interfacing real world devices with Arduino : Overview of Arduino, Configuration, Interfacing, Board layout, Atmega328 specifications, Interfacing of Arduino with LED, Switches, Light dependent resistor (LDR), PWM, 16*2 LCD, Serial, L293D for motor interfacing, ADC.

Text Book:

1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay, "The 8051 Microcontroller and Embedded Systems using Assembly and C" Pearson Education India, 2nd Edition

Reference Books:

1. Kenneth Ayal, "The 8051 Microcontroller", Architecture, Programming and Applications.
2. SubrataGhoshal, "Embedded Systems and Robots, Projects using the 8051Microcontroller".

Course Outcomes

After successful completion of the course, students will be able to:

CO1. **Explain** the architecture of embedded system and 8051.
CO2. **Develop** assembly language programming skills for 8051.
CO3. **Analyze** the concept of Timers/Counters, Serial communication and interrupt handling processes of 8051 microcontroller.
CO4. **Interface** memory and I/O devices with 8051microcontroller.
CO5. **Interface** Arduino with LED, Switches, Light dependent resistor (LDR), PWM, 16*2 LCD, Serial, L293D for motor interfacing, ADC.

Item 7

To review and finalize the *Courses & Syllabi* to be offered *(to the batch admitted in 2018-19)* under *Departmental Core (DC)* Courses for the *IV &VI semester* students along with their COs.

S.No	Category	Semester	Course Code	Course Name
1	Departmental Core	IV	200401	Electronics-II
2		IV	200402	Analog Communication
3		IV	200403	Communication Networks
4		IV	200404	Stochastic processes in communication
5		VI	200601	Digital Signal Processing
6		VI	200602	Data Communication

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B.Tech. IV Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200401	DC	Electronics-II	70	20	10	30	20	150	2	1	2	4

Electronics-II (200401)

Course objective: Students will be able to learn the concepts of feedback amplifier, design of oscillators and multistage amplifiers.

Unit I Tuned amplifier: General behavior of tuned amplifier, Single tuned and doubled tuned amplifier, Advantages and disadvantages of tuned amplifiers, Q factor of a circuit and coil, series and parallel resonant circuit, variation of impedance with frequency, Bandwidth of series and parallel resonant circuit.

Unit II Power Amplifiers: Introduction, amplifier classification, Analysis and design of Class A, Class B, Class AB, class C amplifiers, Amplifier Distortion, Power Transistor Heat Sinking, Class C, harmonic distortion, push pull amplifiers,

Unit III Multistage Amplifiers: classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, the RC coupled amplifier, low frequency response of an RC coupled stages, effect of an emitter bypass capacitor on low frequency response.

Unit IV: Operational Amplifier: Differential amplifier and analysis, Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an op-amp, Power supply configurations for op-amp, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio (CMRR), Slew rate and its Effect, Gain bandwidth product, frequency limitations and compensations, Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Schmitt Trigger, Sample and hold Circuit.

Unit V Application of Operational Amplifier:, Amplifier and Oscillator, Filter designing using Op-amp: Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, Notch filter; all pass filters, self-tuned filters.

Text Books:

1. Electronics Devices and Circuits: Boylested & Nashelsky,11th Edition**,**Pearson Education India
2. Op-Amp and Linear Integrated Circuit: R.A.Gayakwad, 4th Edition, Prentice Hall of India.

Reference Books:

1. Integrated Electronics: Millman & Halkias, 2nd Edition,McGraw Hill Education
2. Electronics Devices and Circuits: Shalivanan, 2nd Edition, Tata Mcgraw Hill Education.
3. Microelectronic Circuits- Theory and Application: Sedra & Smith,7th Edition**,** Oxford University Press.

Course Outcomes

After the completion of this course students will be able to:

- **CO1.** **Analyze** the characteristics of an amplifier.
- **CO2.** **Design** the tuned amplifier with the given parameters.
- **CO3.** **Compare** various power amplifiers.
- **CO4.** **Design** the multistage amplifiers.
- **CO5.** **Design** the various electronics circuits using Operational amplifier.
- **CO6.** **Design** the active filters based on given specifications.

