11AC (D-7) Recognition of Credit / Marks for Academic Electives Specified by the Central Board of Education (CBSE) in Universities

UGC's directives of recognition of Credit / Marks for Academic Electives specified by the Central Board of Secondary Education (CBSE) in Universities while admitting the students was approved by the Council.

11AC (D-8) Admission for 2016 Batch: Non-engineering programmes

Considering overwhelming response for admissions in B Arch, BA LL B, BA (J&MC), B Com & BBA programmes, the Council approved that from 2016 batch entrance examinations may be conducted for certain programmes. The Council further suggested that the merit list / entrance examinations may be considered for M Tech programmes also.

11AC (D-9) Recognition of Credits for Academic Electives among Group Institutions

The proposal of conducting short term courses during summer vacation for the students of the group institution / universities was approved by the Council.

Each such course will only be conducted for a minimum strength of 10 students. The duration of the course will be one month with minimum 40-45 the total counseling hours The Council suggested that courses so offered should be generic in nature.

11AC (D-2) FACULTY OF ENGINEERING

11AC (D-2-1) Revamping of Structure and Syllabi of B Tech Programme

As decided in Academic Council in its 10th meeting, the entire scheme and syllabi of B Tech programme was revamped and the credits for completion of the programme were reduced to around 174.The proposed structure and syllabi for B Tech first year programme was approved by the Council.

The Council emphasized that self-learning among the students be promoted through this new scheme.

MANIPAL UNIVERSITY JAIPUR

12AC (D-1-5) Introduction of National Service Scheme (NSS) as an Elective Subject in Higher Education:

In compliance of MHRD direction, the Council approved the proposal to offer 'Introduction of National Service Scheme (NSS)' as open elective subject from the Academic Year 2015-16. It was suggested that Faculty of Arts & Law should own the course and wherever required, the expertise from other schools may be incorporated for this course.

12AC (D-2) FACULTY OF ENGINEERING

12AC (D-2-1) Revamping of Scheme and Syllabi of B Tech II Year:

The Council approved the revamped scheme & syllabi of B Tech second year with following suggestions:

1. History to be rephrased as 'History of Science & Technology.'
2. The content of History of Science & Technology to be revised and around 50-60% of the content should be a generic prospective of history and remaining portion to be branch specific.
3. Year of edition to be mentioned for suggested Reference Books for Economics course

12AC (D-2-2) Introduction of Programme Elective for Department of Mechanical Engineering:

The proposal to offer "Introduction to Micro Electro Mechanical Systems" as Programme Elective was approved by the Council.

12AC (D-2-3) Scheme & Syllabi M.Tech (PES) by Research:

Scheme & syllabi of M.Tech (PES) by Research was not approved by the Council in its submitted format. It was advised that scheme and syllabi be revisited and reframed under supervision of Director SEEC and Dean FoE and finally be submitted to the Chairperson Academic Council for consideration.

MANIPAL UNIVERSITY JAIPUR

14AC (D-1-10) Teaching Assistance for Full Time Research Scholars:

The proposal made by University Research Committee in its 12th meeting to increase the amount of Teaching Assistance from Rs. 12000/- to 15000/- per month was approved by the Council. Further the Council emphasized that the Teaching Assistance should be provided against justified workload only. This will be implemented from July, 2016 onwards

The Council recommended that the matter be placed before the Finance Committee for consideration and approval

14AC (D-2) FACULTY OF ENGINEERING

14AC (D-2-1) Revamped Syllabi of Second Year B Tech Programme:

The Council approved the revamped syllabi of Second year B Tech Programme. It will be effective from batch 2015-19 onwards. It was suggested that all second year and onward courses be spelt out as per Outcome Based Education framework.

14AC (D-2-2) Scheme and Syllabi of M.Tech (Product Design) Programme:

The Council deliberated on proposed scheme and syllabi of M.Tech (Product Design) Programme with following suggestions:

a) Eligibility criteria for students seeking admission be specified.
   Necessary information in this regard be provided at the University website and Admission Brochure.
b) Programme electives be included
c) A Basic Design Philosophy Course may be offered in the first semester

The Council directed that the changes as per the above be incorporated in the scheme and syllabi of the programme and placed before the Chairman of the Academic Council for approval (prior to launch of Programme). The programme will be offered from academic year 2016-17.

14AC (D-2-3) Revised Curriculum of IV semester B Tech CSE/ IT/ C&C Programme:

The Council approved the revised scheme of IV semester B Tech CSE/ IT/ CC programmes as placed. Revision will be effective for 2015-19 batch.

MANIPAL UNIVERSITY JAIPUR

SIGNATURE OF HOD WITH DATE

SCHOOL OF ENGINEERING, MANIPAL UNIVERSITY JAIPUR
SCHOOL OF ELECTRICAL, ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINUTES OF THE BOARD OF STUDIES (BOS) V MEETING

Date	: 08/07/2015	Day	: Wednesday	Time	: 11:00 AM	Venue	: Board Room 1A Building 2nd Floor

Members Present	Prof. S. N. Sharan (Director, SEEC), Prof. B.P.Singh (HOD, ECE), Prof. Vivekanand Tiwari, Dr. Amit Rathi, Prof. Amit Soni (HoD), Dept. of EE, Nominee of the President)
BOS Members Excused	Prof. Vandana Suhag, Registrar, MUJ, Prof. Vineet Sahula (External member), Dr. Tarun K. Dubey

Agenda Points

1. Welcome by the Chairman BOS.
2. Decide contents of Basic Electronics (EC1101) as per the revamping of the structure for B.Tech. programme
3. Vote of thanks

MINTUES OF THE MEETING

No	Agenda Point	Discussion / Action
1	Welcome	• Chairman BOS welcomed all Board members
2	Decide contents of Basic Electronics (EC1101) as per the revamping of the structure for B.Tech. programme	• The syllabus of Basic Electronics EC1101 was discussed and finalized. • The finalized syllabus in the meeting to be presented to the President, MUJ • Thus finalized syllabus to be sent to Prof. Vineet Sahula for his consent through mail. • The consent of Prof. Sahula will be enclosed.
3	Vote of thanks	• Chairman BoS delivered vote of thanks.

