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UNIVERSITY OF MYSORE

Estd. 1916

Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

No.AC.2(S)/31/18-19

Dated: 15.06.2018

NOTIFICATION

Sub: Revision of syllabus for Electronics (UG) as per CBCS pattern from the academic year 2018-19.

Ref: 1. Decision of Board of Studies in Electronics (UG) meeting held on 19.03.2018.
2. Decision of the Faculty of Science & Technology Meeting held on 21.04.2018.
3. Decision of the Deans Committee meeting held on 22.05.2018.

*****

The Board of Studies in Electronics (UG) which met on 19th March, 2018 has recommended to revise the syllabus for B.Sc. Electronics as per CBCS pattern from the academic year 2018-19.

The Faculty of Science and Technology and the Deans committee meetings held on 21-04-2018 and 22-05-2018 respectively have approved the above said proposal with pending ratification of Academic Council and the same is hereby notified.

The CBCS syllabus of B.Sc. Electronics course is annexed. The contents may be downloaded **from the University Website i.e., www.uni-mysore.ac.in**.

Draft approved by the Registrar

15/6

Deputy Registrar(Academic)

To:

1. The Registrar (Evaluation), University of Mysore, Mysore.
2. The Dean, Faculty of Science & Technology, DOS in Physics, Manasagangotri, Mysore.
3. The Chairperson, BOS in Electronics, DOS in Electronics, Hemagangotri, Hassan.
4. The Chairperson, Department of Studies in Electronics, Hemagangotri, Hassan.
5. The Director, College Development Council, Moulya Bhavan, Manasagangotri, Mysore.
6. The Principals of the Affiliated Colleges where UG Program is running in Science stream.
7. The Deputy/Assistant Registrar/Superintendent, AB and EB, UOM, Mysore.
8. The P.A. to the Vice-Chancellor/Registrar/Registrar (Evaluation), UOM, Mysore.
9. Office file.

University of Mysore.

Proposed CBCS Syllabus for the six semesters
B.Sc. (Electronics)
Choice Based Credit Scheme 2018

University of Mysore

Proposed CBCS Syllabus for B.Sc. Electronics
2018

Credit Pattern for Courses
Subject: Electronics

L→Lecture, T→Tutorial, P→Practical's

Semester	Type	Subject : ID	Course(Title)	L+T+P	Total Credit
1	**DSC**	**ELE101**	Network Analysis and Analog Electronics	**4+0+0**	**4**
	DSC	**ELE102**	**Practical 1**	**0+0+2**	**2**
2	**DSC**	**ELE201**	Linear and Digital Integrated Circuits	**4+0+0**	**4**
	DSC	**ELE202**	**Practical 2**	**0+0+2**	**2**
3	**DSC**	**ELE301**	Communication Electronics	**4+0+0**	**4**
	DSC	**ELE302**	**Practical 3**	**0+0+2**	**2**
4	**DSC**	**ELE401**	Microprocessor and microcontrollers	**4+0+0**	**4**
	DSC	**ELE402**	**Practical 4**	**0+0+2**	**2**
5	**DSE**	**ELE501**	Verilog and VHDL	**3+0+0**	**3**
	DSE	**ELE502**	**Practical 5**	**0+0+1.5**	**1.5**
	DSE	**ELE503**	**Practical 6**	**0+0+1.5**	**1.5**
	SEC	**ELE511**	Electrical circuits and network skills	**2+0+0**	**2**
	SEC	**ELE512**	Computer networks	**2+0+0**	**2**
	SEC	**ELE513**	Renewable Energy and Energy harvesting	**2+0+0**	**2**
6	**DSE**	**ELE601**	Digital Signal Processing	**3+0+0**	**3**
	DSE	**ELE602**	**Practical 7 (Mat Lab)**	**0+0+1.5**	**1.5**
	DSE	**ELE603**	**Practical 8 (Part-A & Part-B)**	**0+0+1.5**	**1.5**
	SEC	**ELE611**	Technical Drawing	**2+0+0**	**2**
	SEC	**ELE612**	PCB Fundamentals	**2+0+0**	**2**
	SEC	**ELE613**	Weather Forecasting	**2+0+0**	**2**

Credit means the unit by which the course work is measured. One hour session of Lecture or Tutorial per week for 16 weeks amounts to 1 credit. Two hours session of practical per week for 16 weeks amounts to 1 credit per semester.

