MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Minutes of the online Board of studies meeting on 08-06-2021

Following members have attended the online meeting;

1.	Dr. Laxmi Shrivastava	Chairperson, Associate Professor and Head
2.	Dr. Jyoti Singhai	RGPV nominee by Academic Council, Professor, MANIT, Bhopal
3.	Dr Alok Jain	V.C. Nominee, RGPV Professor, SATI, Vidisha
4.	Dr. N. S. Raghava	External Member, Professor, ECE Deptt., DTU, Delhi
5.	Dr. P. K. Singhal	Professor
6.	Dr. V. V. Thakare	Associate Professor
7.	Dr. R. P. Narwaria	Assistant Professor
8.	Dr. Karuna Markam	Assistant Professor
9.	Prof. Madhav Singh	Assistant Professor
10.	Prof. D. K. Parsediya	Assistant Professor
11.	Prof. Pooja Sahoo	Assistant Professor
12.	Dr. Sandeep Sharma	Assistant Professor
13.	Dr. Vikas Mahor	Assistant Professor
14.	Dr. Rahul Dubey	Assistant Professor
15.	Dr. Deepak Batham	Assistant Professor
16.	Dr. Hemant Choubey	Assistant Professor
17.	All NPIU Faculty	Assistant Professor

Following external members could not attend the meeting:

1. Er. Gaurav Tripathi, Representative from industry/ corporate sector/ allied area External member, Sr. Enterprise Architect, HCL Technologies SEZ, Noida
2. Er. Pankaj Agarwal, Alumni, External member, Assistant Engineer, UP Power Corporation Limited

At the onset, the chairperson welcomed external members to the meeting of BOS and placed the agenda for the deliberation to the members. The minutes of the last BOS held in Nov, 2020 were approved by the experts. The minutes of the same were confirmed. The following deliberations were made as per the items of circulated agenda:

Item 1:	To propose the list and syllabi for all ***Departmental Elective (DE)*** Courses of ***VII Semester*** under the flexible curriculum along with their COs (Batch admitted in 2018-19). ***The list and syllabi for all DE courses along with their COs of VII semester has been discussed and finalized. The list and syllabi of the same can be find in Annexure-I.***
Item 2:	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 ***VII Semester*** *(Batch admitted in 2018-19)* ***The list of courses for the students of VII semester to opt from SWAYAM/NPTEL/MOOC Platform has been discussed and finalized. The details about the course duration, important dates are written in Annexure-II.***

Item 3:	To propose the list and syllabi for all ***Open Category (OC)*** Courses of ***VII Semester*** under the flexible curriculum along with their COs *(Batch admitted in 2018-19).* ***The list and syllabi for all Open Category (OC) Courses of VII Semester under the flexible curriculum along with their COs has been discussed and finalized, the same can be find in Annexure-III.***
Item 4:	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 **V semester** (for the batch admitted in 2019-20) and for **VII semester students** (for the batch admitted in 2018-19)]* ***The list of courses against the Hons/Minor category for the V and VII Semester students has been discussed and finalised. The details for the same can be traced out in Annexure-IV.***
Item 5:	To review and update the syllabi for all ***Departmental Core (DC) Courses*** of ***V & VII Semester*** *(for b*atches admitted in 2018-19 &2019-20) under the flexible curriculum along with their COs ***The syllabi for all Departmental Core (DC) Courses of V Semester has been discussed and finalized along with their COs. In the flexible curriculum; there is no departmental core category subject in VII semester. The syllabi of the DC courses of V sem are available in Annexure-V.***
Item 6:	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform for ***Seminar/Self Study Courses*** in V Semester (Batch admitted in 2019-20) ***The list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform for Seminar/Self Study Courses in V Semester has been finalized, the same is written in Annexure-VI.***
Item 7:	To prepare and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of III & IV semester*** **of the newly started B. Tech. programme(s) in the emerging areas (EE-IoT, IT-IoT, IT-AIR and MAC) (started from 2020-21 Session)** *{Applicable for the concerned departments only; others must mentions NA against this agenda point}* ***The structure of the scheme and the syllabi of the concerning subjects has been discussed and finalised by the committee. The scheme and syllabus of the same can be find out in the Annexure VII-VIII.*** ***Annexure VII-Scheme*** ***Annexure VIII- Syllabus***
Item 8:	To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in V and VII semester (Batches admitted in 2018-19 & 2019-2020) ***The Experiment list/ Lab manual for Laboratory Courses to be offered in V and VII semester has been discussed and finalized. Please find the Annexure-IX for the details.***
Item 9:	To propose a suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory courses to be offered in July-December 2021 ***Skill based mini-project' category in various laboratory courses to be offered in July-December 2021 has been prepared. The same has also been discussed and finalized in the meeting. The list of such projects is available in Annexure-X.***
Item 10:	To review the CO attainments for July-December 2020 semester, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels ***The review of CO attainments for July-December 2020 semester has been done, the gaps were***

	identified, and the suggestive corrective measures were discussed. The sheet for the same can be find out in Annexure-XI.
Item 11:	To review curricula feedback from various stakeholders, its analysis and impact ***Curriculum feedback has been taken from students, parents, employers and alumni. The analysis of all the feedbacks has been shown to the experts and has been approved by the same. The feedbacks are available in following Annexures.*** ***Annexure-XII: Students Curriculum feedback*** ***Annexure XIII: Parents Survey*** ***Annexure XIV: Employer and other stakeholders feedback*** ***Annexure XV: Alumni Feedback***
Item 12:	To review course outcomes (COs) feedback of various courses, its analysis and impact ***The course outcomes (COs) feedback of various courses has been reviewed by the team along with its analysis and impact. The detailed report is available in Annexure-XVI.***
Item 13:	To present matters, if any, related to new curriculum/structure PG programme (Batch admitted in 2020-21) needing rectification in the forthcoming Academic Council meeting ***The structure of the scheme were discussed and finalize with no rectification needed. Subject list for one MOOC course in III semester (ME CCN) was finalized and written in Annexure-XVII.***
Item 14:	Any other department specific matter(s) Following: ***With the permission of chair; list of subjects has been finalized to students for self learning/presentation in III Sem for both Electronics Engineering/ Electronics & Telecommunication Engineering. The list is available in Annexure-XVIII.***

As per the suggestions of the expert during the BOS meeting, following suggestions has been incorporated in the scheme after the consent of the experts.