Signature of HOD with Date: 8/7/15

SCHOOL OF ELECTRICAL, ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINUTES OF THE BOARD OF STUDIES (BOS) VI MEETING

Date :	**16/09/2015**	Day :	**Wednesday**	Time :	**03:30 PM**	Venue :	**Board Room 1A Building 2nd Floor**

Members Present	Prof. S. N. Sharan (Director, SEEC) Prof. B.P.Singh (HOD, ECE) Prof. Vineet Sahula (External member) Prof. Awdhesh Kumar (Dean faculty Affairs and Provost) Prof. Vivekanand Tiwari Dr. Amit Rathi Dr. Tarun K. Dubey Prof. Amit Soni (HoD, Dept. of EE)
BOS Members Excused	Prof. Vandana Suhag, Registrar

Agenda Points

1. Welcome of the BOS Members by the Chairman BOS.
2. Finalizing the scheme of B.Tech.(E&CE)
3. Vote of thanks

MINTUES OF THE MEETING

No	Agenda Point	Discussion / Action
1	Welcome	• Chairman BOS welcomed all Board members
3	Finalizing the scheme of B.Tech.(E&CE)	• The final scheme for B.Tech. (E&CE), after implementing the comments of the external member Prof. Vineet Sahula (as discussed with him from 10:00 am to 1:00 pm on 16 September 2015 at MNIT Jaipur) was presented and approved by the BoS.
4	Vote of thanks	• Chairman BoS delivered vote of thanks to the BoS members and the faculty members.

16/9/15

Signature of HOD with Date:

SCHOOL OF ENGINEERING, MANIPAL UNIVERSITY JAIPUR
SCHOOL OF ELECTRICAL, ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINUTES OF THE BOARD OF STUDIES (BOS) VII MEETING

Date : **02/11/2015** Day : **Monday** Time : **01:30 PM** Venue : **Board Room 1A Building 2nd Floor**

Members Present	Prof. S. N. Sharan (Director, SEEC) Prof. B.P.Singh (HOD, ECE) Prof. Vineet Sahula (External member) Prof. Awdhesh Kumar (Dean faculty Affairs and Provost) Prof. Vivekanand Tiwari Dr. Amit Rathi, Dr. Tarun K. Dubey Prof. Amit Soni (HoD, Dept. of EE)
BOS Members Excused	Prof. Vandana Suhag, Registrar, MUJ.

Agenda Points

1. Welcome of the BOS Members by the Chairman BOS.
2. Finalizing the course structure for II,III and IV year
3. Approval of syllabus for 3rd and 4th semester courses as per new scheme
4. Vote of thanks

MINTUES OF THE MEETING

No	Agenda Point	Discussion / Action
1	Welcome	• Chairman BOS welcomed all Board members
	Approval of minutes of meeting	• The minutes of meeting held on 16th September 2015.
3	Approval of syllabus for 3rd and 4th semester courses as per new scheme	• Detail syllabus as per new scheme was presented before the committee. • Concerned faculty members explained the justification of inclusion and deletion of the matter in the syllabus. • Prof. Sahula suggested adding more reference books to the courses EC1308, EC1401, EC1404, EC1405. • He suggested addition of the book by Sedra Smith to the course EC1306. • The suggestions were incorporated and the syllabus was approved by BoS.
4	Vote of thanks	• Chairman BoS delivered vote of thanks to the BoS members and the faculty members.

24/11/15

Signature of HOD with Date:

Name of Program with code: B. Tech (ECE) Program code: 9202	
Name of Course with Code: Basic Electronics EC1101	**Name of Course with Code: Basic Electronics EC1101**
Syllabus Prior Revision	**Syllabus Post Revision**
Introduction to electronic devices: Diode, Zener diode, BJT, LED; Diode circuits: Half Wave and Full Wave rectifier, clipper, clamper circuits; BJT biasing: CE, CB, CC Configurations, Biasing and stabilization of Q- point, fixed bias, self bias, ~~collector bias.,~~ Operational amplifier; Number systems; logic gates and its truth table, Boolean algebra, Realization of function using Boolean algebra: Boolean identities, De Morgan's theorems, combinational logic circuits, truth tables; K-map; Flip-flops: R-S, ~~J-K, D, T, Master Slave.~~ Introduction to communication: ~~Frequency Bands, Noise, Transmission media, Wire media, comparisons, Wireless communications; AM: Block diagram, spectral expressions, Waveforms, AM Detector, Definition and applications of SSB, DSB, VSB; FM: Block diagram, spectral expressions and waveforms, Comparison of AM & FM.~~ References 1~~. A. P. Malvino, David J Bates, Electronic Principles, Seventh edition, TMH.~~ ~~2. Tokhiem, Digital Electronics, Principles and Applications, Sixth edition, TMH.~~ 3. G. Kennedy, B. Davis, Electronic Communication systems,TMH. 4. R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Ninth edition, PHI, 5. J. Millman, C. C. Halkias, Satyabratajit, Millman's Electronic Devices and Circuits, TMH	PN Junction: Formation of depletion region, Effect of forward and reverse bias on depletion region, I-V characteristics and equivalent circuits of ideal and practical diode, Diode equation; Application of Diodes: Series and parallel combination of diodes in circuits, Half Wave and Full Wave rectifiers, Capacitor filter, clipper, clamper circuits; Zener Diode: I-V Characteristics, Zener Regulators; LEDs; BJT: Construction, schematic diagram and characteristic of CE, CB Configuration, CC Configuration w.r.t. CE, Relation between α and β, transistor biasing, Q-point, load line, fixed bias, self-bias, bias stabilization, Transistor as amplifiers, frequency response; Operational Amplifiers: Ideal characteristics of an op amp., inverting and non- inverting amplifiers, linear circuit applications as voltage follower, integrator, differentiator, summing amplifier, subtractor; Digital Electronics: Number systems, Boolean algebra, DeMorgan's Theorem. Logic gates; Truth tables, SOP, POS form, K-map for minimization of Boolean expressions, Implementation of Boolean expression with logic gates; Combinational circuits: Half and full adders, Half and Full subtractors, S-R flip-flops; Communication Systems: Elements of communication systems, examples of communication systems, Analog and optical communication. Reference Book: 1. J. Millman & C. C. Halkias "Integrated Electronics" Tata McGraw Hill, New Delhi, 1994 2. M. M Mano, "Digital Design", 3rd edition, Pearson, 2009. 3. G. Kennedy, B. Davis, "Electronics Communication Systems", TMH, 3rd Edition, 1985. 4. B. P. Singh and R. Singh, "Electronic Devices and Circuit", Second Edition, Pearson Edu, 2013. 5. R. L. Boylestad, L. Nashelsky, "Electronics Devices and Circuit Theory", 10th ed, PHI, 2009.
Name of Course with Code: EC1304 Computer Organization & Architecture	**Name of Course with Code: EC1304 Computer Organization and Architecture**
Syllabus Prior Revision	**Syllabus Post Revision**
Basic structure and operation of Computers: Introduction to the basic operational concepts of digital computer. Overview of architecture of typical computers; Accumulator based, General Register machines and stack machines; Instruction Set: Instruction formats, types and addressing modes. Reverse Polish notation. Opcode Encoding techniques., Stack Addressing, One byte	Basic structure and operation of Computers: Introduction to the basic operational concepts of digital computer, Von-Neumann and Harvard Architecture, Overview of typical computer architecture: Accumulator based, General Register based and Stack based; Instruction Set: Instruction formats, types and addressing modes, Reverse Polish notation, Opcode Encoding

Instructions, Two Byte Instructions, Three Byte Instruction, Arithmetic Instructions, Logical Instructions, Control Instructions: JUMP, CALL, Conditional JUMP & CALL instructions; Processor Design: Von-Neumann, Hardward Architecture and comparision; Algorithms: Multiplication of signed and unsigned integers, Booths multiplication Algorithm, Division of unsigned integers – Restoring type.; Control Unit Design: Basic concepts, Bus structures. Design methods-Hardwired and micro programmed. Micro programmed control-Micro instruction formats. Hardwired and micro programmed Control unit design examples; Memory Organization: Memory hierarchies, Main memory and cache memory. Cache mapping functionsassociative and direct, ~~introduction to virtual memory~~; Input/output Organization: Isolated I/0, memory mapped I/0, programmed I/0, Interrupt driven I/0, DMA; transfer methods and bus arbitration. References: 1. ~~M. Raffiquzzaman & R. Chandra "Modern Computer Architecture", Galgotia publications, New Delhi, 1990~~ ~~2. N. Carter, "Computer architecture", Schaum's outlines, McGraw-Hill, New Delhi, 2006.~~ 3. V. C. Hamacher, Z.Vranesic & S.Zaky "Computer Organization,McGraw Hill International Edition", Computer Science series 1987-2nd Ed. 4. ~~A.S. Tanenbaum, "Structured computer organization", Prentice Hall Englewood Cliffs N.J, 1984~~	techniques, Stack Addressing, RISC and CISC architecture; Data Path and Control Unit Design: Basic concepts, Data path: Fast adders, subtractors, Types of Bus structures, Control Unit design methods-Hardwired and micro programmed; Computer Arithmetic: Multiplication of signed and unsigned integers, Booths Multiplication algorithm, Division, Floating Point Arithmetic Operation; Memory Organization: Memory hierarchies: types of ROMs, Main memory: SRAM and DRAM, Memory Address Map; Cache memory: mapping functions – associative, direct and set-associative; Input/Output Organization: Introduction to Input/output Organization: Types of I/O: Isolated I/O, memory mapped I/O, programmed I/O, Interrupt driven I/O; Introduction to Direct Memory Access (DMA) & DMA Controller, DMA transfer methods; Introduction to Arbiters and Bus Arbitration methods; Introduction to Multicore and Multi-processor Systems: Parallel Processing, Pipelining Structure of General-purpose Multiprocessor, Interconnection networks, Memory organization in Multiprocessors, Cache Coherence, Multicore organization: hardware and software performance issues. Text books/ Reference books: 1. William Stallings, "Computer Organization & Architecture: Designing for Performance", Pearson, 2012. 2. M. Morris Mano, "Computer System Architecture", Pearson, 2011. 3. V.C. Hamacher, Z. Vranesic & S. Zaky, "Computer Organization", McGraw Hill International Edition, Computer Science series, 2002. 4. J.L. Hennessy and D. A. Patterson, "Computer Architecture: A Quantitative Approach", Morgan Kauffman Publication, 2012.
Name of Course with Code: EC1301 Analog Electronic Circuits	**Name of Course with Code: EC1306 Analog Electronic Circuits**
Syllabus Prior Revision	**Syllabus Post Revision**
Introduction to BJT: ~~PNP and NPN transistors, Characteristics of current flow across base region of transistor, Graphical analysis (DC and AC load line), CE, CB, CC Configurations, Biasing and stabilization of Q- point, fixed bias, self-bias, collector bias; BJT as an amplifier. BJT as a Switch;~~ Transistor at low frequencies and high frequencies: Hybrid – TT model, high frequency limitations; multistage amplifiers: Distortion in amplifiers, Frequency response of an amplifier, bandwidth of cascaded amplifiers, and low frequency response of an RC coupled stage, effect of coupling and emitter by-pass capacitor on low frequency response; Power amplifiers: Classification of large signal	Junction Diode Analysis: Built in voltage, Transition and diffusion capacitances; Introduction to BJT: hybrid model, Hybrid – TT model, analysis of CE, CB, and CC configurations of BJT amplifiers, Miller's theorem; Multistage amplifiers: Distortion in amplifiers, Frequency response of an amplifier, bandwidth of cascaded amplifiers, frequency response of an RC coupled, direct coupled and transformer coupled stages; Power amplifiers: Classification of large signal amplifiers, Analysis and design with respect to efficiency, linearity and harmonic distortions of classes of Amplifier; FET: Structure of JFET and MOSFET, Characteristics, FET biasing, small signal, Analysis of CS, CD

