(Effective from the academic session 2020-21)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-IV

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C410	Digital Communication	3	0	0	20	10	30	70	100	3
BEE-C406	Electrical Circuits Analysis	3	0	0	20	10	30	70	100	3
BET-C411	Microprocessor and Interfacing	3	0	0	20	10	30	70	100	3
BET-C412	Electromagnetic waves	3	0	0	20	10	30	70	100	3
BET-C413	VLSI Design and Technology	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
BKT-A403	BharteeyaJnanaparampara	2	0	0	20	10	30	70	100	0
PRACTICAL										
BET-C461	Microprocessor Lab	0	0	2	10	5	15	35	50	1
BET-C462	Circuit Simulation Lab	0	0	2	10	5	15	35	50	1
BET-C463	Digital Communication Lab	0	0	2	10	5	15	35	50	1
BET-C482	Seminar	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
TOTAL		17	0	8	160	80	240	560	800	19

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after IV semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in V semester. Also the students have to present PPT of the industrial training/mini project/internship.

Effective from the session 2020-21

BET-C410
DIGITAL COMMUNICATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit :3**
3 0 0 **NOTE:** The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Elements of Digital Communication and Information Theory: Model of a Digital Communication, System, Probability Theory and Random Variables, Logarithmic Measure of Information, Entropy and Information Rate, Conditional Entropy and Redundancy, Source Coding, Fixed and Variable Length Code Words, Source Coding Theorem, Prefix Doing and Kraft Inequality, Shannon-Fanno and Huffman Coding.

UNIT II

Digital Base band Transmission: PCM Coding, DM, DPCM, ADCM, Data Transfer Rate, Line Coding and Its Properties, NRZ & RZ Types, Signaling Format For Unipolar, Polar, Bipolar (AMI) &Manchester Coding and Their Power Spectra (No Derivation) Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlation Detector Decision Threshold and Error Probability For Binary, Unipolar (ON-OFF) Signalling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum.

UNIT III

Digital Modulation Techniques: Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.

UNIT IV

Digital Multiplexing: Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals).

UNIT V

Error Control Coding: Error Free Communication Over a Noise Channel, Hamming code, Relation Between Minimum Distance and Minimum Distance Error Correcting Capability, Linear Block Codes, Encoding and Syndrome Decoding, Cyclic Codes, Encoder and Decoder For Cyclic Codes, Convolution Codes, Tree diagram state diagram and Trellis Diagram, Viterbi and Sequential Decoding, Comparison of Performance.

Reference

1. Haykin, Simon / “Communication Systems” / John Wiley / 4th Ed
2. Lathi, B.P / “Modern Digital & Analog Communication Systems” / OxfordUniversity Press .
3. Taub& Schilling / “Principles of Communication Systems” / Tata McGraw-Hill /

4. A.B. Carlson / "Communication Systems" / Tata McGraw-Hill.
5. Charkrabarti, P. / "Analog Communication Systems" / Dhanpat Rai & Co.
6. Singh, R.P. &Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw- Hill.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze and compare different digital modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes to compute the bit error performance

Effective from the session 2020-21
BEE-C406/BEE-C308
ELECTRICAL CIRCUITS ANALYSIS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit :3**
3 0 0 **NOTE:** The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.

UNIT II

Network Theorems: Applications to ac networks- Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

UNIT III

Sinusoidal steady state Analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC curcuit analysis, effective or RMS value, average power and complex power, series and parallel resonances, three phase circuits, mutual coupled circuits, Dot convention in coupled circuits, ideal transformer.

UNIT IV

Two Port Networks: Characterization of LTI two port networks Z, Y, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T and Π Representation. Image parameters and characteristics impedance

UNIT V

Network Synthesis: Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

Reference

1. M.E. Van Valkenburg, Network Analysis, Prentice Hall of India.
2. D. Roy Chaudhary, Networks and Systems, Wiley Eastern Ltd.
3. W.H. Hayt& Jack E-Kemmerly, Engineering Circuit analysis, Tata McGraw Hill.
4.A. Chakrabarti, Circuit Theory, Dhanpat Rai & Co.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.

3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.

Effective from the session 2020-21
BET-C411
MICROPROCESSOR ANDINTERFACING

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit :3**
3 0 0

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UNIT I

Introduction to Microprocessors and assembly language, 8085 architectures, addressing modes of 8085, 8085 instruction set and programming techniques, timing diagrams, Counters & time delays.

UNIT II

stacks and subroutines, basics of memory interfacing. Interfacing I/O Devices, programming of basic arithmetic operations: addition, subtraction, multiplication, division, code conversion etc, Interrupts.

