SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Outcome based Curriculum for Undergraduate Degree Courses in Engineering & Technology
Department of Electronics and Communication Engineering
T.V & Radar Engineering
ECA-801

ECA-801	**T.V & Radar Engineering**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

1. To introduce the basics of picture transmission and reception, analysis and synthesis of composite video signal, receiver and picture tubes and television camera tubes.

2. To study various colour television systems with greater emphasis on television standards

3. To become well conversant with new development in digital video engineering.

4. To introduce advanced TV systems, MAC signals and direct to home TV technology.

5. To introduce most latest and revolutionary ideas in the field of digital TV, HDTV, WDTV.

6. To study various display system and its application.

Course Outcomes:

1. Understand the fundamental concepts of television transmitter and receiver systems, the transmission of video signals and importance of television standards to effectively work with broadcasting applications, trouble shooting of television systems.

2. Understand different colour television systems used worldwide and its compatibility.

3. Understand principles of digital video and component video signal.

4. Understand advanced TV technology, MAC signals and DTH technology.

5. Describe and differentiate working principles of latest digital TV, HDTV, and WDTV.

6. Understand the working principles and applications of latest display like LCD, LED, Plasma and large flat panel monitors.

Unit I : Basic Television System (10H)

Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning.

Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system.

Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems.

Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.

Unit II : Colour Television (10H)

Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays.

Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.

Unit III : Digital Television Technology(10H)

Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit.

Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition

television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..

Unit IV : RADAR (6H)

The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters.

The CW radar: the Doppler effect, FM-CW radar.The Moving Target Indicator (MTI) Radar: delay line cancellers.

Unit V : Radar Receivers (6H)

The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors.

Other Radar systems: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.

References:

1. M. Dhake: Television and Video Engineering, 2nd Edition,TMH, New Delhi.
2. M. I. Skolnik: Introduction to Radar Systems, TMH, New Delhi.
3. R. G. Gupta: Television Engineering and Video Systems, TMH, New Delhi.
4. R. R. Gulati: Monochrome and Colour Television, New Age International.
5. Grob and Herndon: Basic Television and Video Systems, McGraw Hill International.
6. P. Z. Peebles, Jr.: Radar Principles, Wiley India Pvt. LTD.
7. Edde: Radar- Principles, Technology Applications, Pearson Education.

ECA-801	**T.V & Radar Engineering**	**0L:0T:2P**	**1 credits**	**3Hrs/Week**

List of Experiments:

Section A: Television Engg.

1. (a) To Study the Circuit Description of RF Tuner Section.
   (b) To Study the RF Section by Measuring Voltages at Various Test Points.

(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.

2. (a) To Study the Circuit Description of VIF Tuner Section.
(b) To Study the VIF Section by Measuring Voltages at Various Test Points.
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.

3. (a) To Study the Circuit Description of Video and Chroma Section Tuner Section.
(b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points
(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Video and Chroma Section.

4. (a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator and Horizontal Output Section.

5. (a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and Vertical Output Section.

6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.

7. To Study the Circuit Description of Audio and Video Section Tuner Section.

8. (a) To Study the System Control Section by Measuring Voltages at Various Test Points.
(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.

2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate etc.)

3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.

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Outcome based Curriculum for Undergraduate Degree Courses in Engineering & Technology
Department of Electronics and Communication Engineering
Program Elective-V
Mobile Communication and Networks

ECA-802(A)

ECA-802(A)	**Mobile Communication and Networks**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

1. To understand the basic cellular system concepts.
2. To have an insight into the various propagation models and the speech coders used in mobile communication.
3. To understand the multiple access techniques and interference Eduction techniques in mobile communication.