1. ***Skill based mini project has been introduced in the scheme from academic year 2021-22.***
2. ***Structure of the scheme has been modified. The exam mode, and teaching mode has been included in the structure of the scheme.***
3. ***Experts suggested to keep MOOCs courses in the trackwise manner. The same has been incorporated in the scheme with the consent of the experts.***
4. ***As per the suggestions from expert member, and student curriculum feedback, Electronics-I has been broken into three different subjects namely, Electronics Devices, Engineering materials, Electronics circuit design.***

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Annexure-I

Item 1

To propose the list and syllabi for all ***Departmental Elective (DE)*** Courses of ***VII Semester*** under the flexible curriculum along with their COs (Batch admitted in 2018-19).

S.No	Category	Subject Code	Subject Name
1	Departmental Electives (DE-3)	200711	Satellite and Radar Communication Systems
2		200712	VLSI Design
3		200713	Microwave Engineering

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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	
200711	DE-III	Satellite & Radar Communication	70	20	10	-	-	100	2	-	-	2

Satellite & Radar Communication (200711)

Course objective: The main objective of the course is to provide a comprehensive and state of the art knowledge in the area of satellite communication and radar Systems.

Unit 1 Introduction: Introduction to Satellite Communication, Origin and History of Satellite Communication, Current State of Satellite Communication, Orbital Aspect of Satellite Communication , Orbital Mechanism, Equation of Orbit, Locating Satellite in Orbit , Orbital Elements ,Orbital Perturbation , Frequency Allocations and Applications.

Unit 2 Space Craft Sub System and Earth Station: Altitude and Orbit Control System , Telemetry Tracking and Commend Power System, Communication Sub System, Earth Station Design , Antenna Tracking, LNA, HPA,RF, Multiplexing Factor Affecting Orbit Utilization, Tracking, Equipment for Earth Station.

Unit 3:Satellite Link Design: Satellite Link Design, System Noise Temperature and G/T Ratio, Downlink Design, Domestic Satellite System, Uplink Design, Earth Path Propagation Effect, Losses in Link Design.

Unit 4 Introduction to RADAR: Principles OfRADAR, Radar Frequencies, Pulse RADAR, RADAR Range Equation, RADAR Application, RADAR Cross Section of Targets RADAR Indicator, Noise Figure of Receiver, Mixer Duplexer, Line Pulsar.

Unit 5 Operational RADAR : MTI RADAR, Delay Line Canceller, Digital Signal Processing, Limitation of MTI RADAR, CW RADAR, FM CW RADAR.

Text Book:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. RADAR System –Skolnik, 4th Edition, Tata McGraw-Hill, 2006.

References Books:

3. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.
4. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed, 2007.
5. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

Course Outcomes

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

CO1. **Explain** Basic Concepts and Terminologies of Satellite Communication

CO2. **Design** the Earth Station and Space Craft System

CO3. **Calculate**the Link Power Budget Including Propagation Effects in Satellite.

CO4. **Evaluate**the Various Performance Factors Related to the RADAR

CO5. **Explain**Target Detection and Tracking using Radar Systems.

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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	
200712	DE-III	VLSI Design	70	20	10	-	-	100	2	-	-	2

VLSI Design (200712)

Course objectives: To understand the fundamental properties of digital CMOS logic circuits using basic MOSFET equations and to develop skills for various logic circuits using CMOS design.

Unit I MOS Transistor: The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitances.

Unit – II MOS Inverters Static Characteristics: Introduction, Voltage Transfer Characteristic (VTC), Noise Immunity and Noise margins, Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter, DC Characteristics of CMOS Inverter, Calculation of VIL, VIH, VOL, VOH and Vth, Design of CMOS Inverters, Supply Voltage Scaling in CMOS Inverters, Power and Area considerations.

Unit – III MOS Inverters Dynamic Characteristics: Switching Characteristics and Interconnect Effects, Switching Characteristics of CMOS Inverter- Delay-Time Definitions, CMOS Propagation Delay, Calculation of Delay times, Power Dissipation-Switching, Short-Circuit and Leakage Components of Energy and Power, Power-Delay Product.

Unit – IV CMOS Logic Structures and Layout Design: Combinational MOS logic circuits- CMOS Logic circuits (NAND, NOR and Complex Logic Gates, Multiplexers etc.), CMOS Transmission Gates (Pass Gates). CMOS n-Well Process, layout design rules, layout design of CMOS Inverter, designing of stick diagram.

Unit – V Semiconductor Memories and Low-Power CMOS Logic Circuits: Semiconductor memories: non-volatile and volatile memory devices, flash memories, SRAM cell design, 1T DRAM cell design, dynamic CMOS logic circuits, domino logic CMOS circuits.

Text Books

1. Sung-Mo Kang & Yusuf Leblebici, “CMOS Digital Integrated Circuits – Analysis and Design”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2003.
2. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic, “Digital Integrated Circuits: a design perspective”, 2nd Edition, Pearson Education, 2003.

Reference Books

1. David A. Hodges, Horace G. Jackson, Resve A. Saleh, “Analysis and Design of Digital Integrated Circuits: In Deep Submicron Technology”, McGraw, 2003.
2. David A. Johns and Ken Martin, “Analog Integrated Circuit Design” John Wiley and Sons Inc., 1997.
3. Neil Weste and David Harris, “CMOS VLSI Design: A Circuits and Systems Perspective”, 4th Edition, Addison-Wesley, 2010
4. John P.Uyemura, “CMOS Logic Circuit Design”, Springer International Edition.2005.Logic Circuit Design”, Springer International Edition.2005.

Course Outcome:

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

CO1. **Analyze** the working of CMOS Transistors in different Modes of Operation.
CO2. **Derive** the Static Characteristics of Resistive Load, N-Type MOSFET Load CMOS Inverters.
CO3. **Evaluate** the Propagation Delay and Power Dissipation of a CMOS Inverter.
CO4. **Design** a CMOS Logic Circuit and Layout Design for a Given Boolean Function.
CO5. **Analyze** the Design and Operation of Various Semiconductor Memories.