Scheme of IA marks Distribution

IA Marks - Theory

Semesters: I To VI

1	Test For C1 & C2 test to be conducted during 8th &16th week respectively in all semesters.	20 Marks
2	IA = Average of Test and Assignment	20 Marks

IA Marks - Practical

Semesters: The student has to compulsorily submit the practical record for evaluation during C1 & C2. For C3, the Practical record has to be certified by the Head of the Department.

1. Student is evaluated for 10 marks in C1&C2 as per the scheme (8th & 16th week respectively):
   a) Experiment: 8
   b) Record : 2

   The marks scored is then normalised for 10 marks **IA**.

2. The student is evaluated for 40 marks in C3 as per the scheme: **Practical 1 to 7**

Sl.No.		Part- A
1	Experiment	25 Marks*
2	Viva	5 Marks
3	Record	10Marks
4	Total	40 Marks

*The experiment portion of evaluation is carried out as per the following scheme:

Sl.No.	Heading	Marks
1	Circuit, Tabular column, Formula, Nature of Graph	6
2	Arrangement, Circuit connections	6
3	Taking readings & recording readings	5
4	Plotting the Graph & calculations	5
5	Accuracy of result	3
6	Total	25

For practical-8:

Sl.No.		Part- A	Part - B	
1	Experiment	15 Marks**	Mini project	15 Marks ***
2	Viva	5 Marks	-	-
3	Record	5Marks	-	-
4	Total	40 Marks	-	-

**Experiment portion of evaluation is carried out as per the following scheme:

Sl.No.	Heading	Marks
1	Circuit, Tabular column, Formula, Nature of Graph	3
2	Arrangement, Circuit connections	3
3	Taking readings & recording readings	3
4	Plotting the Graph & calculations	3
5	Accuracy of result	3
6	Total	15

***Mini project portion of evaluation is carried out as per the following scheme:

Sl.No.	Heading	Marks
1	Working Project	5
2	Viva	5
3	Project report	5
6	Total	15

Theory Question paper pattern

1. DSC Courses ELE-101,201,301,401 and similar courses:

Max.Marks:80 Time: 3 hours

Part-A

Long answer questions; Answer 4 out of 6.

(3 from each part with division : 6 Marks) 10x4=40

Part-B

Short notes & Numerical; 4 out of 6.(4 from each part with division) 5x 4=20

Part-C

Short answer questions; Answer 10 out of 12. (6 from each part) 2x10=20

2. DSE Courses ELE-501,601 and similar courses:

Max.Marks:80 Time: 3 hours

Part-A

Long answer questions; Answer 4 out of 6.

(3 from each part with division : 6 Marks) 10x4=40

Part-B.

Short notes & Numerical; Answer 4 out of 6.

(3 from each part with division : 5 Marks) 5x4=20

Part-C

Short answer questions; Answer 10 out of 12. (6 from each part) 2x10=20

3. SEC Courses ELE-511-513,611-613 and similar courses:

Max.Marks:40 Time: 2 hours

Part-A

Long answer questions; Answer 2 out of 4.

(2 from each part with division : 5 Marks 3 Marks-Numeric's(optional)) 10x2=20

Part-B.

Long answer questions; Answer 2 out of 4. (2 from each part with division : 5 Marks) 5x2=10

Part-C

Short answer questions; Answer 5 out of 8. (4 from each part) 2x5=10

Semester I

DSC: ELE101

NETWORK ANALYSIS AND ANALOG ELECTRONICS

(Credits: Theory-04, Practicals-02)
Duration 16 weeks **Theory: 64 Lectures.**
4 hours / week.

Part-A

Circuit Analysis:
Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law. Mesh Analysis. Node Analysis. Star and Delta networks, Star-Delta Conversion. Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Two Port Networks: h, y and z parameters and their conversion.