Course Outcomes:

1. Discuss cellular radio concepts.
2. Identify various propagation effects.
3. To have knowledge of the mobile system specifications.
4. Classify multiple access techniques in mobile communication.
5. Outline cellular mobile communication standards.
6. Analyze various methodologies to improve the cellular capacity

UNIT- I (10H)

Overview of OSI Model : Significance of layered Model , PDUs, SDUs,IDUs, Higher layer Protocols. Switching and Components. Introduction, Applications, history, of wired & wireless Communication systems. Radio Transmission: frequencies ,signal propagation, antenna , types of modulation, FHSS, DSSS. Multiple Access technology for Wireless Communication FDMA,TDMA,CDMA Cellular System: Introduction, types.

UNIT–II(10H)

Mobile Data Communication: Cellular Telephony, Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSO interconnections, frequency hopping, frequency reuse. Circuit Switched Data Services & Packet Switched Data Services on Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT,) Personal Access Comm. System (PACS).

UNIT-III(10H)

Digital Cellular Systems and Standards: GSM System overview, Architecture, GSM Protocol Model, GSM Mobility Management, SMS security aspects. Broadcast System overview. General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5 G), 3G Mobile Services: UMTS and International Mobile Telecommunications (IMT-2000), W-C DMA and CDMA 2000,Quality of service in 3G .

UNIT- IV(6H)

WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards , Protocols for WLAN ,MACA,MACAW, Infrared technology. Wireless Application Protocol (WAP) model, architecture, Gateway, WAP protocols and WML

UNIT-V(6H)

Introduction to Bluetooth technology. Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies, access schemes.

BOOKS

1. Jochen Schiller “Mobile Communication”, Pearson Education.
2. Yi –Bing Lin and Imrich Chlamtac “Wireless and Mobile Network Architectures”, Wiley India.
3. Raj Pandaya “Mobile and Personal Communication System & Services”.
4. Uwe Hansmann, Lothar Merk “Principles of Mobile Computing” 2nd Ed. Wiley India.

5. Roger L. Freeman " Telecom Transmission handbook" 4th ed. 1998 John Wiley & Sons Inc. New York.
6. Lee "Mobile Cellular Telecom" 1995 Mc Graw Hill.

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Department of Electronics and Communication Engineering

Embedded systems
ECA-802 (B)

ECA-802(B)	**Embedded systems**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

1.Students have knowledge about the basic functions of embedded systems

Course Outcomes:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Unit I :(10H)

Introduction to Embedded System, Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, Embedded firmware, system components.

Unit II: (10H)

Fundamental issues of hardware software co-design, computational models in embedded design data flow graph, control flow graph, state machine model, sequential programmed model, concurrent model, unified modeling language.

Unit III: (10H)

Architecture of 8085 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets.

Unit IV: (10H)

Embedded firmware design approaches- OS based, Super loop based. Embedded firmware development languages- Assembly language based, high level language based, mixed. Programming in embedded C.

Unit V: (10H)

Types of Operating system, Task, process and threads, Multi processing and multi task, Task scheduling, Task communication, Task synchronization.

References:-

1. Shibu K V, “Introduction to Embedded System”, TMH.
2. David E Simon, “An Embedded Software Primer”, Pearson education Asia, 2001.
3. Steven F. Barett, Daniel J. Pack, “Embedded Systems” Pearson education, First Impression 2008.
4. Vahid Frank, Tony Givargis, “Embedded System Design”, John Wiley and Sons, Inc.
5. Dream Tech Software Team, “Programming for Embedded Systems” Wiley Publishing house Inc.
6. Sriram V Iyer, Pankaj Gupta, “Embedded Realtime Systems Programming”, TMH.

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Department of Electronics and Communication Engineering
CAD of Digital Systems

ECA-803 (A)

ECA-803(A)	**CAD of Digital Systems**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

1.Understand the fundamentals used to create and manipulate geometric models
2.Get acquainted with the basic CAD software designed for geometric modeling
3.Learn working principles of NC machines CNC control and part programming
4.Understand concept of Group Technology, FMS and CIM

Course Outcomes

1. Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics.
2. Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations
3. Explain fundamental and advanced features of CNC machines
4. Illustrate Group Technology, CAQC and CIM concepts

Unit 1(10H)

Introduction: Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); Mfg as a system, productivity and wealth creation; production processes on volume-variety axes; importance of batch and job shop production; CIM definition and CIM wheel, evolution and benefits; CIM as a subset of Product Life Cycle (PLC) mgt; design for mfg (DFM) and concurrent engg; product design in conventional and CIM environment; terms like CAD, CAE,
CAM, CAP, CAPP, CATD and CAQ.