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List of Experiments

Subject Name: ELECTRONICS –II
Subject Code: 200401

1. Design of the circuit using IC 741 Op-Amp:
    a. Summer, &Subtractor
    b. Differentiator,& Integrator.
    c. Inverting & Non-inverting amplifier.
    d. Voltage,& Current follower.
    e. Comparator, &Schmitt Trigger
2. To design the multistage amplifier.
3. To design the Tuned amplifier with given specification.
4. To design the RC coupled amplifier.

Course Outcomes:

After completing the lab, students will be able to:

CO1. **Design** various applications using Op-Amp.
CO2. **Troubleshoot** the already fabricated circuit individually or in a team.
CO3. **Design** various amplifier circuits.

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B.Tech. IV Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200402	DC	Analog Communication	70	20	10	30	20	150	2	1	2	4

Analog Communication (200402)

Course objective: To understand the concept of multiplexing, various types of modulation, design and analysis of transceiver for AM, FM application, probability theory and probability function, noise.

Unit I Amplitude Modulation: Introduction to multiplexing, types of multiplexing, need of modulation, Amplitude modulation**,** single side band and double side band suppressed carrier and vestigial side band, modulation techniques their generation, detection and spectral analysis, square law modulators, switching modulator, envelope and square law detector, balanced modulator.

Unit II Angle Modulation: Relationship between Frequency and phase modulation, frequency and phase deviation, types of FM, Carson's rule, spectrum of FM signal, Constant bandwidth of FM,comparison of narrow band and wide band FM, generation and detection of FM, and PM signal.

Unit IIIAM & FM transmitter and receiver: Tuned radio receiver, limitation of TRF, Super heterodyne receiver, concept of IF frequency, image signal rejection, selectivity, sensitivity and fidelity, Noise in AM, FM, Block diagram of FM transmitter& receiver, AGC, AVC, AFC.

Unit IV Probability, and random variables: Cumulative distribution function, probability density function, average and variance of random variables, Various types of elementary Discrete and continuous PDF function and calculation of statistical averages, moment generating and characteristic function, Gaussian and Rayleigh probability density function, Error function and complementary error functions.

Unit V Noise Analysis: Various sources of noise, types of noise with their characteristics, Mathematical representation of noise figure, Noise bandwidth, Noise temperature and noise figure of amplifiers in cascades, Figure of merit of modulation techniques, comparison of modulation scheme for noise.

Text Books:

1. Communication System:Simon Haykins,4th Edition, Wiley & Sons.
2. Communication Systems - B.P.Lathi,BSP Publication

Reference Books:

1. Communication System:George Kennedy, 5th Edition, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi ,4th Edition, Oxford University Press;
3. Principles of Communication System:Taub and Schilling,3rd Edition, McGraw-Hill Education.

Course Outcomes

After the completion of this course students will be able to:

- **CO1.** **Apply** the concept of multiplexing and modulation in communication engineering.
- **CO2.** **Analyze** the amplitude modulation and angle modulation with their waveforms
- **CO3.** **Explain** the generation and detection for various modulation techniques**.**
- **CO4.** **Explain** the working of transmitter and receiver.
- **CO5.** **Evaluate** the statistical parameters for general PDF/CDF.
- **CO6.** **Evaluate** the effects of noise on different modulation techniques.