amplifiers, Analysis and design with respect to efficiency, linearity and harmonic distortions of class A, class B and AB push-pull amplifiers., FET: Structure of JFET and MOSFET, Characteristics, small signal and large signal model, Analysis of CS, CD and CG amplifiers at low and high frequencies, FET biasing; Feedback amplifiers: Concept of feedback, types of feedback – their advantages and disadvantages, effect of feedback on frequency response & impedances, ~~Analysis of voltage-series, voltage-shunt, current series & current-shunt feedback amplifiers. Voltage-series and Current shunt Feedback amplifiers using FET;~~ Oscillators: Barkhausen criterion for sustained oscillation, Nyquist criterion for stability of amplifier, R-C phase shift oscillator, Wein bridge oscillators, RF oscillators (Colpitts tuned collector/drain oscillators), crystal oscillator and frequency stability; ~~Sweep Circuits: Sweep parameters, exponential sweep circuit, Miller & Bootstrap circuits.~~ References: 1. J.Millman & C.C.Halkias "Integrated Electronics" Tata McGraw Hill, New Delhi. (1994). 2. ~~B. Razavi "Fundamental of Microelectronics" BR Wiley, (2006).~~ 3. R.L.Boylestad & L.Nashelsky "Electronic Devices and Circuit Theory" 10th Ed. Prentice Hall (2009). 4. ~~Millman & H.Taub "Pulse, digital and switching waveforms" Tata McGraw Hill (1965).~~	and CG amplifiers at low and high frequencies; Feedback amplifiers: Concept of feedback, types of feedback – their advantages and disadvantages, effect of feedback on frequency response & impedances; Oscillators: Barkhausen criterion for sustained oscillation, Nyquist criterion for stability of amplifier, Types of Oscillators: Hartley and Colpitt oscillator; Wein bridge oscillator; RC phase shift oscillator; crystal oscillator; Introduction to Power Electronic Devices. Text books/ Reference books: 1. J. Millman & C. C. Halkias, "Integrated Electronics", Tata McGraw Hill, New Delhi, 2011 2. B.P. Singh and Rekha Singh, "Electronic Devices an Integrated Circuits", Pearson India, 2012 3. R. L. Boylestad & L. Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall, 2009 4. S. Salivahanan and N Suresh Kumar, "Electronics Device and circuits", McGraw Hill Publication, 2010
Name of Course with Code: EC1302 Network Analysis	**Name of Course with Code: EC1307 Network Analysis and Synthesis**
Syllabus Prior Revision	**Syllabus Post Revision**
~~Network equations: Nodal and loop analysis of networks, source transformation, star delta transformations~~; Laplace transformation and its application; Definition, Basic theorems in Laplace transformation, properties of Laplace transforms, inverse Laplace transforms, ~~partial fraction expansion,~~ initial and final value theorems~~, Shifting theorems, step, ramp and delayed functions. Solution of RL, RC, RLC networks using Laplace transformation method,~~ Laplace transform of periodic and non periodic signal; Network Theorems: ~~Superposition~~, Reciprocity, Millman's theorems, ~~Thevinin's and Norton's theorems~~, Maximum Power transfer theorem, Tellegan's Theorem and Millers Theorem; First order and higher order differential equations: General and particular solutions of RL, RC and RLC circuits; Transient behavior and Initial conditions in networks: Behaviour of circuit elements under switching condition and their representation. Evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations; linear wave shaping: Response of RC & RL circuits to step, pulse, square wave, ramp and exponential inputs, compensated attenuators; Two port network and network functions, Network Topology. References:	Network theorems and elements: Reciprocity, Tellegen's and maximum power transfer theorems. Networks with dependent sources. Mutual Inductance; Introduction of graph theory: basics of graph theory, cut set matrix, tie set matrix, current and voltage equation; Transients analysis: Impulse, Step, Ramp and sinusoidal response analysis of first order and second order circuits. Time domain & transform domain (Laplace) analysis. Initial and final values of networks; Two port networks: Two Port General Networks: Two port impedance, admittance, hybrid, ABCD parameters and their inter relations. Equivalence of two ports. Interconnection of two port networks: filters, image impedance symmetric T and pi networks; Network functions: Terminals and terminal pairs, Driving point Impedance, admittance and transfer functions. Procedure for finding network functions for general two terminal pair networks, Stability & causality, Hurwitz polynomial, positive real function; Network synthesis: The four-reactance function forms, specification for reactance function. Foster form of reactance networks. Cauer form of reactance networks Synthesis of R-L and R-C and L-C networks in Foster and Cauer forms. Text books/ Reference books:

1. M.E. V. Valkenberg “Network analysis”, Prentice Hall of India (2000) 2. F. F. Kuo, “Network analysis and Synthesis”, Wiley International Edition 3. ~~J. Edminister,“Electric Circuits” , Schaum's Series,McGraw Hill~~ ~~4. P.M. Chandrashekharaiah, “Electric Circuits”.~~	1. M. E. Van Valkenberg, “Network Analysis”, Prentice Hall of India Ltd, 2000. 2. Franklin F. Kuo, “Network Analysis and Synthesis”, Wiley India Pvt Ltd, 2006. 3. Ghosh & Chakraborty, “Network Analysis and Synthesis”, Tata McGraw Hill Education Private Ltd, 2000.
Name of Course with Code: **EC1303 Logic Design** **EC1403 Digital System Design & HDL**	**Name of Course with Code: EC1308 DIGITAL SYSTEM DESIGN AND HDL**
Syllabus Prior Revision	**Syllabus Post Revision**
~~Number Systems and Codes: Review of number systems, BCD codes and arithmetic, Gray code, self-complimenting codes, Error detection and correction principles; Digital Circuits: Switching algebra & simplification of Boolean expressions. De Morgan‘s Theorem. Implementations of Boolean expressions using logic gates;~~ Combinational Logic Design: Combinational circuit analysis and synthesis, Techniques for minimization of Boolean functions such as Karnaugh map, VEM and Quine-Mc Cluskey methods. Design of arithmetic circuits, code convertors, multiplexers, demultiplexers, encoders, decoders & comparators, Parity generators and checker; Introduction to Sequential Logic: Need for sequential circuits, Binary cell, Latches and flipflops. RS, JK, Master-Slave JK, D & T flip flops; Synchronous Sequential Circuit Design: Fundamentals of Synchronous sequential circuits, Classification of synchronous machines, Analysis of Synchronous Sequential circuits, Design of Synchronous and Asynchronous Counters, Shift registers & Ring counters, Analysis and design of Finite State Machines. Timing issues in synchronous circuits; ASM charts: Introduction, ASM Chart conventions, Design examples; Logic Families: Performance metrics of logic gates, Basic Transistor-Transistor Logic and CMOS logic; Asynchronous Sequential Circuits: Fundamentals of Asynchronous Sequential circuits, Analysis and design of Asynchronous Sequential circuits, Pulse mode and Fundamental-mode Circuits, Cycles, Races and Hazards in asynchronous circuits. References: 1. ~~D. D.Givone, “Digital Principles and Design”, Tata McGraw Hill, 2002.~~ 2. M. Mano, “Digital design”, Prentice Hall of India, Third Edition. 3. ~~W. I. Fletcher, “An Engineering approach to Digital Design”, Prentice Hall of India, 2009.~~ ~~4. Z. Kohavi, “Switching and Finite Automata Theory”, Tata Mc Graw Hill, second edition.~~	Combinational Logic Design: Combinational circuit analysis, Techniques for minimization of Boolean functions such as Karnaugh map, VEM and Quine-Mc Cluskey methods; Design of arithmetic circuits: code convertors, BCD codes and arithmetic, Gray code, self-complimenting codes, multiplexers, demultiplexers, encoders, decoders & comparators, Parity generators and checker; Introduction to Sequential Logic: Need for sequential circuits, Binary cell, Latches and flip-flops. RS, JK, Master-Slave JK, D & T flip flops; Synchronous Sequential Circuit Design: Introduction to Synchronous Sequential circuits, Design of Synchronous Counters, Shift register, Finite State Machines, Moore and Mealy Machines. Timing issues in synchronous circuits; Asynchronous Sequential Circuits: Introduction to Asynchronous Sequential circuits, Asynchronous Counters, Pulse mode and Fundamental-mode Circuits, Cycles, Races and Hazards in asynchronous circuits; Logic Families: Basic ECL, Transistor-Transistor Logic and CMOS logic; Introduction to Verilog programming: Behavioral, Data flow, and structural modeling. Basic constructs, designing combinational and sequential circuits using Verilog. Text books/ Reference books: 1. S. Brown and Z. Vranesic, “Fundamentals of Digital logic with Verilog Design”, McGraw Hill, 2013. 2. M. Mano and M. Ciletti, “Digital Design: With an introduction to Verilog HDL”, Pearson, 2013 3. Z. Navabi, “Verilog Digital System Design” McGraw Hill, 2008.
Name of Course with Code: EC1305 Signals and Systems	**Name of Course with Code: EC1405 Signals and Systems**
Syllabus Prior Revision	**Syllabus Post Revision**
Introduction to signals and systems: Definitions, Overview of specific systems, Classification of signals, Basic	Introduction to signals and systems: Definitions, Overview of specific systems, Classification of signals, Basic

