SHRI VENKATESHWARA UNIVERSITY

Syllabus

B.Tech

Electronic & Communication Engineering

VI SEMESTER

(Four Years Programme)

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

Electronic & Communication Engineering

SEMESTER- VI

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	**SEC - 601**	Computer Network	3	0	0	20	10	30		70		100	3
2	**SEC -602**	Digital Control Systems	3	0	0	20	10	30		70		100	3
3	**SEC -603**	Information Theory and Coding	3	0	0	20	10	30		70		100	3
4	**SEC -604**	Image Processing	3	0	0	20	10	30		70		100	3
5	**SOE-061**	Sociology,Society and Culture	3	0	0	20	10	30		70		100	3
6	**SEC -611**	Computer Networks Lab	0	0	4				25		25	50	2
7	**SEC-612**	Electronic Measurement Lab	0	0	2				25		25	50	1
8	**SEC-613**	Electronic Design workshop	0	0	4				25		25	50	2
												650	**20**

SEC-601	Computer Network	3L:0T:0P	3 credits

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic ail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation ofblocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical Multiplexing. Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call.

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Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines,TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routingalgorithms, Broadcast and Multicast routing

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks,addressing, Ethernet, Hubs, Switches.

Text Reference books:

1. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring theInternet”, Pearson Education, 5th Edition
2. L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier MorganKaufmann Publisher, 5th Edition.
3. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall
4. S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education
5. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition
6. Andrew Tanenbaum, “Computer networks”, Prentice Hall

7. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
8. William Stallings, “Data and computer communications”, Prentice Hall

Course Outcomes:

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

1. Understand the concepts of networking thoroughly.
2. Design a network for a particular application.
3. Analyze the performance of the network.

SEC611:Computer Network Laboratory[0L:0T:4P 2 credits]

Hands-on experiments related to the course contents SEC-601

SEC-602	Digital Control Systems	3L:0T:0P	3 credits

Course Outcomes:

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

- Obtain discrete representation of LTI systems.
- Analyse stability of open loop and closed loop discrete-time systems.
- Design and analyse digital controllers.
- Design state feedback and output feedback controllers.

Module 1: Discrete Representation of Continuous Systems (6 hours)

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modelling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

Module 2: Discrete System Analysis (6 hours)

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.

Module 3: Stability of Discrete Time System (4 hours)

Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.

Module 4: State Space Approach for discrete time systems (10 hours)

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability & observability.

Module 5: Design of Digital Control System(8 hours)

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

Module 6: Discrete output feedback control (8 hours)

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

Text Books :

1. K. Ogata, "Digital Control Engineering", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.
3. G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", Addison-Wesley, 1998.
4. B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

1.

SEC-603	**Information Theory and Coding**	**3L:0T:0P**	**3 credits**

Basics of information theory, entropy for discrete ensembles; Shannon's noiseless codingtheorem;Encoding of discrete sources.

Markov sources; Shannon's noisy coding theorem and converse for discrete channels;Calculation ofchannel capacity and bounds for discrete channels; Application to continuous channels.

Techniques of coding and decoding; Huffman codes and uniquely detectable codes;Cyclic codes,convolutional arithmetic codes.

Text/Reference Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. R.B. Ash, Information Theory, Prentice Hall, 1970.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the concept of information and entropy
2. Understand Shannon's theorem for coding
3. Calculation of channel capacity
4. Apply coding techniques

Image Processing(SEC -604)		
Course Outcome (CO)		
At the end of course , the student will be able:		
CO 1	To become familiar with digital image fundamentals.	
CO 2	To get exposed to simple image enhancement techniques in Spatial and Frequency domain	
CO 3	To learn concepts of degradation function and restoration techniques	
CO 4	To study the image segmentation and representation techniques.	
CO 5	To become familiar with image compression and recognition method	
DETAILED SYLLABUS		**3-0-0**

Unit	Topic	Proposed Lecture
I	**DIGITAL IMAGE FUNDAMENTALS:** Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.	**08**
II	**IMAGE ENHANCEMENT :** Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.	**08**
III	**IMAGE RESTORATION :** Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum NotchFiltering – Inverse Filtering – Wiener filtering	**08**
IV	**IMAGE SEGMENTATION:** Edge detection, Edge linking via Hough transform – Thresholding – Region based segmentation –Region growing – Region splitting and merging – Morphological processing-erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.	**08**
V	**IMAGE COMPRESSION AND RECOGNITION:** Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEGstandard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.	**08**

Text books:

1. Rafael C. Gonzalez, Richard E. Woods,Digital Image Processing Pearson, Third Edition, 2010
2. Anil K. Jain,Fundamentals of Digital Image Processing Pearson, 2002.
3. Kenneth R. Castleman,Digital Image Processing Pearson, 2006.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,Digital Image Processing using MATLAB PearsonEducation, Inc., 2011.
5. D,E. Dudgeon and RM. Mersereau,Multidimensional Digital Signal Processing Prentice Hall ProfessionalTechnical Reference, 1990.
6. William K. Pratt,Digital Image Processing John Wiley, New York, 2002
7. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2ndedition, 1999

SOE-061 SOCIOLOGY, SOCIETY AND CULTURE

1. OBJECTIVE:

This is one of the foundation course of Humanities (in Foundation Area 1). It strengthens the interest of the student in social issues and demonstrate both the process and challenge of scientific observationand analysis of social behaviour and social data. It focuses on the understanding of basic concepts and descriptive materials of sociology which is considered a tool for identifying the process of idea and a scientific approach for continuing social observation and analysis.