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List of Experiments

Subject Name: ANALOG COMMUNICATION
Subject Code: 200402

1. To generate amplitude modulated wave and determine the percentage modulation.
2. To generate amplitude demodulated wave and determine the percentage modulation.
3. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal
4. To generate SSB-SC -Double Side Band Suppressed Carrier (DSB-SC) signal
5. To generate frequency modulated wave and determine the percentage modulation
6. To generate Phase modulated wave and determine the percentage demodulation
7. To analyse the spectrum of AM signal using Spectrum analyzer
8. Verify the generation and detection of AM Signal using MATLAB
9. Verify the generation and detection of DSB-SC Signal using MATLAB
10. Verify the generation and detection SSB-SC signal using MATLAB
11. To perform Time Division Multiplexing & De-Multiplexing using MATLAB.
12. To perform Frequency Division Multiplexing & De-Multiplexing using MATLAB.
13. Verify the generation and detection of FM Signal using MATLAB.
14. Verify spectral characteristics of AM & FM using Simulink

Course Outcome:

After completing the lab, students will be able to:

CO1. **Differentiate** different modulation and demodulation techniques.
CO2. **Calculate** the modulation index for given modulated wave.
CO3. **Analyse** the frequency spectrum of different modulated signal.
CO4. **Generate** AM, DSB, SSB and FM signals.
CO5. **Compare** time division and frequency division multiplexing.

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B.Tech. IV Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200403	DC	Communication Network	70	20	10	-	-	100	3	1	-	4

Communication Network (200403)

Course objective: To make the students capable of analyzing electrical network and how to synthesize an electrical network from a given impedance/admittance function.

Unit I Basic Parameters of Networks: Characteristic impedance, iterative impedance, Propagation constant, analysis of symmetrical T, π, Lattice and Bridged-T networks, image impedance, attenuators and their design.

Unit II-Network Synthesis: Positive real function, LC, RL, RC and RLC network synthesis, Foster and Cauer form realization , Minimum positive real function, Brune's method, Bott-Duffin method, Insertion Loss Synthesis, and Coefficient matching technique.

Unit III- Passive Filters: Constant K prototype Filters: Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, frequency transformation.

Unit IV-.Transmission Line: Voltage and current on a transmission line; characteristic impedance and propagation constant of a transmission line, Lossless & Distortion less line, reflection on a line, Standing wave ratio, and Transient analysis of terminated transmission line.

Unit V- Lines at radio frequency: Dispersion less line, Input impedance of open circuit and short circuit line, power and impedance measurement, λ/8, λ/4, λ/2 lines, Smith chart and application, Single stub and double stub matching.

Text Books:

1. Introduction to Modern Network Synthesis: Van Valkenberg,1st Edition, John Wiley& Sons.
2. Communication Network and Transmission Lines by Bakshi&Bakshi, Technical Publication

Reference Books:

1. Principles of Active Network Synthesis and Design: G. Daryanani,1st Edition, John Wiley & Sons.
2. Network Analysis and Synthesis - F.F. Kuo,2nd Edition, John Wiley & Sons.
3. Networks, Lines, &Fields: J.D. Ryder, 2nd Edition, Prentice Hall of India.
4. Elements of Electromagnetics: Mathew N. O.Sadiku, 3rd Edition, Oxford Publication Press.

Course Outcomes

After the completion of this course students will be able to:

- **CO1. Compute** the various parameters of different passive networks.
- **CO2. Design** the symmetrical and asymmetrical attenuators.
- **CO3. Synthesize** the network for a given positive and minimum positive real function.
- **CO4. Design** passive filters for the given specifications.
- **CO5. Analyze** the characteristics of various transmission lines.
- **CO6. Calculate** the impedance and SWR graphically /analytically.

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B.Tech. IV Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200404	DC	Stochastic processes in communication	70	20	10	-	-	100	3	1	-	4

Stochastic Processes in Communication (200404)

Course objective: To introduce students the use of various electrical/electronic instruments, their construction, applications, principle of operation, standards and units of measurements.