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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	
200713	DE-III	Microwave Engineering	70	20	10	-	-	100	2	-	-	2

Microwave Engineering (200713)

Course objectives: The goal of this course is to introduce students to the concepts and principles of the advanced microwave engineering, theory and design of passive and active microwave components, and microwave circuits.

Unit I Waveguides: Review of Maxwell's equation, Rectangular Waveguides, Characteristics of TE and TM wave in Rectangular Wave Guides, Dominant mode in Rectangular Waveguide, Cylindrical Waveguides, Waveguide Excitation.

Unit II Microwave components & their S-parameters Analysis: Microwave Resonator, Microwave Network representations. Scattering Matrix, S-Matrix for two, three & four port Networks such as E-plane Tee, H-plane Tee, Magic Tee, Directional Coupler, Tuning Screw, Quarter Wave Transformer, Matched Load, Isolator, Circulator.

Unit III Microwave Tubes : Transit Time Effect, Tubes for very high frequency, Limitation of Conventional Tubes, Reflex Klystron, Two Cavity Klystron, Magnetron, Travelling Wave Tube.

Unit IV Microwave Solid State Devices: Pin diode, Tunnel diode, Gunn Effect devices, Varactor diode, IMPATT diode, Circuit applications of above devices.

Unit V Microwave Measurement and Introduction to Planer Transmission lines: Measurement of VSWR, Impedance, Frequency, Dielectric Constant Power, Attenuation and Phase Shift, Planar Transmission lines, Introduction to Micro Strip Lines, Slotlines, Coplanar lines.

Text books:

1. Microwave Devices and Circuits, Samuel Y. Liao, Prentice Hall, 3rd edition, 2003.
2. Microwave engineering-David M. Pozar, 4th ed., John Wiley & Sons, Inc., 2004.

Reference Books:

1. Introduction to Microwaves -Wheeler G.J., Literary Licensing, LLC, 2012
2. Microwave circuits & passive devices- Sisodia and Raghuvanshi, New age International, 1st edition, 1987.
3. Microwave and Radar Engineering. Kulkarni, 5th edition, Dipan, 2016.

Course Outcomes

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

CO1. **Analyze** Rectangular and Circular Waveguides.
CO2. **Calculate** S- parameters of Microwave components.
CO3. **Describe** the working characteristics and applications of Microwave Tubes.
CO4. **Explain** the working characteristics and applications of Microwave Diodes.
CO5. **Measure** VSWR, Impedance, Frequency, Dielectric Constant Power, Attenuation and phase shift and planar transmission lines.

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Annexure-II

Item 2

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 ***VII Semester*** *(Batch admitted in 2018-19)*

S.No	Category	Subject Code	Subject Name
1	Departmental Electives (DE-4)	200751	Digital Image Processing
2		200752	Introduction to Wireless Cellular Communication
3		200753	Milimeter wave Technology

S.No	**Category Code**	**Course Code**	**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	DE (DE-4)	200751	Digital Image Processing	12	06.05.2021	23.08.2021	Prof Pooja Sahoo
2		200752	Introduction to Wireless Cellular Communication	12	06.05.2021	23.08.2021	Prof Madhav Singh
3		200753	Milimeter wave Technology	08	06.05.2021	02.08.2021	Prof D K Parsedia

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Annexure-III

Item 3

To propose the list and syllabi for all ***Open Category (OC)*** Courses of ***VII Semester*** under the flexible curriculum along with their COs *(Batch admitted in 2018-19)*

S.No	Category	Subject Code	Subject Name
1	Open Course (OC-2)	900206	Satellite System
2		900207	Consumer Electronics
3	Open Course (OC-3)	900218	MEMS & Mechatronics
4		900219	Multimedia Communication

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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	
900206	OC-2	Satellite Systems	70	20	10	-	-	100	2	1	-	3

Satellite Systems (900206)

Course objective: The main objective of the course is to provide a comprehensive knowledge in the area of satellite system. The course emphasis is on the study of orbital mechanics, launching techniques, working of Indian Regional Navigation Satellite System.

Unit 1 Introduction: Introduction of Satellite Communication, Origin and History of Satellite Communication, Current State of Satellite Communication, Orbital Aspect of Satellite Communication , Orbital Mechanism , Equation of Orbit, Locating Satellite in Orbit , Orbital Elements , Orbital Perturbation.

Unit 2 Space Craft Sub System and Earth Station: , Altitude and Orbit Control System, Telemetry Tracking and Commend Power System, Communication Sub System, Earth Station Design, Antenna Tracking, LNA, HPA,RF, Multiplexing Factor Affecting Orbit Utilization, Tracking, Equipment for Earth Station, Frequency Allocation in Satellite Communication.

Unit 3 Indian Satellite Launch Vehicle: SLV (Satellite Launch Vehicle), ASLV (Augmented Satellite Launch Vehicle),PSLV(Polar Satellite Launch Vehicle), GSLV (Geosynchronous Satellite Launch Vehicle), GSLV Mk III, Sounding Rockets.

Unit 4Satellite Link Design: Satellite Link Design, System Noise Temperature andG/T Ratio, Downlink Design, Domestic Satellite System, Uplink Design

Unit 5 Indian Regional Navigation Satellite System: IRNSS System Overview, IRNSS Signal Characteristics, IRNSS Data Structure, Sub Frame Structure.

TEXT BOOK:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. https://www.isro.gov.in/update/06-nov-2015/book-indian-space-programme-released-second-anniversary-of-mars-orbiter

REFERENCES BOOKS:

3. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.
4. IRNSS SIS ICD for standard positioning service, version 1.1, August 2017, ISRO Satellite Centre Indian Space Research Organization Bangalore

Course Outcomes

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

- **CO1.** **Explain** basic concepts and terminologies ofSatellite Communication.
- **CO2.** **Design** the Earth station and Space Craft System.
- **CO3.** **Explain** the Indian Satellite Launchers.
- **CO4.** **Calculate** the Link power budget including Propagation effects in Satellite.
- **CO5.** **Examine** the Indian Regional Navigation Satellite System.