(14 Lectures)

Junction Diode and its applications:
PN junction diode - (Ideal and practical)-construction, Formation of Depletion Layer, I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point.
Zener diode - Reverse saturation current, Zener and avalanche breakdown.
Qualitative idea of Schottky diode & Vector diode.
Rectifiers- Half wave rectifier, Full wave rectifiers (centre- tapped and bridge), circuit diagrams, working and waveforms, expressions for efficiency. Ripple factor (Mention)
Filter-Shunt capacitor filters working with FWR.
Regulation- Line and load regulation, Zener diode as voltage regulator and explanation for load and line regulation.

Bipolar Junction Transistor:
Construction, types and operation of transistor, Review of the characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β (Relevant Numerical). **(18 Lectures)**

Part-B

Transistor biasing:
Need for biasing, DC load line and Q point, Thermal Runaway,
Stabilization – stability and expression for stability factor S. Fixed Bias and Voltage Divider Bias.
Amplifiers: Small signal analysis of single stage CE amplifier. Transistor as two port network, h-parameter equivalent circuit, Input and Output impedance, Current and Voltage gains.

Power amplifiers: Class A, B, and C Amplifiers (Qualitative analysis) Class-B Push-Pull amplifier **(14 Lectures)**
Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

Multistage amplifiers **(3 Lectures)**

Feedback in Amplifiers:

Concept of feedback, negative and positive feedback, advantages of negative feedback, expression for gain with negative feedback (Numerical). **(5 Lectures)**

Sinusoidal Oscillators:

Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator. Expression for Frequency and Condition of oscillation (Numerical). **(5 Lectures)**

Unipolar Devices:

JFET - Construction, working and I-V characteristics (output and transfer), Expression for Pinch off voltage (Numerical).

UJT - Construction, working, equivalent circuit and I-V characteristics (Numerical).

(5Lectures)

Reference Books:

1. Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
2. Electronic Devices and Circuit theory,Robert L. Boylestad,PHI
3. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
4. Electrical Circuits, M. Nahvi & J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
5. Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
6. Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.
7. Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
8. Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning
9. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn.,
10. Oxford University Press.
11. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
12. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata
13. McGraw Hill (1991)

DSC : ELE102 Practical- 1

Network Analysis and Analog Electronics

Course duration: 16 weeks

4 hours / week

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), Digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of Superposition Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
7. Study of Half wave rectifier with and without C- filter
8. Study of Full wave rectifier with and without C- filter.

9. Study of the voltage regulation using Zener diode[Load and line regulation].
10. Study of the I-V Characteristics of UJT .
11. Study of input and output Characteristics of Transistor in CE configuration.
12. Study of the output and transfer I-V characteristics of common source JFET.
13. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
14. Study a Stage CE amplifier.(frequency response and band width)
15. Study a Stage JFET amplifier.(frequency response and band width)
16. Study of the RC Phase Shift Oscillator.
17. Study the Colpitt`s oscillator.

Minimum of EIGHT Experiments to be done. First experiment is compulsory.

Reference Books:

- Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
- Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
- Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.

Semester II

DSC: ELE201

LINEAR AND DIGITAL INTEGRATED CIRCUITS

(Credits: Theory-04, Practicals-02)
Duration 16 weeks **Theory: 64 Lectures.**
4hours / week.

Part-A

Operational Amplifiers (Black box approach):
Block diagram of Op-amp**,** Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR & Slew Rate.
Applications of Op-Amps:
Inverting and non-inverting amplifiers and concept of Virtual Ground, (1) Summing scaling and averaging Amplifier (2) Difference amplifier, (3) Differentiator, (4) Integrator, (5)Active low pass and high pass Butterworth filter (1st order only). (6)Wein Bridge Oscillator, (7) Comparator and (8) Zero crossing detector (9) Astable multivibretor
(22 Lectures)

Timer (IC 555):
Block diagram of IC 555, working, expression for frequency of Astable and Monostable multivibrator circuits. **(4 Lectures)**