UNIT III

Programmable Peripheral Interface(PPI) (8255), Programmable Interval Timer (8254), Programmable interrupt controller (8259), DMA & DMA controller (8237), ADC / DAC interfacing.

UNIT IV

8086 Processor: 8086 architectures, Pin configuration, 8086 in min/max mode, addressing modes, Instruction set of 8086, Assembler directives, basic assembly language programming.

UNIT V

Overview of Advanced Microprocessors- 80186,286,386,486, Pentium – I, Pentium – II, Pentium – III, Pentium – IV.

Reference

1. 8086 microprocessor: programming and interfacing the pc- K.J Ayala
2. Microprocessors and interfacing: Douglas hall.
3. Microprocessor, architecture, programming and applications with 8085 R.S Gaonkar.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Do assembly language programming
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.

Effective from the session 2020-21
BET-C412
ELECTROMAGNETIC WAVES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit :3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Electrostatics – Fundamentals: Electric charges – Coulomb's Law – Electric Field Intensity – Linear, Surface and Volume charge density – Gauss Law and its application – electric Scalar Potentials and potential difference – Potential due to uniformly charged disc and uniformlycharged line, potentials between two coaxial cylinders and between two conductingspherical shell – Electric field lines and equipotential contours – Potential gradientand electric field due to electric dipoles – Conservative nature of electric field.

UNIT II

Dielectrics & Capacitance: Dielectric boundaries – Capacitance – Capacitance of system of conductors Overhead lines and underground cables – Methods of images and its application Electrostatic energy and energy density – Force between charged conductors dielectric strength and breakdown. Divergence and curl of vector fields . Divergencetheorem – Stokes theorem – solutions of electrostatic problems – Examples onLaplace's equation.

UNIT III

Magnetostatics Fundamentals: Magnetic field intensity and magnetic flux density, BiotSavarat law, Force between current carrying wires. Torque on closed circuits, Ampere's law Magnetic scalar and vector potentials – Boundary conditions at magnetic surfaces.

UNIT IV

Magnetic Circuits and Inductance: Faraday's law of electromagnetic induction , Inductor and inductance Inductance of solenoids, toroids, transmission lines and cables, Mutual inductance, Inductors in series and parallel, energy stored in magnetic field, Pull of an electromagnet magnetic circuits.

UNIT V

Electro Magnetic Waves: Maxwell's equations, Equation of continuity, displacement current , Maxwell'sequation in point and integral forms ,The wave equations, Uniform plane wave , relation between electric and magnetic field intensities in a uniform plane wave,Poynting vector ,Poynting theorem, boundary conditions.

References

1.Gangodhar, K.A., ' Field Theory', Khanna Pub. Delhi 11th edition, 1994.
2. William H. Hayt, ' Engineering electromagnetics', Tata- McGraw Hill, 5th edition,1992.
3. Sarwate, V.V., ' Electromagnetic Fields and Waves', Wiley Eastern Limited, NewDelhi, 1993.
4. Mahajan, A.S. and Rangawala, A.A. 'Electricity and Magnetism, Tata-McGraw HillPublishing Company, Ld, New Delhi, 1989.
5. Seely, S., Introduction to electromagnetic Fields', McGraw Hill.

6. Joseph, a. Edminister, ‘ Electromagnetic – Schaum’s outline Series’, InternationalEdition, McGraw Hill Inc., New York, 1993.
7. Narayana Rao, N., ‘Elements of Engineering Electromagnetics’, Prentics Hall ofIndia, 1991.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand characteristics and wave propagation on high frequency transmission lines
2. Carryout impedance transformation on TL
3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface
6. Analyze wave propagation on metallic waveguides in modal form
7. Understand principle of radiation and radiation characteristics of an antenna

Effective from the session 2020-21

BET-C413
VLSI DESIGN AND TECHNOLOGY

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit :3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT-I

Introduction to ICs and MOS Review: Evolution of Integrated Circuit (ICs), VLSI Design Flow, Review of Basic Metal Oxide Semiconductor (MOS) structure, MOSFET, Current-Voltage Characteristics, Threshold Voltage, Body Bias concept, MOSFET Capacitances, Technology Scaling Theory, Long channel & Short channel characteristics, and short channel effects (SCEs).

UNIT-II

Basic of Semiconductor Fabrication: Crystal Growth, Epitaxial- Growth Techniques, Structures and Defects, Film Formation, Deposition methods, Thermal Oxidation, Dielectric Deposition, Polysilicon and High-K dielectric, Lithography, Next Generation Lithographic Methods, Dry and Wet Chemical Etching, Impurity Doping, Diffusion-Related Processes, Implant-Related Processes, Annealing, Metallization, Integrated Devices, CMOS Fabrication Process, IC Packaging, Material and Device Characterization.