operations on signals, Elementary signals and functions, Systems viewed as interconnections of operations, properties of systems; Time domain representations for Linear time-invariant systems: Introduction, Convolution: Impulse response representation for LTI systems, properties of the impulse response representation for LTI systems, Differential and difference equation representations for LTI systems, Block diagram representations; Fourier representation for signals: The discrete-time Fourier series, continuous-time periodic signals: The Fourier series, Discrete-time non-periodic signals: ~~The discrete-time Fourier transform, continuous-time non-periodic signals: The Fourier transform, properties of Fourier representations, Discrete-time periodic signals;~~ Applications of Fourier representations: Introduction, Frequency response of LTI systems, Fourier transform representations for periodic signals, convolution and modulation with mixed signal classes, Fourier transform representation for discrete-time signals, sampling, Reconstruction of continuous-time signals from samples; Applications of Laplace transform: Continuous Time System Analysis using Laplace transform, Region of convergence and Stability, Analysis of continuous time signals and systems; Z-Transform: Introduction, the Z-transform, properties of the Region of convergence, Properties of the Z-Transform, Inversion of the Z-Transform, Transform analysis of LTI systems, the unilateral Z-Transform. References: 1. S. Haykin & B. V. Veen, "Signals and Systems", John Wiley &Sons, New Delhi, (2005). 2. A.V. Oppenheim , A. S. Willsky & A. Nawab, "Signals and Systems" PHI. /Pearson Education, New Delhi, (2002). 3. ~~H. Hsu, R. Ranjan "Signals and Systems", Schaums's outline, Tata McGraw – Hill, New Delhi, (2006).~~ 4. B. P. Lathi., "Linear systems and Signals", Oxford University Press (2005)	operations on signals, Elementary signals and functions, Systems viewed as interconnections of operations, properties of systems; Time domain representations for Linear time-invariant systems: Introduction, Convolution, Impulse response representation for LTI systems, properties of the impulse response representation for LTI systems, Differential and difference equation representations for LTI systems, Block diagram representations; Fourier representation for signals: The discrete-time Fourier series, continuous-time periodic signals: The Fourier series, Discrete-time non-periodic signals; Applications of Fourier representations: Introduction, Frequency response of LTI systems, Fourier transform representations for periodic signals Properties of Fourier transform, convolution and modulation with mixed signal classes; energy, power, parseval's theorem, spectra of signals, cross correlation and auto correlation, power and energy spectral density; Applications of Laplace transform: Continuous Time System Analysis using Laplace transform, Region of convergence and Stability, Analysis of continuous time signals and systems; Z-Transform: Introduction, the Z-transform, properties of the Region of convergence, Properties of the Z-Transform, Inversion of the Z-Transform, Transform analysis of LTI systems, pole-zero analysis, stability, the unilateral Z-Transform; Sampling of Continuous-Time Signals: Introduction, periodic sampling, Frequency domain Representation of sampling, Reconstruction of Band-limited Signal from its Samples. Text books/ Reference books: 1. A.V. Oppenheim, A. S. Willsky & A. Nawab, "Signals and Systems", PHI/Pearson Education, New Delhi, 2002. 2. S. Haykin, B. V. Veen, "Signals and Systems", John Wiley & Sons, New Delhi, 2002 3. A. Anand Kumar, "Signals and Systems", PHI Learning Press, 2013 4. John G. Proakis, Dimitris K Manolakis, "Digital Signal Processing", Pearson Education, 2006. 5. Tarun Kumar Rawat, "Signals and Systems", Oxford University Press, 2010. 6. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
Name of Course with Code: EC1401 IC systems	**Name of Course with Code: EC1401 Analog Integrated Circuits & Systems**
Syllabus Prior Revision	**Syllabus Post Revision**
Operational Amplifier: Introduction: Basic block diagram of OPAMP; Differential Amplifier: Types of differential amplifier, analysis using block diagram, characteristics of differential amplifier, analysis of emitter coupled differential amplifier using small signal hybrid model, methods of improving common mode rejection ratio using constant current source and current mirror circuits, current repeaters and active load; Level shifter: Circuit operation and analysis of level shifter and output stage of an	Operational Amplifier: Introduction: Basic block diagram of Operational Amplifier; Differential Amplifier: Types of differential amplifier, analysis using block diagram, characteristics of differential amplifier, analysis of emitter coupled differential amplifier using small signal hybrid model, methods of improving common mode rejection ratio using constant current source and current mirror circuits, current repeaters and active load; Circuit operation and analysis of level shifter and output stage of an