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B.Tech. VII 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	
900207	OC-2	Consumer Electronics	70	20	10	-	-	100	2	1	-	3

Consumer Electronics (900207)

Course objectives: Objective of this course is to make the students understand the technology behind consumer electronics appliances. The units in the course are designed to impart the concepts of Audio Video systems, Television and other domestic appliances like Microwave ovens and air-conditioning system.

Unit I Introduction To Audio Systems: Microphone, Carbon, Crystal and Moving Coil Microphone. Loudspeakers: Permanent Magnet Loudspeaker and its Construction, Introduction to Woofers and it's Operation, Audio System, Anatomy of Hi-Fi System.

Unit II Television System: Elements of Television System, Scanning Process, Persistence of Vision and Flicker, Vertical and Horizontal Resolution. Introduction to LCD and Plasma Display. Introduction to LED TV Technology.

Unit III Landline and Mobile Telephony: Telecommunication Systems, Modulation Techniques: Analog and Digital Methods, Radio System Characteristics, Telephone Receiver and Handset.

Unit IV Cellular and Mobile Communication: Cellular Communications, Transmitting Receiving Antenna, Digital Cellular Phone Block Diagram, Types of Mobile Phones, Cellular Systems.

Unit V Domestic Appliances: Microwave Oven: Microwaves, Transit Time, Magnetrons, Wave Guides, Microwave Oven Block Diagram. Air Conditioning System: Components of Air Conditioning System, All-Water Air Conditioning System, All-Air Air Conditioning System.

Text Book:

1. S. P. Bali, "Consumer Electronics" Pearson Education India, 2nd Edition.

Reference Books:

1. Electronic communication systems by Roy Blake, Thomson Delmar, Cengage Learning, inc; 2nd edition edition, 2011
2. Colour Television by R.R.Gulati, New Age international; Second edition, 2007
3. How Electronic Things Work.& What to Do When They Don't -Robert L. Goodman, TMH, 1998
4. Digital Satellite Television Handbook By Mark E. Long, Newnes; Pap/Cdr edition, 1999.

Course Outcome:

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

CO1. **Describe** various types ofAudio Systems.
CO2. **State** the working principle ofTelevision System.
CO3. **Analyze** the operation of a Landline Telephone System.
CO4. **Explain** the working ofCellular and MobileSystem.
CO5. **Explain** the working of various Consumer Electronic appliances.

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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	
900218	OC-3	MEMS & Mechatronics	70	20	10	-	-	100	3	-	-	3

MEMS and Mechatronics (900218)

Course Objectives: To understand basics of MEMS and basic architecture of the mechatronics system; design and characteristics of different sensors, mechanical and electrical actuators and their selection for design of mechatronic systems

UNIT-1 Introduction to MEMS: Basics of MEMS (Micro-Electro Mechanical Systems), Need of Miniaturization, Micro fabrication, Micromachining, Material for MEMS, Types of MEMS: RF-MEMS, Bio-MEMS, etc, Various Applications.

UNIT-2 Introduction to Mechatronics Systems: Basic Building Blocks of Mechatronic Systems. Mechatronics Key Elements, Mechatronics in Home, office and Industry Automation, Scope of Mechatronics, Advantages of Mechatronics, Pre-Requisites for Mechatronics.

UNIT-3 Sensors: Performance Characteristics of Sensors and Transducers, Position and Speed Measurement; Proximity Sensor, Potentiometer, LVDT, Digital Optical Encoder, Stress and Strain Measurement; Strain Gages, force Measurement With Load Cells, Temperature Measurement; Thermometer, Thermocouple, Vibration and Acceleration Measurement, Pressure and Flow Measurement.

UNIT-4 Actuators and Control Unit: Electromagnetic Principles, Solenoids and Relays, Electric Motors, DC Motors, Stepper Motors, Hydraulic and Pneumatic Actuators, Microactuators, Piezoelectric Actuators, Selection Criteria for Sensors and Actuators, Interfacing of Sensors and Actuators, Control Unit; Microcontroller, PLC.

UNIT-5 Various Example of Mechatronics System: Manipulator/ Robotic Arm, Quad copter, Mobile Robots, Hexapod Robots, Humanoid and Biped Robots.

Text Books:

1. Introduction to Mechatronics and Measurement Systems, Alciatore and Histand Tata McGraw-Hill, 3rd edition, 2007.
2. Mechatronics, Kenji Uchino and Jayne R. Giniewicz, CRC Press, 2nd edition, 2019.

Reference Books:

1. Applied Mechatronics- A. Smaili and F. Mrad, OXFORD university press, 2007.
2. Mechatronics System Design, Shetty and Kolk CENGAGE Learning, India Edition, 2nd edition, 2010.
3. Mechatronics, Necsulescu, Pearson education, 1st edition, 2002

Course Outcome:

After completion of this course students will be able to:

CO1. **Describe** MEMS, their types and applications.
CO2. **Analyze** the Mechatronics system.
CO3. **Analyze** the performance characteristics of Sensors and Actuators.
CO4. **Interface** Sensors and Actuators using control unit such as Microcontroller and PLC.
CO5. **Construct** the prototype of manual Robotic Arm.

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B.Tech. VII 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	
900219	OC-3	Multimedia Communication	70	20	10	-	-	100	3	-	-	3

Multimedia Communication (900219)

Course Objective: To Understand the Multimedia Communications Systems, Applications and its Principles **.**

Unit 1: Basics of Analog And Digital Video: Color Video Formation and Specification, Analog TV System, Video Raster, Digital Video Formats, 2D Motion Estimation: Optical Flow Equation.

Unit 2: Multimedia Information Representation: Introduction to Compression Techniques, Text and Image Compression, Standards for Multimedia Communications..

Unit 3: Basic Compression Techniques: Information Bound for Lossless and Lossy Source Coding: Shannon Source Coding Theorem, Binary Encoding(Huffman Coding and Arithmetic Coding).

Unit 4: Video Compression Standards: H.261 and H.263, MPEG1, MPEG2, MPEG4, MPEG7.

Unit 5: Error Control : Error Control in Video Communications. Video Transport over the Internet and Wireless.Networks.

