EC 801 AUDIO & VIDEO ENGINEERING

Module I

Audio Engineering: Sound waves, Complex sounds, Audio frequency range, loudness, pitch, and decibels. Sound pick up devices (microphones): types: - condenser- carbon, piezoelectric – direction pattern-parameters of microphones: - frequency range- sensitivity-impedance- noise. Sound reproduction devices: types: - horn, cone – typical specifications- Acoustics of speech production and hearing. Recording of Sound: Magnetic recording systems –optical storage systems-Coding and decoding applied to CD – CD-R

Module II

Video Engineering: Elements of Television System:- Basic Block Schematic of Monochrome TV Transmitter and receiver, Gross structure, flicker& interlaced scanning ,number of scanning lines. Horizontal and Vertical resolution, Resolution and Bandwidth. Composite video signal- Vertical and horizontal synchronization, Vestigial Sideband Transmission, transmission of Sound signal. Modulation Positive and Negative Modulation and its comparison - Picture tubes. Television Cameras, Working Principle and operation of CCD cameras,

Module III

Colour Television: Compatibility considerations, Colour response of human eye, three colour theory, additive mixing of colours, chromaticity diagram, Luminance and chrominance, Block schematic explanation of Colour TV Cameras. Colour difference signal and its generation. Colour signal transmission, Modulation of colour Difference signals and colour burst signal. Basic Colour Television Systems: PAL, NTSC and SECAM.-Block Schematic, explanation and Comparison. Colour TV picture tubes: CRTs, LCD and Plasma displays.

Module IV

Audio and Video coding: Introduction to Audio Coding, Audio compression, MPEG – Block diagram of audio encoder and decoder, Digital Audio Broadcasting- Block schematic explanation.
Video coding and compression: Need for compression- video image representation – quantization of image data-intra frame compression techniques: DPCM –DCT based transform coding- Motion Compensation –H261 video conference coding standard-MPEG video compression- HDTV- DVB-T

Text Books:

1. *The Electronics Hand Book* edited by JC Whitaker ,IEEE Press
2. RR Gulati, *Monochrome and Colour Television*, New Asian Age
3. Fred Halsal , *Multimedia Communications* ,Pearson Education
4. Thomas Quatieri , *Discrete Time Speech Signal Processing: Principles and practice* , Pearson Education

References:

1. Kinsler , Frey, Coppens, *Fundamentals of Acoustics* , Wiley Eastern, 4th edition
2. Bernad Grob, *Basic Television Engineering*, Mcgraw hill
3. A M Dhake , *Television and Video Engineering* ,McGraw hill
4. S P Bali , *Colour Television* , New Age International Publishers
5. Whitaker, Jerry, *Mastering Digital Television: The Complete Guide to the DTV Conversion* ,McGraw Hill

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 802 COMMUNICATION SYSTEMS

Module 1

Microwave Communication : Basic principles of microwave links- Microwave Relay Systems – Choice of frequency – line of sight and over the horizon systems – modulation methods – block schematics of terminal transmitters and receivers – microwave repeaters – microwave repeaters – microwave repeaters – microwave antennas – propagation mechanisms – propagation characteristics – path loss models – shadowing models – small scale fading and multipath fading – basic principles of design of microwave link

Module II

Satellite Communication – Orbit of communication satellite – Satellite Constellation – Orbital parameters – Orbital perturbations – Geostationary orbits – Low Earth and Medium Orbits – Look Angles – Frequency selection RF Links – Propagation characteristics – Modulation methods- coding – multiple access – space craft – antennas – transponders – intersatellite link – link power budget – earth station interference – Satellite systems – Geostationary systems – Distress and Safety systems – Navigation systems – direct sound broadcast systems – Direct Television broadcast systems

Module III

Spread system Communication: General concepts – Direct Sequence spread spectrum – frequency hopping – transmitter and receiver – time hopping – Antijam consideration – CDMA
Telemetry and Remote Sensing : Definition of telemetry – different types – Applications – Image characteristics – Contrast Ratio – Spatial Resolution – Resolving Power – brightness – tones etc. – Remote Sensing Systems – Framing systems – Scanning systems – characteristics of aerial photographs – spatial and ground resolution – relief displacement etc – IR detection and imaging – IR image characteristics – Applications of Remote Sensing.