operational amplifier; transfer characteristics of op.amp, measurement of operational amplifier parameters; linear applications of operational amplifier: Characteristics of ideal operational amplifier, open loop and closed loop operation of operational amplifier, Inverting amplifier, non inverting amplifier, input resistance, output resistance and band width; ~~sign changer, scale changer, summing amplifier, adder,~~ voltage follower, integrator, differentiator, voltage to current converter, current to voltage converter, difference amplifier, instrumentation amplifier and bridge amplifier; Active filters: Design and analysis of first and higher order low pass, high pass, band pass (wide and narrow band) and band elimination (wide and narrow band) and all pass active filters; Non-linear applications of operational amplifier: Precision half wave and full wave rectifiers, peak detector, sample and hold circuit, log and antilog amplifiers, analog multipliers and dividers, comparators, window detector, Schmitt trigger, square wave, triangular wave generators and pulse generator; Timer: Introduction, pin details of 555 I.C., functional diagram of 555 IC, astable multivibrator, positive and negative edge triggered monostable multivibrator, linear ramp generator and FSK generator, Data converters: Principles of digital to analog converter (DAC) and analog to digital converters (ADC), binary weighted, R2R digital to analog converters, flash type, successive approximation type, counter type and servo tracking type and dual slope analog to digital converters, specifications of ADC and DAC; Phaselocked loops: Functional diagram of voltage controlled oscillator - 566 I.C. and its analysis, Operating principle of PLL, study of IC 565, circuit analysis of phase detector, Definition and derivation for free running frequency, lock range and capture range, Applications of PLL as frequency multiplier, frequency divider, AM and FM demodulation and FSK demodulation. References: 1. S. William D. “Operational Amplifiers with Linear Integrated Circuits” Prentice Hall (2004) 2. M. Jacob “Microelectronics”, McGraw Hill (1979). 3. F. Sergio "Design with Op amps & Analog Integrated Circuits" McGraw Hill (1997). 4. D. L. Terrell, Butterworth - Heinemann “Op Amps Design, Application, and Troubleshooting” (1996).	operational amplifier; transfer characteristics of op. amp, measurement of operational amplifier parameters; Linear applications of operational amplifier: Characteristics of ideal operational amplifier, open loop and closed loop operation of operational amplifier, voltage follower, integrator, differentiator, voltage to current converter, current to voltage converter, difference amplifier, instrumentation amplifier and bridge amplify; Active filters: Design and analysis of first and higher order low pass, high pass, band pass (wide and narrow band) and band elimination (wide and narrow band) and all pass active filters; Non-linear applications of operational amplifier: Precision half wave and full wave rectifiers, peak detector, sample and hold circuit, log and antilog amplifiers, analog multipliers and dividers, comparators, window detector, Schmitt trigger, square wave, triangular wave generators and pulse generator; Timer IC: Introduction, pin details of 555 I.C., functional diagram of 555 IC, astable multivibrator, positive and negative edge triggered monostable multivibrator, linear ramp generator and FSK generator; Data converters: Principles of digital to analog converter (DAC) and analog to digital converters (ADC), binary weighted, R-2R digital to analog converters, flash type, successive approximation type, counter type and servo tracking type and dual slope analog to digital converters, specifications of ADC and DAC; Phase-locked loops: Functional diagram of voltage controlled oscillator - 566 I.C. and its analysis, Operating principle of PLL, study of IC 565, circuit analysis of phase detector, Definition and derivation for free running frequency, lock range and capture range, Applications of PLL as frequency multiplier, frequency divider, AM and FM demodulation and FSK demodulation; Introduction to CMOS Amplifiers Text books/ Reference books: 1. R.A. Gayakwad “Op-Amps and Linear Integrated Circuits”, PHI, Fourth Edition. 2. B. Razavi, “Design of Analog CMOS Integrated Circuits”, Tata Mc-Graw Hill, 2002. 3. A.Holberg; “CMOS analog Circuit Design”, Oxford Univ. Press. 3rd Edition, 2013. 4. S. William D. “Operational Amplifiers with Linear Integrated Circuits” Prentice Hall (2004) 5. M. Jacob “Microelectronics”, McGraw Hill (1979). 6. F. Sergio "Design with Op amps & Analog Integrated Circuits" McGraw Hill (1997). 7. D. L. Terrell, Butterworth - Heinemann “Op Amps Design, Application, and Troubleshooting” (1996).
Name of Course with Code: EC1402 Microprocessors & Microcontrollers	**Name of Course With Code: EC1402 Microprocessor and Microcontroller**
Syllabus Prior Revision	**Syllabus Post Revision**
8086 MICROPROCESSOR: Introduction to 16-bit microprocessors, History of microprocessors, Intel 8086 ~~and 8088 Architecture~~, Bus Interface Unit and Execution	8086 Microprocessor: Introduction to 16-bit microprocessors, History of microprocessors. 8086 Architecture: Bus Interface Unit and Execution Unit,