Textbook:

1. Y. Wang, J. Ostermann, and Y.Q.Zhang, "Video Processing and Communications," 1st ed., Prentice Hall, 2002. ISBN: 0130175471.

Reference Book:

1. Iain E G Richardson, "H.264 and MPEG-4 Video Compression," John Wiley & Sons,September 2003, ISBN 0-470-84837-5.

Course Outcomes:

CO1. **Understand** the basics of Analog and Digital Video: Video representation and transmission.
CO2. **Analyze** Analog and Digital Video Signals and Systems.
CO3. **Know** the fundamental video processing techniques.
CO4. **Acquire** the basic skill of designing video compression and familiarizing with Video Compression standards.
CO5. **Know** the basic techniques in designing video transmission systems: error control and rate control.

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Annexure-IV

Item 4

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 **V semester** (for the batch admitted in 2019-20) and for **VII semester students** (for the batch admitted in 2018-19)]*

Category	Semester	Name of The course	Duration of the Course in weeks	Course Registration		Name of the Mentor Faculty
				Start Date	End Date	
Electronics & Telecommunication Engineering (V Semester)						
Hons	V	Solid State Physics	08	06.05.2021	23.08.2021	Prof Rishabh Shukla
		Cloud Computing	08	06.05.2021	23.08.2021	Prof Shambhu Kumar
		Solar Photovoltaic Fundamentals, Technology and Applications	08	06.05.2021	23.08.2021	Prof. Deepak Batham
Minors		Semiconductor Devices and Circuits	12	06.05.2021	23.08.2021	Dr. Hemant Choubey
		Digital Circuits	12	06.05.2021	23.08.2021	Dr Vandana Vikas Thakare
		Analog Communication	12	06.05.2021	23.08.2021	Dr. Karuna Markam
Electronics & Telecommunication Engineering (VII Semester)						
Hons	VII	Microelectronics Devices to Circuits	12	06.05.2021	23.08.2021	Dr Vikas Mahor
		Data Science for Engineers	12	06.05.2021	23.08.2021	Dr Sandeep Sharma
		Design of photovoltaic systems	12	06.05.2021	23.08.2021	Prof Arpita Singhal
Minors		Microwave Engineering	12	06.05.2021	23.08.2021	Prof Santosh Sharma
		Image Signal Processing	12	06.05.2021	23.08.2021	Dr Ashish Gupta
		Control Engineering	12	06.05.2021	23.08.2021	Dr Rahul Dubey

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Annexure V

Item 5

To review and update the syllabi for all ***Departmental Core (DC) Courses*** of ***V& VII Semester*** *(for b*atches admitted in 2018-19 & 2019-20) under the flexible curriculum along with their Cos

S.No	Category	Semester	Course Code	Course Name
1	Departmental Core	V	200502	Electromagnetic Theory
		V	200503	Microprocessor and Interfacing
3		V	200504	Linear Control Theory
4		V	200505	Digital Communication
5		VII	NA as per Scheme	

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B.Tech. V 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	
200502	DC	Electromagnetic Theory	70	20	10	-	-	100	2	1	-	3

Electromagnetic Theory (200502)

Course objectives: To develop an understanding of fundamental concepts of electromagnetic fields with an emphasis on wave propagation and to create ability to relate basic electromagnetic concepts to the performance of devices, circuits, and systems.

Unit I Electrostatics: Coulomb's Law, Electric field intensity, Electric flux and flux density, Gauss law, Boundary relations, Concept of divergence, Curl, Scalar and vector potential, Divergence theorem, Stokes theorem, Electric field in dielectric and conductor, Continuity equation, Poisson's and Laplace's equations.

Unit II Magnetostatics: Lorentz force, Magnetic field intensity (H) – Biot–Savart's Law– Ampere's Circuit Law – H due to straight conductors, Circular loop, Infinite sheet of current, Magnetic flux density (B) –in free space and conductor, Magnetic materials – Magnetization.

Unit III Electrodynamic Fields: Magnetic field in multiple media – Boundary conditions, Scalar and vector potential, Poisson's equation, Magnetic force, force between current carrying wires, Magnetic circuits – Faraday's law, Displacement current – Maxwell's equations (differential and integral form) –for steady, time varying and time harmonic fields.

Unit IV Electromagnetic Wave Equation: General wave equation, Uniform plane wave in free space, Perfect dielectric, Lossy dielectric and conducting medium, Skin depth, Poynting vector and Poynting theorem.

Unit V Polarization and Reflection of Wave: Wave Polarization- linear-elliptic-circular**,** Reflection of uniform plane waves, Normal incidence and Oblique incidence, Brewster angle, Total internal reflection.

Text Books:

1. Elements of Engineering Electromagnetic Third Edition- N.N. Rao- Prentice Hall, India.
2. Elements of Electromagnetic, Second Edition- Matthew N.O. Sadiku- Saunders coll Publishing.

Reference Books:

1. Fields & Waves in Communication Electronics - S.Ramo, J.R. Whinnery& T. Van Duzer- John Wiley & Sons.
2. Electromagnetic - J.D. Kraus-McGraw Hill.
3. Electromagnetic Waves & Radiating Systems - E.C. Jordan & K.G. Balmain- Prentice Hall.

Course Outcomes

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

CO1. **Solve** the problems associated with static electromagnetic fields in different engineering situation.
CO2. **Describe** static and dynamic electric and magnetic field.
CO3. **Apply** boundary conditions for electric and magnetic fields at the interface of two different media.
CO4. **Solve** diverse engineering problems with the help of Maxwell equations.
CO5. **Analyze** the behavior of plane waves in different media
CO6. **Examine** the phenomenon of wave propagation and reflection in different media.

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B.Tech. V 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	
200602	DC	Data Communication	70	20	10	30	20	150	2	-	2	3

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.

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B.Tech. V 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	
200503	DC	Microprocessor & Interfacing	70	20	10	30	20	150	2	-	2	3

Microprocessor and Interfacing (200503)

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

Unit I: Introduction to Microprocessor: History and evolution of microprocessor and their classification, Introduction to microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, Interrupts, Interrupts and interrupt service routine.