Module IV

Wireless communication systems: Cellular concepts – Cell Splitting and Frequency Reuse - Propagation Mechanisms – Modulation techniques for wireless communication – Analog, Digital and Spread Spectrum modulation – Equalisation, Diversity and Channel coding Diversity Techniques – Multiple access techniques for Wireless Commuications – FDMA,TDMA and CDMA – Wireless systems and standards – AMPS – Global System for Mobile(GSM) – CDMA – General Packet Radio Service – DECT System .

References :

1. T.S. Rappaport, *Wireless Digital Communications : Principles and Practice* , Pearson Education/ Prentice Hall, NJ, 1996
2. Schiller, *Mobile Communications* , Pearson Education
3. Dennis Roddy, *Satellite Communications*, Prentice Hall
4. WL Prichard , *Satellite Comunication Systems Engineering*, Pearson Education
5. A Grarwal and An Zeng ,*Introduction to wireless and Mobile systems* , Thomson Learning
6. B P Lathi ,*Analog and Digital Communication* ,Oxford University Press
7. Floyd F Sabins, *Remote Sensing Principle and Interpretation*, WH Freeman & C, New York
8. Dr. B C Panda, *Remote Sensing Principles and Applications*, Viva Books Private Ltd.,2005
9. D. Muples and M Rehharia, *Mobile Satellite Communication,* Pearson Education
10. K Foher , *Wireless digital Communications* , Prentice Hall, NewDelhi,1995
11. Blake, *Wireless Communication Technology*, Thomson Publishers, I edition

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 803 OPTO ELECTRONICS AND COMMUNICATION

Module 1

Nature of light, optical laws, optical fiber –ray analysis –wave propagation in di-electric slab wave guide – mode theory of optical fiber – multi mode and signal mode fibers – graded index fiber –NA-fabrication of optical fibers-specification of optical fiber – attenuation characteristics-dispersion- types-effect on bandwidth- dispersion shifted and polarization maintaining fiber.

Module II

Optical sources-direct and indirect band gap materials-LED structures- quantum efficiency- modulation.
Laser diodes- rate equations- diode structure- single mode laser-modulation- temperature effects- quantum cascade lasers-vertical cavity surface emitting lasers- modal noise- partition noise- reflection noise. Photo detectors-PIN, APD, Photo detector noise - response time- structure of detectors- receiver units.

Module III

Light coupling-source to fiber coupling, fiber splices- fiber to fiber coupling-effect of mis-alignment-coherent detection-transceivers for fiber optic communication. Pre amplifier types-optical receiver performance calculation-noise effects-receiver modules: - Analog communication link - link power budget, rise time budget.
Optical spectrum analyzer- Applications-Measurement of attenuation-Cut back technique-Insertion Loss method, OTDR, Dispersion measurement for chromatic, polarization mode and intermodal dispersion. Eye patterns.

Module 1V

Components of fiber optic networks: – couplers - splitters- semiconductor optical amplifiers- Erbium doped fiber amplifiers- wavelength division multiplexers/ demultiplexers. Filters- isolators-circulators-optical switches-Wavelength converters- Fiber gratings tunable sources-tunable filters.
Optical networks:- SONET/ SDH, DWDM, Optical CDMA, FDDI, performance of various systems.

Text Book:

1. Gerd Kaiser , *Optical fiber communication*, Mc Graw Hill, 3rd edition.

Reference s:

1. John Gowar, *Optical communication systems* , Prentice Hall
2. Mynbaev and Scheiner , *Fiber optic communications technology*,Pearson education
3. Selvarajan, Kar and Srinivas, *Optical Fiber communications*, Tata Mc Graw Hill
4. John M. Senior, *Optical fiber Communication*, Prentice Hall

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EC/EE/EI 804 A DIGITAL IMAGE PROCESSING

Module I

Digital image fundamentals: representation - elements of visual perception - simple image formation model - Image sampling and quantization - basic relationships between pixels – imaging geometry.
Review of matrix theory results: Row and column ordering - Toeplitz, Circulant and Block matrices. Review of Image transforms: 2D-DFT, FFT, Walsh, Hadamard , Haar, DCT and Wavelet transforms.

Module II

Image enhancement: Spatial domain methods: point processing - intensity transformations, histogram processing, image subtraction, image averaging; Spatial filtering- smoothing filters, sharpening filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering. Generation of spatial masks from frequency domain specifications.
Image segmentation: Detection of discontinuities - point, line and edge and combined detection , Edge linking and boundary description - local and global processing using Hough transform – Thresholding - Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging - Use of motion in segmentation. Fundamentals of Representation and Description.