Unit 2(10H)

Graphics and standards: Raster scan, coordinate systems for model (M/ WCS) user and display; database for graphic modeling; PDM, PIM, EDM; define EDM, features of EDM; basic transformations of geometry- translation, scaling, rotation and mirror; introduction to modeling software; need for CAD data standardization; developments in drawing data exchange formats; GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data-STEP and major area application protocols.

Unit 3(10H)

Geometric Modeling: Its use in analysis and mfg; 2D and 3D line, surface and volume models; linear extrusion and rotational sweep; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, b-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, b-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping.

Unit 4(6H))

Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; NC part programming; ISO standard for coding, preparatory functions(G)- motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; ISO codes for turning tools and holders; ATC, modular work holding and pallets; time and power estimation in milling, drilling and turning; adaptive control, sequence control and PLC; simple part programming examples.

Unit 5(6H)

Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile mfg; Computer Aided Process Planning (CAPP), variant/ retrieval and generative approach

References:

1. S.Kant Vajpay; Principles of CIM; PHI

2. Rao PN; CAD/CAM;TMH

3. Groover MP; Automation, Production Systems & CIM; P.H.I.

4. Rao PN, Tiwari NK, Kundra TK; Computer Aided Manufacturing; TMH

5. Alavudeen A, Venkteshwarn N; Computer Integrated Mfg; PHI

6. Radhakrishnan P, Subramanian S and Raju V; CAD/CAM/CIM;

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Outcome based Curriculum for Undergraduate Degree Courses in Engineering & Technology
Department of Electronics and Communication Engineering
Engineering and Acoustics

ECA-803 (B)

ECA-803(B)	**Engineering and Acoustics**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preamble:

The fundamentals of sound wave description and propagation, noise control techniques, the hearing mechanism, acoustic instrumentation, noise criteria, psychoacoustics, sound source types and radiated sound fields, outdoor sound propagation, sound power measurement techniques, sound transmission loss, acoustic enclosures.

Course Outcomes

1. Be able to assess complex occupational and environmental noise problems using acceptable assessment criteria.
2. Understand the importance of protecting the community from excessive noise and how it damages the hearing mechanism.
3. Be able to use instrumentation for noise measurement and understand the type of measurements appropriate for various situations.

Unit-I (10H)

Audio and acoustics subdisciplines, survey Fundamental quantities, Fourier review, mass and vibration Damping, complex exponential solutions, forced oscillation.

Unit-II(10H)

Resonance, electrical circuit analogies Acoustic wave equation.

Unit-III (10H)

Armonic plane waves, intensity, impedance Spherical waves, sound level, dB examples Radiation from small sources.

Unit-IV (6H)

Baffled simple source, piston radiation Near field, far field Radiation impedance.

Unit-V (6H)

Recap and review Demos, speed of sound measurement.

Reference

1. Foundations of engineering acoustics Book by Frank Fahy

2. Engineering Acoustics: An Introduction to Noise Control Book by Michael Moser

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Project Stage-II

ECA-804

ECA- 804	**Projects –II (Major)**	**0L:0T:16P**	**8 credits**	**12Hrs/Week**

Preambles:

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone orjointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EEP1;

2. Review and finalization of the Approach to the Problem relating to the assigned topic;

3. Preparing an Action Plan for conducting the investigation, including team work;

4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;

5. Final development of product/process, testing, results, conclusions and future directions;

6. Preparing a paper for Conference presentation/Publication in Journals, if possible;

7. Preparing a Dissertation in the standard format for being evaluated by the Department.

8. Final Seminar Presentation before a Departmental Committee