Unit II: 8085 Assembly Language Programming: 8085 instruction set, 8085 assembly language programming, Addressing modes, Counters and Time delays, Instruction cycle, Machine cycle, T-states, timing diagram for 8085 instructions.

Unit III: Peripheral Devices and their Interfacing: Introduction to memory interfacing and various interfacings chips like: Programmable input/output ports 8155/8255, Programmable interval timer 8253/8254, keyboard/display controller 8279, Programmable communication interface 8251 USART, Programmable interrupt controller 8259, DMA controller 8257.

Unit IV: Architecture and Programming of 16-Bit Microprocessor: 8086 Block diagram and Architecture, Pin configuration of 8086, Execution Unit (EU) and Bus Interface Unit(BIU), Minimum mode & Maximum mode operation, Memory segmentation, Instruction set and addressing modes of 8086, Introduction to 8086 assembly language programming.

Unit V: Microcontrollers & Embedded Systems: Introduction to microcontrollers and embedded systems, 8051 architecture, Pin description, I/O configuration, Interrupts, Addressing modes, an overview of 8051 instruction set, use of microcontrollers in real time embedded system design.

Text Book:

1. Ramesh. S. Gaonkar, Microprocessor architecture Programming and Application with 8085 - Penram International Publishing, 4th Edition.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputer" DhanpatRai, 5th Edition.

Reference Books:

1. Douglas V Hall., "Microprocessor and Interfacing" Tata Mcgraw Hill
2. A.K. Ray and K. M. Bhurchandi , "Advance Microprocessor and Peripheral", Tata Mcgraw Hill

Course Outcomes

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

- **CO1.** **Explain** the architecture and organization of 8085 microprocessors.
- **CO2.** **Develop** assembly language programming skill for 8085.
- **CO3.** **Design** the Interfacing circuitry of memory and I/O devices using interfacing chips/PICs with 8085.
- **CO4.** **Discuss** the architecture and organization of 8086 microprocessors.
- **CO5.** **Describe** the instruction set and architecture of 8051 microcontroller.

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B.Tech. V 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	
200504	DC	Linear Control Theory	70	20	10	30	20	150	2	-	2	3

Linear Control Theory (140504/200504)

Course Objectives: learning of control system theory and its implementation in practical systems using electronic devices.

UNIT-I: Introduction to Control Systems: Basic control system terminology, Open loop and Closed loop system, Feedback control, Different modeling of physical systems, Linear approximation of physical systems. Transfer function of linear systems, Block diagram algebra and Signal flow graphs, Effects of negative feedback.

UNIT II: **Time Domain Analysis:** Test input signals, First order systems, Second order systems, Effects of addition of poles and zeros to open and closed loop transfer functions, Steady state error, Constant and error coefficients for type 0, 1, and 2 systems.

UNIT III: Stability Analysis: Concept of stability of linear systems, Relation between the closed loop poles and stability, Relative stability, Absolute stability, Routh Hurwitz criteria and its applications, Root locus plot.

UNIT IV: Frequency Domain Analysis: Performance specifications in frequency domain, Co-relation between frequency domain and time domain, Polar plots and Bode plots of transfer function, Nyquist stability criterion, Assessment of relative stability.

Unit V: Introduction to Controllers: Introduction to Proportional, Integral, and Derivative controller, PD controller, PI controller, PID controller, Design of various controllers and their limitations.

Text Books:

1. Control System Engineering- I. J. Nagrath& M. Gopal, New Age International.
2. Modern Control Engineering –K. Ogata, Prentice Hall.
3. Control System- A. Anand Kumar, PHI
4. Control System Engineering – B.S. Manke, Khanna publications.

Reference Books:

1. Automatic Control System— B. C. Kuo,Wiley.
2. Control System Engineering- Norman Nise, John Wiley & Sons.

Course Outcomes:

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

CO1. **Determine** the transfer function of linear control system.
CO2. **Evaluate** the time domain response of control system for different standard inputs.
CO3. **Compute** the steady state error for type 0,1,2 systems.
CO4. **Analyze** the stability of control system using time and frequency domain methods.
CO5. **Design** proportional, integral, and derivative controller, PD, PI, PID controllers.

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B.Tech. V 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	
200505	DC	Digital Communication	70	20	10	30	20	150	2	-	2	3

Digital Communication (200505)

Course Objectives: The main objective of this course is to understand the basic concepts of digital modulations, signal-space analysis and digital transmission techniques.

Unit I Sampling: Sampling theorem for Low pass and Band pass signals, Ideal sampling, Natural sampling and Flat top sampling, Crosstalk, Aliasing, Time division multiplexing, PAM, PWM and PPM their generation and detection.

Unit II Digital Modulation Systems: Pulse Code Modulation, Quantization, Quantization noise, Companding, Inter symbol interference, Eye pattern, Delta modulation, Adaptive delta modulation and DPCM. Encoding techniques: On-Off signaling, Polar signaling, RZ signaling, Bipolar signaling, AMI, Manchester code, Differential encoding their advantage and disadvantages.

Unit III Band Pass Data Transmission: ASK, Binary phase shift keying (BPSK), QPSK, DPSK, Coherent and Non coherent BFSK, Minimum shift keying, QAM, Concept of M-ary PSK and M-ary FSK, Spectral properties of QPSK and MSK.

UNIT IV Detection Techniques: Matched filter and Correlator detector, Gram Schmidt orthogonalization procedure and Concept of signal space for the computation of probability of error, Calculation of error probability for BPSK, QPSK, QAM and coherent BFSK, Comparison of different modulation techniques.

Unit V Information Theory and Coding: Concept of information theory, Entropy and Information rate, Channel capacity, Shannon's theorem, Shannon Hartley theorem , BW and signal to noise ratio trade off, Sources encoding, Extension of zero memory source.

***Error correcting codes*:** Properties of linear block codes, Encoding and Decoding of linear block codes and cyclic codes, Burst error correcting codes, Concept of convolution codes.

Text Books:

1. Singh, R.P. &Sapre, S.D, "Communication Systems: Analog & Digital", Tata McGraw-Hill, 5th reprint, 2000.
2. John G. Proakis, "Digital Communication", McGraw Hill Inc, 5th Edition, 2008.