Module III

Image restoration: Degradation model - Diagonalization of circulant and Block circulant matrices - Algebraic approaches - Inverse filtering - Wiener filter - Constrained Least squares restoration - Interactive restoration - Geometric transformations.
Fundamentals of Colour image processing: colour models - RGB, CMY, YIQ, HIS - Pseudo color image processing - intensity slicing, gray level to color transformation.

Module IV

Image compression: fundamentals- redundancy: coding, inter pixel, psycho visual, fidelity criteria, Models, Elements of information theory, Error free compression- variable length, bit plane, lossless predictive, Lossy compression- lossy predictive, transform coding. Fundamentals of JPEG, MPEG, Fractals.

Text Book:

1. Gonzalez and Woods, *Digital Image Processing*, Pearson Education, 2002.

References:

1. Anil K. Jain ,*Fundamentals of Digital Image Processing*, Pearson Education, 2003.
2. Mark Nelson, Jean-Loup Gailly ,*The Data compression Book*, BPB Publications, 2nd edition.
3. Pratt William K.,*Digital Image Processing*, John Wiley & sons
4. Chanda & Majumdar, *Digital Image Processing and Analysis* , Prentice Hall ,3rd edition
5 M.Sonka,V. Hlavac, R. Boyle, *Image Processing, Analysis and Machine Vision*, Thomson Learning,2006

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/IT 804 B BIOINFORMATICS

Module I

Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, GenBank

Module II

Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global -Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

Module III

Informational view of Genomic data, Genomic Signal Processing, DNA Spectrograms, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

Module IV

Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, Introduction to Drug Discovery.

Case Study

Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

Text Books:

1. Setubal & Meidanis, *Introduction to Computational Molecular Biology*, Thomson:Brooks/Cole, International Student Edition, 2003
2. Claverie & Notredame, *Bioinformatics - A Beginners Guide*, Wiley-Dreamtech India Pvt Ltd, 2003.

References:

1. Lesk, *Introduction to Bioinformatics*, Oxford University Press, Indian Edition, 2003
2. Higgins and Taylor, *Bioinformatics: Sequence, structure and databanks*, Oxford University Press, Indian Edition, 2003
3. Bergeron, *Bioinformatics Computing*, Prentice hall of India, 2003
4. Jiang, Xu and Zhang, *Current topics in Computational Molecular Biology*,Ane Books, New Delhi, 2004
5. S.C Rastogi & Namitha Mendiratta, *Bioinformatics method and application Genomics,Protinomics & drug discovery*
6. Dov Stekel, *Microarray Bioinformatics* ,Cambridge University Press

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC/EI 804C ASIC DESIGN

Module I

Introduction to ASICs: - Types of ASICs - Design flow - Combinational Logic Cell -Sequential logic cell - Data path logic cell – I/O cells .Transistors as Resistors - Transistor Parasitic Capacitance-Logical effort.

Module II

Programmable ASICs: - Anti fuse - static RAM - EPROM and EEPROM technology – practical issues - Programmable ASIC logic cells : Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX.
Programmable ASIC I/O cells : DC & AC inputs and outputs - Clock & Power inputs .

Module III

Programmable ASIC interconnect: Actel ACT -Xilinx LCA - Altera MAX 5000 and 7000 –
Testing: Importance, Faults, Fault models, physical faults, Stuck at fault model, Logical faults, Fault collapsing, Fault simulation – serial fault simulation, parallel fault simulation, concurrent fault simulation, nondeterministic fault simulation, ATPG-D-Calculus, Basic ATPG algorithm, PODEM algorithm, controllability, observability.

Module IV

ASIC construction: System partition - FPGA partitioning - partitioning methods – Popular algorithms Floor planning and placement: physical design flow- algorithms. Routing : global routing - detailed routing - special routing - circuit extraction - DRC.

Text book:

1. M.J.S .Smith, *Application Specific Integrated Circuits* , Pearson Education ,1997.

References:

1. Andrew Brown, *VLSI Circuits and Systems in Silicon* , McGraw Hill, 1991.
2. S.D. Brown, R.J. Francis, J. Rox, Z.G. Uranesic, *Field Programmable Gate Arrays,* Kluever Academic Publishers, 1992.
3. Mohammed Ismail and Terri Fiez, *Analog VLSI Signal and Information Processing*, McGraw Hill, 1994.
4. S. Y. Kung, H. J. Whilo House, T. Kailath, *VLSI and Modern Signal Processing* , Prentice Hall, 1985.
5. Jose E. France, Yannis Tsividis, *Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing*, Prentice Hall, 1994.