UNIT-III

Static Inverter Design & Performance Metrics: Static NMOS and CMOS Inverter circuits, Static and Dynamic characteristics, Estimation of Noise Margin, Delay, Power Consumption (dynamic and static) and Energy, CMOS Latch up, Stick diagram and Layout. Combinational CMOS logic circuits.

UNIT-IV

Various MOS Logic Circuits: Brief overview of Complementary CMOS, Ratioed Logic, Pass Transistor Logic and transmission gate etc. Dynamic CMOS Logic, Advantages & Disadvantages over static CMOS, Charge sharing, Domino and NORA logic.

UNIT-V

Memories and array structures: basics of ROM and RAM cells design, SRAM & DRAM cell and arrays, memory peripheral circuits.Introduction to BiCMOS technology and Inverter. Basic BiCMOS Circuit behavior.

References

1. Rabaey, J. M. Digital Integrated Circuits - A Design perspective. 2nd ed. Pearson Education, 2002.
2. Sze, S.M. VLSI Technology. 2nd ed., New Delhi: Tata McGraw-Hill, 2011.
3. Kang, S. M., Leblebici, Y and Kim, C. CMOS Digital Integrated Circuits, 4th ed., McGraw Hill India, 2016.

4. Martin, K. Digital integrated circuit design. Oxford University Press, 2003.
5. Weste, N., and Eshraghian, K. Principles of CMOS VLSI Design – A Systems perspective. 2nd ed., Pearson, 1993.
6. Ghandhi, S.K. VLSI Fabrication Principles. 2nd ed., New Delhi: Wiley India, 2010.
7. Plummer, James D. Silicon VLSI Technology Fundamentals: Practice and Modeling, Pearson Education, 2009, Simon Sze. Semiconductor devices & Technology: Mc

Course Outcomes:

At the end of the course the students will be able to

1. Design different CMOS circuits using various logic families along with their circuit layout.
2. Use tools for VLSI IC design.

Effective from the session 2020-21
BET-C461
MICROPROCESSOR LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. Addition of 8 bit hexadecimal numbers without carry.
2. Addition of 8 bit hexadecimal numbers with carry.
3. To calculate 2's compliments of a 8 bit number.
4. Subtraction of two 8 bit hexadecimal number.
5. Interfacing with 8255 in I/O mode & BSR mode.
6. Verification of all interrupts.
7. Multiplication of 8 bit hexadecimal number by 2.
8. Division of 8 bit hexadecimal numbers.
9. Addition of two 8 bit decimal numbers.
10. Transfer the block from one memory location to another.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-C462
CIRCUIT SIMULATION LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

Electronic Workshop & PCB

1. Winding Shop: Step down transformer winding of less than 5VA.
2. Soldering Shop: Fabrication of DC unregulated power supply.
3. PCB Lab: (a) Artwork & printing of a simple PCB.
   (b) Etching & drilling of PCB.

Wiring & Fitting Shop: Fitting of Power Supply along with a meter in cabinet.

4. Testing of Power Supply fabricated.
5. Design, simulation and Analysis of circuits using circuit simulator:
6. Layout design of 5 V regulated supply.

MATLAB Exercises

7. (i) Write a MATLAB program to find the roots of a quadratic equation.
   (ii) Write a MATLAB program to find the factorial.
   (iii) Simulate an RC circuit in MATLAB.
   (iv) Write a MATLAB program to draw I-V characteristic of a MOSFET.
   (v) Write a MATLAB program to find the average with a dynamic array.
   (vi) Plot one and two-dimensional graphs using various MATLAB 2-D Plot types.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21

BET-C463
DIGITAL COMMUNICATION LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. Study of Sample and hold circuit using Op-amp.
2. Study of PAM generation and detector and observe characteristics of both single and dual polarity pulse amplitude modulation.
3. Study of pulse width modulation and demodulation.
4. Study of pulse position modulation demodulation.
5. Study of delta modulation and demodulation and observe effect of slope overload.
6. Study of pulse data coding techniques for NRZ formats.
7. Data decoding techniques for NRZ formats.
8. Study of amplitude shift keying modulator and demodulator.
9. Study of frequency shift keying modulator and demodulator.
10. Study of phase shift keying modulator and demodulator .
11. Study of single bit error detection and correction using Hamming code.
12. Study of Pulse code modulation and demodulation.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-C482
SEMINAR

MM: 50

L	T	P
0	0	2

Credit: 1

Objective: To increase the communication ability on students and to prepare them for presenting seminar on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest in or any advanced technical topics related to the theory papers studied. The topic will be decided by mutual consent of the Faculty- in- charge and students.

* Total 50 marks include 15 marks for report and 35 marks for presentation.