Unit, The Instruction pipeline, Data and Address Bus Configuration, Memory Segmentation, Memory Address generation, I/O Port addressing. Functions of all signals, Minimum and Maximum Mode signals, Bus Cycles, Bus driver 8288, Addressing Modes, Instruction Set in detail, ~~Assembler directives,~~ Assembly Language Programming, Programming examples, Macros, DOS function, Interrupt processing, Hardware and Software interrupts, Internal interrupts, ~~Interfacing: Memory interfacing, Programmable peripherals Interface-8255, Programmable I/O interface 8254, Programmable Interval timer 8251 Programmable USART, Programmable Interrupt controller 8259;~~ 8051 MICRO CONTROLLER: Introduction microcontroller, ~~Difference between microprocessors and microcontrollers, Microcontroller survey, CISC and RISC Microcontrollers, Architectural features and Advantages. Applications of Microcontrollers, Introduction to 8051 family, History of 8051~~, Architectural features of 8051, Programming model, Pin details, I/O Ports, Addressing Modes, Instruction set of 8051, Arithmetic and logical instructions, Byte level and Bit level, Jump, loop and call instructions, Programming examples, Counters and Timers programming~~, RS 232 standard~~, Serial I/O in 8051, Interrupts in 8051, Interrupt based Timer/Counter and Serial programming, ~~Interfacing: External memory, LCD, ADC, DAC, Sensor, Seven segment display, DC motor, Stepper Motor, Keyboard, Interfacing using 8255.~~ ~~References:~~ ~~1. B. B. Brey "The Intel Microprocessors" (Eight Edition), Pearson (Prentice Hall).~~ ~~2. Liu and Gibson, "Microcomputer systems the 8086/8088 family", 2nd ed., PHI.~~ ~~3. D. Hall, "Microprocessor & Interfacing" TMH.~~ ~~4. A. K. Ray and K. M. Bhurchandi, "Advanced microprocessor and peripherals" TMH~~	Instruction pipeline, Data and Address Bus Configuration, Memory Segmentation, Memory Address generation, I/O Port addressing. 8086 Signals: Functions of all signals, Minimum and Maximum Mode signals; Bus Cycles, Bus driver 8288. 8086 Instruction Set: Types of Instructions and Addressing Modes, Programming; 8051 Microcontroller: Architectural features, Programming model, I/O Ports, Addressing Modes, Instruction set of 8051, Programming; ARM Processor fundamentals: Introduction, RISC design philosophy, ARM design philosophy. Registers; Current Program Status Register; Pipeline and stages; Exceptions, Interrupts and Vector Table; Core Extensions: Coprocessors. Instruction Set: Arithmetic and Logic; Memory Load and Store; Block Load and Store; Branch and Branch with Link; Machine Control. Thumb Instruction Set: Thumb Register Usage; ARM-Thumb Interworking; Other Branching Instructions; Data processing; Single-Register Load-Store Instructions; Multiple-Register Load-Store Instructions; Stack instructions; Software Interrupt Instruction. Text books/ Reference books: 1. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010 2. B. P. Singh, Renu Singh, "Advanced Microprocessors and Microcontrollers", New Age International (P) Ltd., 2008. 3. Steve Ferber, "ARM System-on-Chip Architecture", Addison-Wesley Professional imprint in Pearson, 2001. 4. A. Sloss, D. Syms and C. Wright, "ARM Systems Developer's Guide Designing and Optimizing System Software", Elsevier and Morgan Kaumann Publication, 2004.
Name of Course with Code: EC1491 Transducers and Instrumentation	**Name of Course with Code: EC1491 Transducers and Instrumentation**
Syllabus Prior Revision	**Syllabus Post Revision**
Generalized measurement system, static characteristics of instruments. Resistance potentiometer and thermometers. Thermistors, photo resistors and thermocouple. Induction potentiometers, Magnetostrictive transducer, Capacitive transducers, piezoelectric crystals. Accelerometer and Vibrometer. Optical sensors, IC sensors. Introduction to fiber optic sensors. Intelligent and smart transducers. Piezoelectric transducer. Digital transducers References: 1. S. Ranganathan, 'Transducer Engineering', Allied Publishers Pvt. Ltd., 2003. 2. A.K. Sawhney, 'A course in Electrical & Electronic Measurement and Instrumentation', DhanpatRai and Co (P) Ltd., 200D.	Introduction: Units and systems, Dimensions and standards, Calibration methods, Static calibration, Generalized Measurement System, Sensor, Basic requirements of a transducer, Classifications of transducer. Error analysis, Statistical methods, Choice of transducer, factor influencing choice of transducer; Characteristics of a Transducer: Static characteristics, Accuracy, Precision, Sensitivity, Linearity, Hysteresis, Threshold, Resolution, Dead time, Dead zone, Scale range, Scale span - Dynamic characteristics - Speed of response, Measuring lag, Fidelity, Dynamic error- mathematical model of transducer - Zero, I, II order transducer, Response to step, ramp, impulse inputs; Instruments: Ammeter, Voltmeter. Expression for torque of moving coil, moving iron, dynamometer, induction and electrostatic instruments. Extension of range of

3. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999. 4. E.A. Doebelin, 'Measurement Systems – Applications and Design', Tata McGraw Hill, NewYork,1990.	instruments wattmeter, Torque expression for dynamometer instruments. Reactive power measurement; Bridge Methods: Measurement of inductance, capacitance and resistance using Bridge. Maxwell's Anderson, Wein bridge, Heaveside Cambell's Desauty's, Schering's bridges, kelvin's doublebridge, price guard wire bridge loss of charge method, Megger, Wagners Earthing device; Transducers : Principle of operation, construction, Characteristics and applications of potentiometer - loading effects, Strain gauge - theory, temperature compensation, applications – RTD , Thermistors, Hotwire anemometer, piezo resistive sensor; Inductive and capacitive transducer- Self-inductance, Mutual inductance transducer , Induction potentiometer, LVDT, RVDT, Synchro's, Capacitive transducer analog and digital transducer, Thermoelectric transducer, Photovolatic cell, Hall effect Piezo electric, Magnetostrictive. Text books/ Reference books: 1. A.K. Sawhney, "A course in Electrical & Electronic Measurement and Instrumentation", Dhanpat Rai and Co (P) Ltd., 2011, 2. H.S. Kalsi, "Electronic Instrumentation", Tata McGrwaw-Hill, 2015. 3. S. Ranganathan, "Transducer Engineering", Allied Publishers Pvt. Ltd., 2003. 4. Patranabis, "Sensors and Transducers", Prentice Hall of India, 1999. 5. E.A. Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, New York, 1990.