Number System and Codes:
Decimal, Binary, Octal and Hexadecimal number system - conversion from one system to another, Binary arithmetic - addition, subtraction (1`s & 2's complement method) , multiplication and division, BCD code. (**6 Lectures**)

Part-B

Logic Gates and Boolean algebra: Discussion & Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates, Basic postulates of Boolean algebra , Principle of Duality , De Morgan`s theorems. Simplification of Boolean Expressions, logic circuit for the Boolean expression and vice – versa. (**6 Lectures**)

Combinational Logic Analysis and Design:

Standard representation of logic functions -SOP and POS, Minimization Techniques - Karnaugh map minimization up to 4 variables for SOP. (**6 Lectures**)

Arithmetic Circuits: Half and Full Adder and Half and Full Subtractor, 4-bit binary Adder/Subtractor. (**2 Lectures**)

Data processing circuits:

Multiplexers (4 x 1), De-multiplexers (1 x 4)

Decoders – 3 to 8 line

Encoders – Decimal to BCD encoder.

Sequential Circuits: SR flip-flop, clocked SR & D flip-flops, JK Flip-Flops. Clocked (Edge Triggered)Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop. (**6 Lectures**)

Shift registers:

Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits) (Qualitative analysis). (**3 Lectures**)

Counters (4 bits):

Asynchronous counters – Ripple counter,Mod-3, Decade counter. Up/Down Counter, (**3 Lectures**)

D-A and A-D Conversion:

D – A Conversion- 4 bit binary weighted and R-2R D-A converters, circuit and working. Accuracy and Resolution. A-D conversion - characteristics, successive approximation type ADC & Tracking DAC. (Mention of relevant ICs for all). **(6 Lectures)**

Reference Books:

(1) OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall

(2) Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.

(3) Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

(4) Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw

(5) Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.

(6) Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.

(7) Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.

(8) R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

DSC : ELE202 **Practical- 2**

Linear and Digital Integrated circuits

Course duration: 16 weeks

4 hours / week

Section-A: Op-Amp. Circuits (Hardware)

1. To design an inverting & non-inverting amplifier using Op-amp (741,351) for dc voltage of given gain
2. To design inverting amplifier using Op-amp (741,351) & study its frequency response
3. To design non-inverting amplifier using Op-amp (741,351) & study frequency response
4. To add two dc voltages using Op-amp in inverting.
5. To subtractor using Op-amp.
6. To study the zero-crossing detector and comparator.
7. To design an Astable multivibretor using Op-amp.
8. To investigate the use of an op-amp as an Integrator.
9. To investigate the use of an op-amp as a Differentiator.
10. To design a Wien bridge oscillator for given frequency using an op-amp.
11. Design a digital to analog converter (DAC) of given specifications.
12. Design an analog to digital converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware)

1. 1 (a) To convert Boolean expression into logic circuit & design it using logic gate ICs.
   (b) To minimize a given logic circuit.
2. Half Adder and Full Adder.
3. Half Subtractor and Full Subtractor.
4. Universal logic gates.
5. 4 bit binary adder and adder-subtractor using Full adder IC.
6. To design a seven segment decoder.
7. To Study the Encoder.
8. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
9. To build JK Master-slave flip-flop using Flip-Flop ICs
10. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.
11. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.

Minimum of 04 experiments each from section A and B.

Reference Books

- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edn., 2000, Prentice Hall
- R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)
- Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill

Semester III

DSC: ELE301 COMMUNICATION ELECTRONICS

(Credits: Theory-04, Practicals-02)
Duration 16 weeks **Theory: 64 Lectures.**
4hours / week.

Part-A

Electronic communication:
Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Concept of Noise, signal-to-noise (S/N) ratio.

(6Lectures)

Analog Modulation:
Amplitude Modulation, modulation index, analysis of AM wave and frequency spectrum, power relation, current calculation, modulation by several sine waves.
Generation of AM (Emitter Modulation),
Concept of Single side band generation – Balanced modulator and suppression of sidebands using filter method. Amplitude Demodulation (diode detector),
Frequency Modulation (FM) - modulation index and frequency spectrum, Phase Modulation (PM), comparison between FM and PM and FM & AM , FM detector (slope detector), Generation of FM using VCO
Qualitative idea Block diagram of AM & FM Super heterodyne receiver.