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 804D MIXED SIGNAL SYSTEM DESIGN

Module I

Basic current mirrors and single-stage amplifiers : simple CMOS current mirror, common-source amplifier, source-follower or common-drain amplifier, common-gate amplifier, source-degenerated current mirrors, high output impedance current mirrors, cascode gain stage, MOS differential pair and gain stage. Basic Opamp Design and Compensation – Two-stage CMOS opamp, Feedback and Opamp Compensation. Advanced Current Mirrors and Opamps – Folded-Cascode Opamp, Current Mirror Opamp, Fully Differential Opamps, Common-Mode Feedback Circuits, Current-Feedback Opamps.

Module II

Comparators using Opamp:- Charge-Injection Errors, Latched Comparators, Examples of CMOS comparators. Sample-and-Hold Circuits, MOS Sample-and-Hold Basics, Examples of CMOS S/H Circuits, Band-Gap Reference Voltage, Switched-Capacitor circuits – Basic building blocks, operation and analysis, Charge Injection, Switched-Capacitor Gain Circuits, Correlated Double Sampling techniques.

Module III

Data Converter Fundamentals: Nyquist-rate D/A and A/D Converters, Oversampling Converters with and without noise shaping, Sigma-delta A/D converters, Higher-order modulators, MASH architecture, band-pass oversampling converters, multi-bit oversampling converters, Continuous-time filters.

Module IV

Analog Layout considerations:, CMOS Layout and design rules, Layout of integrated resistors, capacitors and analog switches.

Text Book:

1. David A. Johns, Ken Martin, *Analog integrated circuit design*, Wiley & Sons, Inc., 1997.

References:

1. Mohammed Ismail, Terri Fiez, *Analog VLSI signal and information processing*, McGraw-Hill, 1994.

2. Philip E. Allen, Douglas R. Hollberg, *CMOS analog circuit design*, Oxford University Press, 2002.

3. Behzad Razavi, *Design of analog CMOS integrated circuits*, McGraw-Hill, 2001

4. Paul R. Gray, Robert G. Meyer, *Analysis and design of analog integrated circuits*, Wiley & Sons, Inc.,4th edition, 2001.

5. Behzad Razavi, *Principles of data conversion system design*, IEEE Press, 1995

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

EC 805 PROJECT WORK

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

- For hardware projects, practical verification of the design, PCB design, fabrication, design analysis and testing shall be done.
- For software projects, a proper front end (GUI) if applicable, shall be designed. A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.
- Integration of hardware and software, if applicable, shall be carried out.
- A detailed project report in the prescribed format shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report.
- The work shall be reviewed and evaluated periodically

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

- Presentation of the work
- Oral examination
- Demonstration of the project against design specifications
- Quality and content of the project report

Guidelines for evaluation:

Regularity and progress of work		30
Work knowledge and Involvement		100
End semester presentation and oral examination		50
Level of completion and demonstration of functionality/specifications		70
Project Report – Presentation style and content		50
	Total	300 marks

Note: *Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.*

EC 806 VIVA - VOCE

Each student is required to appear for a viva-voce examination at the end of the complete course work. The students shall produce the seminar report and project reports duly attested by the institutional authorities, before the examiners. The examination panel shall comprise of one internal examiner and one external examiner, both appointed by the University. The examiners shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.

804 B BIOINFORMATICS

Last two references year/edition

EC 803 OPTO ELECTRONICS AND COMMUNICATION

References year/edition

EC 802 COMMUNICATION SYSTEMS

References 2-9 year/edition

EC 801 AUDIO & VIDEO ENGINEERING

All texts and references year/edition

EC /EI 706 SIGNAL PROCESSING LABORATORY No changes made

EC/EI 705A INTELLIGENT SYSTEMS more ref to be obtained from Gopika

EC 704 ELECTRONIC PRODUCT DESIGN ref. 4,9,10 year/edition

IOM to be added

CS/EB/EC/EI 605 CONTROL SYSTEM ENGINEERING

All texts and references year/edition

EC604 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Ref 1,4,5,7, year/edition

EC 602 MICROWAVE TECHNIQUES AND DEVICES

Ref 4,6 year/edition

EC/EI 506 DIGITAL SIGNAL PROCESSING

Last 3 ref. year/edition ref. not obtained from RGK

EB/EC/EE/EI 406 INDUSTRIAL AND POWER ELECTRONICS

No year/edition

EC/EI 403 ELECTRONIC CIRCUITS II No year/edition

303NETWORK THEORY

G.S.N Raju, *Electromagnetic Field Theory and Transmission Lines*, 2005 no publisher