Unit – I THE RANDOM VARIABLE : Introduction, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

Unit – II OPERATION ON ONE RANDOM VARIABLE: EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

Unit – III MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions. OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Unit – IV RANDOM PROCESSES: TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, Nth-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process., RANDOM PROCESSES : SPECTRAL CHARACTERISTICS: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Unit – V LINEAR SYSTEMS WITH RANDOM INPUTS : Random Signal Response of Linear Systems: System Response, Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties, Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

Reference Books:

1. Probability Theory and Stochastic Processes B. Prabhakara Rao, Oxford University Press.
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probabilistic Methods of Signal & System Analysis, George R. Cooper, Clave D. McGillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication, S.P.Eugene Xavier, New Age Publications, 2003.
5. Signals, Systems & Communications, B.P. Lathi, B.S. Publications, 2003.

Course Outcomes

After the completion of this course students will be able to:

CO1. **Analyze** the different probability distribution functions.
CO2. **Calculate** Statistical parameters.
CO3. **Perform** transformation of random variables.
CO4. **Analyze** joint distribution of continuous and discrete random variables.
CO5. **Classify** strict sense stationary and wide sense stationary random processes
CO6. **Analyze** the behavior of LTI system with random processes.

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B.Tech. VI Semester (Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200601	DC	Digital Signal Processing	70	20	10	-	-	100	-	-	-	4

Digital Signal Processing (200601) (For ET L: 2 T: 1, P:2)

Course Objectives: understanding of the fundamental concepts of digital signal processing, designing of digital filters, and brief knowledge about the Multirate digital signal processing.

Unit I Review of Transform Domain Techniques: Review of discrete time signals and systems, Properties and applications of discrete time Fourier transform, Review of Z transform, Analysis of minimum phase, maximum phase and inverse system.

Unit II Discrete Fourier Transform (DFT): Introduction and properties of DFT, Computation of circular convolution using DFT, Decimation in time FFT algorithm, Decimation of frequency FFT algorithm with radix-2, and radix-4.

Unit III Digital Filters (Part-I): Characteristics of practical frequency selective filters, Various signal flow graph structure of IIR filters.

IIR Filter design: Overview of Butterworth, Chebyshev and Elliptic approximations, Design of discrete time IIR filters using Impulse invariant, and Bilinear transformation methods, Spectral transformation of IIR filters.

Unit IV Digital Filters Part-II: Introduction andSignal flow graph structure of FIR Filter.

FIR Filter design: Symmetric, and Asymmetric FIR filters, Design of linear phase FIR filters using windows, and Frequency sampling method, Design of Optimum Equiripple linear phase FIR filters, Design of FIR differentiators.

Unit V Multirate Digital Signal Processing: Introduction, Decimation and Interpolation, Sampling rate conversion by a Rational factor.

Implementation of Sampling rate Conversion: Sampling rate conversion with Cascaded integrator, Comb filters,Polyphase structures for decimation, and interpolation filters, Application of multirate signal processing.

Text Books:

1. John. G. Proakis, "Digital Signal Processing", 4th Edition, Pearson Education.
2. Oppenheim and Schafer, "Digital Signal Processing", 2nd Edition, PHI Learning.

Reference Books:

1. Johnny R. Johnson, "Introduction to Digital Signal Processing", 1st Edition, PHI Learning.
2. Rabiner and Gold, "Theory and Application of Digital Signal Processing",3rd Edition, PHI Learning.
3. Ingle and Proakis, "Digital Signal Processing- A MATLAB based Approach", 3rd Edition, Thompson, Cengage Learning.

Course Outcomes:

After successful completion of the course, students will be able to:

CO1. **Analyze** discrete time system using transform methods.
CO2. **Compute** DFT using FFT algorithms.
CO3. **Design** IIR Filters.
CO4. **Design** FIR Filters.
CO5. **Apply** the concept of multi-rate signal processing in practical applications.

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B.Tech. VI Semester (Electronics and Telecommunication Engineering)

Subject Name: Digital Signal Processing Lab

Subject Code: 200601

L	T	P	C
-	-	2	1

Course Objectives

The objective of the course is to practically implement the convolution, correlation, DFT, IDFT and to design FIR & IIR filter.