(15 Lectures)

Analog Pulse Modulation:
Channel capacity, Sampling theorem, Basic Principles- PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

(11Lectures)

Part-B

Digital Pulse Modulation:
Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques - Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK). **(11 Lectures)**

Introduction to Communication and Navigation systems:
Satellite Communication
Introduction, need of satellite communication, geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. **(10 Lectures)**

Mobile Telephony System

Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only).
GPS navigation system (qualitative idea only) **(11 Lectures)**

Reference Books:

• Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
• Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
• Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011,Oxford University Press.
• Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.
• Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
• Communication Systems, S. Haykin, 2006, Wiley India
• Electronic Communication system, Blake, Cengage, 5th edition.
• Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

DSC: ELE302 Practical- 3

Communication Electronics

Course duration: 16 weeks

4 hours / week

At least 8experiments respectively from following .

1. To design an Amplitude Modulator using Transistor
2. To study envelope detector for demodulation of AM signal
3. To study FM - Generator and Detector circuit
4. To study the IF-amplifier.
5. To study the RF-amplifier.
6. To study AM Transmitter and Receiver
7. To study FM Transmitter and Receiver
8. To study Time Division Multiplexing (TDM)
9. To study Pulse Amplitude Modulation (PAM)
10. To study Pulse Width Modulation (PWM)
11. To study Pulse Position Modulation (PPM)
12. To study ASK modulators.
13. To study PSK modulators.
14. To study FSK modulators.

Minimum of EIGHT Experiments to be done.

Reference Books:

• Electronic Communication systems, G. Kennedy, 1999, Tata McGraw Hill.
• Electronic Communication system, Blake, Cengage, 5th edition.

Semester IV

DSC: ELE401 MICROPROCESSOR AND MICROCONTROLLER

(Credits: Theory-04, Practicals-02)
Duration 16 weeks **Theory: 64 Lectures.**
4hours / week.

Part-A

Microcomputer Organization: Digital computers, Main features of 8085, Block diagram., Data and address buses. Registers. Memory organization & addressing. Memory Interfacing. Memory Map.Input/Output Devices. Data storage (idea of RAM and ROM).
(10 Lectures)

8085 MPU: Pin-out diagram of 8085,Architecture and its operations,Address bus, Data bus, Control and Status Signals, Power supply and Clock Frequency, ALU. Stack memory. Program counter Flags, Timing and Control unit, Instruction register And Decoder, Register Array,Serial I/o ports, **(10 Lectures)**

8085 Programming:
Instruction classification, Instruction format-Word sizes, Opcode format.
Instructions set - Data transfer, Addressing Modes,Arithmetic, logical, branch, and control instructions. Writing Assembly Language Programs. Subroutines, Additional DataTransfer and 16-bit Arithmetic instructions,delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(12 Lectures)**

Part-B

8051 microcontroller:
Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register.
(11 Lectures)

8051 I/O port programming:
Introduction of I/O port programming, pin out diagram of 8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation. **(7Lectures)**

8051 Programming:
8051 addressing modes - Immediate, direct, indirect and register addressing modes, Bit addresses for I/O and RAM, assembly language instructions using each addressing mode
Instruction Set: Arithmetic Instructions, logic instructions, Jump, loop and call instructions.
(7 Lectures)

Introduction to embedded system:
Embedded systems and general purpose computer systems. Architecture of embedded system. Classifications, applications and purpose of embedded systems. **(7 Lectures)**

Reference Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
3. The 8051 Microcontroller, Ayala,3rd Edition,CENGAGE Learning.
4. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A.Mazidi, J.G.
5. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
6. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
7. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
8. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
9. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill
10. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

DSC: ELE302 Practical- 4

Microprocessor and Microcontroller

Course duration 16 weeks **4 hours / week.**

Section-A: Programs using 8085 Microprocessor

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Finding Largest among a group of numbers.
8. Finding Smallest among a group of numbers.
9. Arranging in an ascending order of a group of numbers.
10. Arranging in descending order of a group of numbers.
11. To Check the number of 1s in a data.
12. Other programs (e.g. Parity Check, using interrupts, etc.).