2. COUSE TOPICS:

2.1 Unit I:Sociology as a Science (7 hours)

1. Sociology and common Sense
2. Sociology and current affairs
3. Sociology as a science
4. Logic in sociological inquiry
5. Sociology of action
6. The field and relevance of sociology
7. Positivism

2.2 Unit II: Society and Culture (12 hours)

1. Culture and society
2. The structure of culture

- Cultural Traits and complexes
- Subcultures and counter cultures
- Cultural integration
- Cultural relativism
- Real and Ideal culture
- Ethnocentrism
- Xenocentrism
- Cultural lag

2.3 Unit III: Social Institutions (17 hours)

1. The concept of varna.
2. The Caste system:

- Origin and characteristics (of caste) as a system
- Hierarchy based on birth

Religious sanctions on social participation

- Caste and subcaste
- Caste conflicts
- Caste councils
- An appraisal of caste system
- Prospects of caste in modern India

3. The Class system:

- What is social class?
- Development of class
- Self-identification and class consciousness
- Class in itself and class for itself
- Class having blue collar status and white collar status
- Industrial class
- Significance of social class
- The future of social classes: From Proletariat to status seekers

2.4 Unit IV: Environment and Ecology (10 hours)

1. Conceptualising environment
2. Forest, ecology and society
3. Common Property Resources and its management
4. Significance of forest and environment in modern life

5. Environmental movement with reference to forest and water management

2.5 Unit V: Issues of modernity (14 hours)

1. Concept of modernity
2. Tradition Vs Modernity
3. Globalization
   - Is globalization new and real?
   - Has globalization weakened the state?
   - Has globalization led to cultural homogenisation?
   - Does globalization lead to a clash of cultures?

3. READINGS:

3.1 Reference Books:

- Gisbert, P. (2011), Fundamental of Sociology, Orient Blackswan Private Ltd.
- Horton, Paul B. and Hunt, Chester L. (Sixth edition), Sociology, Mc Graw Hill Book Company.
- Haralambos, M. and Heald, R.M. (26th impression, 2004), Sociology: Themes and Perspectives, Oxford University Press, New Delhi.
- Betteille, Andre (2014), sociology: essays on Approach & Method, Oxford Uninversity Press, New Delhi.

SEC-612	**Electronics Measurement Lab**	**0L:0T:2P**	**1 credit**

List of Experiments

1. Designing DC bridge for Resistance Measurement (Quarter, Half and Full bridge)
2. Designing AC bridge Circuit for capacitance measurement
3. Designing signal Conditioning circuit for Pressure Measurement
4. Designing signal Conditioning circuit for Temperature Measurement
5. Designing signal Conditioning circuit for Torque Measurement
6. Designing signal Conditioning circuit for Strain Measurement
7. Experimental study for the characteristics of ADC and DAC
8. Error compensation study using Numerical analysis using MATLAB (regression)

Course Outcomes:

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

1. Design and validate DC and AC bridges
2. Analyze the dynamic response and the calibration of few instruments
3. Learn about various measurement devices, their characteristics, their operation and theirlimitations
4. understand statistical data analysis
5. Understand computerized data acquisition.

SEC612	**Electronics Measurement Lab**	**0L:0T:2P**	**1 credit**

List of Experiments

9. Designing DC bridge for Resistance Measurement (Quarter, Half and Full bridge)
10. Designing AC bridge Circuit for capacitance measurement
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6.

SEC-613	**Electronic Designworkshop**	**0L:0T:4P**	**2 credits**

Guidelines:

1. The mini-project is a team activity having 3-4 students in a team. This is electronic productdesign work with a focus on electronic circuit design.
2. The mini project may be a complete hardware or a combination of hardware and software.The software part in mini project should be less than 50% of the total work.
3. Mini Project should cater to a small system required in laboratory or real life.
4. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
5. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of mini- project.
6. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week ofthe semester.
7. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
8. Art work and Layout should be made using CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.
9. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.
10. The tutorial sessions should be used for discussion on standard practices used for electronic circuits/product design, converting the circuit design into a complete electronic product, PCB design using suitable simulation software, estimation of power budget analysis of the product, front panel design and mechanical aspects of the product, and guidelines for documentation /report writing.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on mini project work.