Reference Books:

1. Simon Haykin, "Communication Systems", John Wiley & Sons, 4th Edition, 2000.
2. Taub & Schilling, "Principle of Communication Systems", 2nd Edition, 2003.

Course Outcomes:

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

CO 1. **Explain** the process of sampling and pulse modulation.
CO 2. **Analyze** digital modulation systems and line coding schemes.
CO 3. **Describe** the band pass data transmission techniques with spectral analysis.
CO 4. **Determine** the base band pulse transmission techniques and error probability.
CO 5. Illustrate the concepts of information theory, source coding and channel coding**.**

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Annexure VI

Item 6

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform for ***Seminar/Self Study Courses*** in V Semester (Batch admitted in 2019-20)

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					
V	Demystifying Networking	04	06.05.2021	02.08.2021	Prof. Deepak Batham
V	Basics of Software Defined Radios and Practical Applications	04	06.05.2021	02.08.2021	Prof Santosh Sharma
V	Foundation of Cognitive Robotics	04	06.05.2021	02.08.2021	Prof. Shambhu Kumar

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Item 7

To prepare and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of III & IV semester*** **of the newly started B. Tech. programme(s) in the emerging areas (EE-IoT, IT-IoT, IT-AIR and MAC) (started from 2020-21 Session)**

Scheme

Syllabus

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Annexure IX

Item 8

To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in V and VII semester (Batches admitted in 2018-19 & 2019-2020)

S.No	Semester	Subject Code	Subject Name
1	V	200503	Microprocessor & Interfacing
2		200504	Linear Control Theory
3		200505	Digital Communication
4		200506	Minor Project

S.No	Semester	Subject Code	Subject Name
1	VII	200705	VLSI Lab
2		200707	Creative Problem Solving (Simulation & Fabrication)

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

Subject Name: Microprocessor and Interfacing

Subject Code: 200503

L	T	P	C
-	-	2	1

Lab Objectives

This course gives the ability to the students to learn the assembly language programming of 8085, 8086 microprocessor and 8051 microcontroller and their interfacing with different peripherals.

List of Experiments

1. Write an assembly language program to perform different arithmetic operations of 8 bit numbers using 8085 microprocessor.
2. Write an assembly language program to find whether the number is even or odd using 8085 microprocessor.
3. Interface Stepper Motor to the 8085 microprocessor system and write an 8085 assembly language program to control the Stepper Motor.
4. Write an assembly language program to generate standard waveforms using DAC and display waveforms on CRO with 8085 microprocessor.
5. Write an assembly language program to obtain 2's complement of a given number using 8086 microprocessor.
6. Write an assembly language program to perform arithmetic operations of two BCD numbers using 8086 microprocessor.
7. Write an assembly language program to interfacing 8253 Timer with 8086 microprocessor for different modes.
8. Write an assembly language program to interface ADC card with 8051 microcontroller and display the digital value onthe LCD.

Value added Experiments:

9. Write an assembly language program to interfacing temperature measurement card with 8086 microprocessor and display the temperature on LCD.
10. Write an assembly language program to interface 7 segment display with 8051 Microcontroller.

Course Outcomes:

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

CO1. Develop the assembly language programs for the different arithmetic and logical operations using 8085, 8086 microprocessor and 8051 microcontroller.

CO2. Design interfacing circuits for different I/O devices using PPIs with 8085, 8086 microprocessors and 8051 microcontroller.

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

L	T	P	C
-	-	2	1

Subject Name: Linear Control Theory Lab

Subject Code: 200504

Lab Objectives

This course gives students the knowledge on application of machines and electronics devices with control systems. Students will also come to know about the various feedback systems used in the control systems.

List of Experiments

1. Control the Angular Position of a Load using the Synchronous (Motor) Transmitter & Receiver.
2. Control the Luminosity of a Bulb using the Magnetic Amplifier Kit.
3. Plot the Graph between Speed (rpm) and Voltage of DC Motor.
4. Obtain the Characteristics of Stepper Motor.
5. Demonstrate the Input-Output Relationship of AC - Servo Motor.
6. Obtain the Time Response of a Simulated Linear System and to Correlate with Theoretical Result.
7. Evaluate the Performance of P, PI, PD and PID Controllers.
8. Simulation of 2^{nd} order Linear Time-Invariant Control Systems using MATLAB.

Course Outcomes:

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

CO1. **Analyze** the performance of synchronous transmitter and receiver.

CO2. **Use** magnetic amplifier in different configuration.

CO3. **Verify** the characteristics of a D.C. motor, stepper motor and A.C. servo motor.

CO4. **Examine** the performance of P, PI, PD and PID controllers.

CO5. **Simulate** linear control systems using MATLAB.

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

Subject Name: Digital Communication Lab

L	T	P	C
-	-	2	1

Subject Code: 200505

Lab Objectives

The main objective of course is to impart hardware knowledge of various pulse and digital modulation techniques. Students will also learn the implementation using MATLAB software.

List of Experiments

1. To perform sampling and reconstruction.
2. To identify the various encoding schemes for a given data stream.
3. To analyze pulse amplitude modulation.
4. To analyze pulse width modulation.
5. To generate amplitude shift key signal.
6. To generate amplitude shift key signal using MATLAB.
7. To generate phase shift key signal using MATLAB software.
8. To generate frequency shift key signal using MATLAB.
9. To generate quadrature phase shifted key signal using MATLAB.

Course Outcome:

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

CO1. **Understand** sampling theorem.

CO2. **Perform** lines coding technique.

CO3. **Construct** different pulse modulation technique.

CO4. **Implement** different digital modulation technique

CO5. **Evaluate** the performance of the digital communication system using MATLAB.

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

Departmental Lab Core

L	T	P	C
-	-	2	1

Subject Name: Minor Project-I

Subject Code: 200506

Lab objectives

This course gives the basic introduction of electronics hardware system and provides hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such system by making use of the various tools and instruments available in the electronics workshop.