Section-B: Experiments using 8051 microcontroller

1. Addition and subtraction of numbers 8-bit numbers.
2. To find that the given numbers is prime or not.

3. Multiplication by repeated addition
4. Handling of 16-bit Numbers. Addition & Subtraction of 16 bit numbers
5. Finding Largest among a group of numbers.
6. Finding Smallest among a group of numbers.
7. To find the factorial of a number.
8. To Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
9. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's .
10. Program to glow the first four LEDs then next four using TIMER application.
11. Program to rotate the contents of the accumulator first right and then left.
12. Program to run a countdown from 9-0 in the seven segment LED display.
13. To interface seven segment LED display with 8051 microcontroller and display
14. 'HELP' in the seven segment LED display.
15. To toggle '1234' as '1324' in the seven segment LED display.
16. Application of embedded systems: Temperature measurement & display on LCD

At least 05 experiments to be done each from Section-A and Section-B

Reference Books:

• Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
• Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
• The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
• 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
• Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

Semester V

DSE: ELE501

VERILOG & VHDL

(Credits: Theory-03, Practicals-03)

Duration 16 weeks **Theory: 48 Lectures.**

3hours / week.

Part-A[VHDL]

Basic Language elements

Identifiers, Data Objects, Data types, Operators.

Behavioral Modeling

Entity Declaration, Architecture Body, Process statement, Variable assignment statement, Signal Assignment, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion statement, Report statement, More on Signal Assignment statement, other sequential statements. **(16 Lectures).** **Dataflow Modelling**

Concurrent Signal Assignment, Concurrent versus Sequential Signal Assignment, Delta Delay Revisited, Multiple Drivers, Conditional Signal Assignment Statement, Selected Signal Assignment Statement, the UNAFFECTED value, Block Statement, Concurrent Assertion Statement, Value of signal. **(08 Lectures)**

Part-B

Structural Modelling

An example, Component Declaration, Component Instantiation, Other examples, resolving Signal Values **(08 Lectures)**

Verilog HDL:

Introduction to HDL. Verilog primitive operators and structural Verilog, Behavioural Verilog. Design verification. Modelling of combinational and sequential circuits (including FSM and FSMD) with Verilog, Design examples in Verilog. **(16 Lectures)**

Reference Books:

- VHDL Primer, J. Bhasker – 3rd Edition, Pearson Education.
- VHDL Programming by Example, Douglas L. Perry – 4th Edition, TMH.
- LizyKurien and Charles Roth. *Principles of Digital Systems Design and VHDL.*Cengage Publishing. ISBN-13: 978-8131505748.

- Palnitkar, Samir, *Verilog HDL.* Pearson Education; Second edition (2003).
- Ming-Bo Lin. *Digital System Designs and Practices: Using Verilog HDL andFPGAs.* Wiley India Pvt Ltd. ISBN-13: 978-8126536948.
- ZainalabedinNavabi. *Verilog Digital System Design.* TMH; 2ndedition. ISBN-13:978-0070252219.
- Wayne Wolf. *FPGA Based System Design.* Pearson Education.S. K. Mitra, Digital Signal processing, McGraw Hill, 1998.
- VLSI design, Debaprasad Das, 2nd Edition, 2015, Oxford University Press.
- D.J. Laja and S. Sapatnekar, Designing Digital Computer Systems wit.