1. To generate the following signals:-Unit Impulse Signal, Unit Step Signal, Unit Ramp Signal, Exponential Growing and Decaying Signal, Sine Signal And Cosine Signal.
2. Verification of sampling theorem.
3. To perform the Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform(IDFT)
4. To perform the Linear Convolution of given sequences using DFT and IDFT.
5. To perform the Circular Convolution of given sequences.
6. To perform the Linear Convolution using Circular Convolution.
7. To perform autocorrelation of a given sequence and verify of its Properties.
8. To perform the computation of N-point DFT of a given sequence also to plot magnitude and phase spectrum.
9. To analyze the spectral parameters of the given window functions.

Value Added Experiments

10. To design the low pass and high pass FIR filters using the given window functions.
11. To design the band pass and band stop FIR filters using the window functions
12. To design IIR Butterworth filter corresponding to given order and specifications.

Course Outcomes

After studying this course the students would be able to-

CO1. Generate discrete/digital signals using MATLAB

CO2. Calculate and Plot convolution of two given DT signal.

CO3. Plot frequency response of a given system and verify the properties of LTI system.

CO4. Implement FFT of given sequence and identify the reduction of computations using FFT.

CO5. Design FIR and IIR filters.

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B.Tech. VI Semester (Electronics and Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
200602	DC	Data Communication	70	20	10	-	-	100	4	-	-	4

Data Communication (200602)

Course objectives: To provide an introduction to fundamental computer network architecture concepts and their applications.

Unit I Introduction to Switching Techniques: Circuit switching, Message switching, Packet switching, Protocols, Layered network architecture and architecture OSI & TCP/IP reference model, Physical layer transmission medium, RS 232 C, Modem, Topologies.

Unit II Data Link Layer: Framing BSC, HDLC. ARQ: Stop and wait, Sliding window, Efficiency, Error detection and Error correction, Hamming codes, Parity checks – CRC, Checksum, HARQ.

Unit III MAC Layer: MAC sub layer – LAN protocols, ALOHA, Slotted and pure ALOHA, CSMA, CSMA/CD, Token bus, Token Ring, TDMA, CDMA, FDMA, Ethernet, Bridge, Router, Gateway, Switch.

Unit IV Network Layer: Routing – Data gram and Virtual Circuit, Distance vector and Link state Routing, Dijkstra's Algorithms, Congestion Control: Leaky bucket algorithm, Slow start, ATM model and ATM traffic management – AAL, X.25, IP layer, IP addressing.

Unit V Transport Layer: Connection oriented transport protocol mechanism, TCP, Transport flow regulation, UDP Segmentation & Reassemble, Session and Transport Interaction, Synchronization, Session protocols, FTP, Remote login.

Text Books:

1. Data Communication & Networking – B.A. Forouzan, Tata Mc-Graw Hill
2. Data and Computer Communication – W. Stallings, Pearson

Reference Books:

1. LANs – Keiser,Tata Mc-Graw Hill
2. Internetworking with TCP/IP – VOL-I – D.E. Comer, PHI
3. ISDN and Broad band ISDN with Frame Relay & ATM – W. Stalling, Pearson

Course Outcome:

After successful completion of the course, students will be able to:

CO1. **Examine** the concept of different layers in data communication networks.
CO2. **Analyze** the error and flow control in communication network.
CO3. **Explain** the concepts of MAC layer.
CO4. **Identify** the different types of routing used in IP.
CO5. **Classify** the transport mechanism in TCP/UDP.
CO6. **Explore** the different application protocol used in internetworking.

Item 8:

To review and finalize the ***Scheme & Syllabi (I & II semester)*** **of the NEW*B. Tech.* programme(s)** to be started by the departments w.e.f. the batch admitted in 2020-21.

1. Scheme
2. Syllabus

Item 12

To identify ***gaps in CO attainment levels*** for ***Jan-June 2020 semester*** and propose corrective measures for improvement.

1. Direct CO attainment
2. CO Gap analysis