List of Exercise/ Experiments

1. Familiarization/Identification of electronics component with specification (Functionally, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electronic-Mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.]
2. Drawing of electronic circuit diagrams using symbols, Interpret data sheets of discrete components and IC's, Estimation and costing.
3. Familiarization/application of testing instruments and commonly used tools. (Multimeter, function generator, power supply, CRO etc.) (soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de-soldering station etc.)
4. Testing of electronic component (Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.)
5. Inter-connecting methods and soldering practices.[Bread board, Wrapping, Crimping, Soldering –types-selections of materials and safety precautions, Soldering practice in connectors and general purpose PCB, Crimping.]
6. Printed circuit board (PCB) [Types, Single sided, Double sided, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]

Course Outcomes

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

CO1. **Identify** electronics components and their testing.

CO2. **Operate** measuring instruments (such as multi-meter) and electronics equipments likes CRO, dual-power tracking power supply &function generator.

CO3. **Design** the electronics circuits on bread-board.

CO4. **Perform** soldering and de-soldering of the circuit components properly.

CO5. **Troubleshoot** a not working electronic circuit and to rectify it.

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

L	T	P	C
-	-	4	2

Subject Name: VLSI Design Lab

Subject Code: 200705

Lab Objectives

To learn the fundamental principles of CMOS VLSI circuit design using SYMICA EDA CAD tool.

List of Experiments:

Digital CMOS logic circuit design using SYMICA CAD tool:

1. Design and simulate basic CMOS logic Gates: AND, OR, NOT.
2. Design and simulate CMOS logic universal gates: NAND and NOR.
3. Design and simulate CMOS logic 2:1 MUX.
4. Design and simulate CMOS logic 2 x 4 Decoder.
5. Design and simulate CMOS logic Half-Adder and Full Adder.
6. Design and simulate CMOS logic RS, JK and D flip-flops.

Gate level design using SYMICA CAD tool:

1. Design and simulate a Verilog program for the following combinational designs:
   a) 2 to 4 decoder
   b) 8 to 1 multiplexer
   c) 4 bit binary to gray converter
2. Design and simulate a Verilog code to describe the functions of a full adder using three modeling styles.
3. Design and simulate a model for 32 bit ALU.

Course Outcomes

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

CO1. **Demonstrate** a clear understanding in hardware design language Verilog and SPICE.
CO2. **Model** a combinational circuit using hardware description language Verilog and SPICE Netlist.
CO3. **Model** a sequential circuit using hardware description language Verilog and SPICE Netlist.
CO4. **Model** a computational circuit using hardware description language Verilog and SPICE Netlist.
CO5. **Simulate** and validate the functionality of the CMOS VLSI circuits using CAD tools.

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

L	T	P	C
-	-	2	1

Subject Name: Creative Problem Solving (Simulation & Fabrication)

Subject Code: 200707

Lab Objective:

The lab comprises of two modules each of which student need to finish passing this course. These 02 modules are named as

(i) Communication Systems
(ii) Antenna Design

Tools Required:

Network Simulator, QualNet, CST Design Studio

List of Experiments

Communication Module:

1. Program in NS(network simulator)/QualNet to implement different topology
2. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology
3. Program in NS(network simulator)/QualNet to implement FTP using TCP bulk transfer
4. Program in NS(network simulator)/QualNet for connecting multiple routers and nodes and building a hybrid topology and then calculating network performance
5. To analyse network traces using Wireshark software.

Antenna Module

1. Design and Simulation of Microstrip Antenna Using CST Tool.
2. Design and Simulation of Microstrip Transmission Line Using CST Tool.
3. Design and Simulation of Waveguide Using CST Tool.
4. Design and Simulation of Half Wave Dipole Antenna Using CST Tool.
5. Study and overview of CST simulation tool.

Course Outcomes:

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

CO1. Write a program in Network Simulator for various topologies.
CO2. Design a network using NS2 or QualNet.
CO3. Design an antenna of given specification.

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Annexure X

Item 9

To propose a suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory courses to be offered in July-December 2021

S.No	Semester	Subject Code	Subject Name
1	III	200311	Analog Electronics
2		200312	Digital Circuits & Systems
3		200313	Network Theory
4		200315	Software Lab (Introduction to MATLAB)

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Subject Name: Analog Electronics

1. To design and simulate a +5V/+9/+12 V regulated power supply.
2. To design and simulate Voltage Doubler Circuit.
3. To design and simulate Voltage Tripler Circuit.
4. To design and simulate a single stage RC coupled amplifier circuit.
5. To design and simulate a oscillator circuit to generate 1 kHz sine wave.

Subject Name: Digital Circuits & Systems

1. Design and simulation of up-counter circuit.
2. Design and simulation of down counter circuit.
3. Design and simulation of flip-flops.
4. Design and simulation of latches.
5. Design and simulation of ring counter.

Subject Name: Network Theory

1. Smart Fan Circuit.
2. Beeper Circuit.
3. Water Level Indicator.
4. Automatic Door Bell Ringer.
5. Rain Alarm.

Subject Name: Software Lab (Introduction to MATLAB)

1. Generation of wave of any given expression.
2. Calculator Design using MATLAB.
3. Draw and calculate the area of circle of given radius.
4. GUI model for various waveform generation and display.
5. GUI model for display of various transform of specific waves.

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Annexure-XVII

Item 13

To present matters, if any, related to new curriculum/structure PG programme (Batch admitted in 2020-21) needing rectification in the forthcoming Academic Council meeting

No rectification needed

Following Subjects has been approved to float against MOOCs course in III Sem ME CCN

S.No	Semester	Course Code	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	III		Digital Image Processing	12	06.05.2021	23.08.2021	Prof Pooja Sahoo
2			Introduction to Wireless Cellular Communication	12	06.05.2021	23.08.2021	Prof Madhav Singh
3			Millimeter wave Technology	08	06.05.2021	02.08.2021	Prof D K Parsedia

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Annexure-XVIII

Item 14

Following subjects has been given to students for self learning/presentation for the students of III Semester for Electronics Engineering/ Electronics & Telecommunication Engineering:

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					
III	C Programming and Assembly Language		04	06.05.2021	02.08.2021	Dr. Rahul Dubey
III	Fundamentals of Electronic Device fabrication		04	06.05.2021	02.08.2021	Dr. Sandeep Sharma
III	Python for Data Science		04	06.05.2021	02.08.2021	Dr. Aashish Gupta