DSE: ELE502 Practical- 5

VHDL

Course duration 16 weeks **3 hours / week.**

1. Behavioural modelling and simulation of basic gates
2. Structural modelling and simulation of simple Boolean expression
3. Modelling and simulation of adders and subtractors
4. Modelling and simulation of magnitude comparators
5. Modelling and simulation of RS,D & JK Flip-flops
6. Modelling and simulation of Shift registers
7. Modelling and simulation of Counters
8. Modelling and simulation of encoders and decoders
9. Modelling and simulation of multiplexers

Minimum of SEVEN experiments to be done

DSE : ELE503 Practical- 6

VERILOG

Course duration 16 weeks **3 hours / week.**

1. Write code to realize basic and derived logic gates.
2. Half adder, Full Adder using basic and derived gates.
3. Half Subtractor and Full Subtractor using basic and derived gates.
4. Design and simulation of a 4 bit Adder.
5. Multiplexer (4x1) and Demultiplexer using logic gates.
6. Decoder using logic gates.
7. Encoder using logic gates.
8. Clocked D, JK and T Flip flops (with Reset inputs).
9. 3-bit Ripple counter

Minimum of SEVEN experiments to be done

Semester V

DSE: ELE601 DSP

(Credits: Theory-03, Practicals-03)

Duration 16 weeks **Theory: 48 Lectures.**
3hours / week.

Part-A

Introduction:

Introduction.Classification of Signals. Basic Operations on Signals. Basic continuous- Time signals. Basic Discrete – Time Signals. Properties of Systems- Linearity,Causality, Time-Invariance,Memory,Stability Invertibility.Linear Time Invariant Systems- Convolution SUM, Convolution Integral. Represention for LTI Systems- Two systems in parallel, Two systems in cascade.

(Text book: 1.1,1.1.2,1.2,1.3,1.3.1 to1.3.7,1.4, 1.4.1 to 1.4.7,1.6,1.6.1 to 1.6.6,1.7, 1.7.1,1.7.2,1.8, 1.8.1,1.8.2.)

Z – Transform: – Introduction, Definition of Z – transform.

Z – Transform and ROC of Finite Duration Sequences- RSS and LSS.

Z – Transform and ROC of Infinite Duration Sequences-PTES,NTES & DSES.

ROC & Stability, Properties of ROC .Problems**.** **(24hours)**

(Text book:2.1,2.2,2.3,2.3.1 to 2.3.3,2.4,2.4.1 to 2.4.3,2.5,2.6,)

Part-B

Properties of Z**-**Transform-Linearity, Time Shift or Translation, Multiplication by an Exponential, Multiplication by a Ramp, Convolution (Time-domain),Time-reversal, Convolution(Z-domain), Initial- value theorem, Final value theorem. Transforms of some useful Sequences. Inverse Z- transform-Partial fraction expansion method, Inverse Z-transform by long division method.

DFT - Introduction. Definition of DFT and IDFT. Periodicity of X(k) and x(n).

FFT – Introduction.

Design of IIR Filters: Analogue filter specifications, Classification of Analogue filters, Butterworth filters, Frequency Transformations/ spectral Transformations, Design of low pass Butterworth filters. Digital filters (Bilinear transformation), analog design using digital filter. **(24hours)**

(Text book:2.7,2.7.1 to 2.7.9,2.8,2.9,2.9.1,2.9.2,3.1,3.2,3.2.1 to 3.2.3,3.12,4.2,4.3,4.4,4.5,4.6. XX)

TEXT BOOKS:

1. Digital Signal Processing – DR. D Ganesh Rao and Vineeta P Gejji – Sanguine Technical Publishers, Bangalore

REFERENCE BOOKS

1. Digital Signal Processing – Ramesh babu P – Scitech Publicaions(India) Limited
2. Proakis and Manolakis – Digital Signal Processing – Principles, algorithm and application, 3e,Pearson/PHI
3. Oppenheim and Schaffer – Discrete Time Signal Processing, Pearson/PHI

DSE:ELE602 Practical -7

Mat lab

Course duration 16 weeks **3 hours / week**

1. Linear Convolution and Circular Convolution
2. DFT of a sequence – direct method
3. IDFT of a sequence – direct method
4. Linear Convolution using DFT and IDFT
5. Circular Convolution using DFT and IDFT
6. Sampling theorem
7. Solution of simple difference equation
8. Impulse response of a system
9. Frequency response of a system
10. DFT using FFT
11. IDFT using FFT
12. FIR / IIR filter Design

DSE:ELE603 Practical -8

Basic Electronics lab

Course duration 16 weeks **3 hours / week**

PART – A

1. Designing of CE amplifier for given gain.
2. Design a Butterworth Low Pass active Filter (1st order) & study Frequency Response
3. Design a Butterworth High Pass active Filter (1st order) & study Frequency Response
4. To design an Astable Multivibrator of given specification using IC 555 Timer.
5. To design a combinational logic system for a specified Truth Table.
6. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
7. To design a Monostable Multivibrator of given specification using IC 555 Timer.

Minimum of Four experiments to be done

PART – B

Mini Project

1. **Project work to be carried out in the Departmental Laboratory.**

2. **Student should submit the project report at the time of examination duly signed by the HOD**

SEC: ELE511 **Skill Enhancement Course**

ELECTRICAL CIRCUITS AND NETWORK SKILLS

(Credits: 02) Theory: 30 Lectures

Part-A

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC and DC Electricity. Familiarization with multimeter, voltmeter and ammeter.

Electrical Circuits: Basic electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money.

Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.

Part-B

Generators and Transformers:DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Relay protection device.

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, and solder. Preparation of extension board.

Reference Books:

1. Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press.
2. A text book in Electrical Technology - B L Theraja - S Chand & Co.
3. A text book of Electrical Technology - A K Theraja.
4. Performance and design of AC machines - M G Say ELBS Edn.

SEC: ELE512 **Skill Enhancement Course**

COMPUTER NETWORKS

The aim of this course is not just to teach computer programming and numerical analysis but to emphasize its role in networking

(Credits: 02) Theory: 30 Lectures

Part-A

Data communication, Components & Basic Concepts

Line configuration- point-to-point, multipoint, Topology – Mesh, Star, Tree, Bus, Ring, and Hybrid Topologies Transmission modes – Simplex, Half Duplex, Full Duplex. Categories of networks – LAN, MAN, WAN, Internet

Transmission Media

Guided media – Twisted pair cable, Co-axial cable, Optical fiber

Multiplexing:

Many to one/one to many, types of multiplexing, Frequency division multiplexing, time division multiplexing, multiplexing applications

Error detection

Types of error, multiple bit error, Burst error,Detection – redundancy, Checksum Error correction – Single bit error correction, Hamming code

(15 Lectures)

Part-B

The OSI Model

Model – layered Architecture, Functions of layers- physical layer, Data link layer, Network layer, Transport layer, Session layer, Presentation Layer, Application layer

Networking and internetworking devices

Repeaters, Bridges- types of Bridges, Routers- Routing concepts, Gate ways

World Wide Web:

Uniform Resource Locator (URL), Browser Architecture (15 Lectures)

Reference Book:

- Introduction to Data Communications &Networking by- BEHROUZ FOROUZAN
- Computer Networks by – ANDREW S TANENBAUM

SEC: ELE513 **Skill Enhancement Course**

RENEWABLE ENERGY AND ENERGY HARVESTING

(Credits: 02) Theory: 30 Lectures

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

Part-A

Fossil fuels and Alternate Sources of energy:

Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy:

Solar energy, its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Wind Energy harvesting:

Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

(15 Lectures)

Part-B

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power

Electromagnetic Energy Harvesting: Linear generators, physics mathematical models, recent applications

Carbon captured technologies, cell, batteries, and power consumption

Environmental issues and Renewable sources of energy, sustainability. (15 Lectures)

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

Reference Books:

• Non-conventional energy sources, B.H. Khan, McGraw Hill
• Solar energy, Suhas P Sukhative, Tata McGraw - Hill Publishing Company Ltd.
• Renewable Energy, Power for a sustainable future, Godfrey Boyle, 3rd Edn., 2012, Oxford University Press.
• Renewable Energy Sources and Emerging Technologies, Kothari et.al., 2nd Edition, PHI Learning.
• Solar Energy: Resource Assesment Handbook, P Jayakumar, 2009
• J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
• http://en.wikipedia.org/wiki/Renewable_energy

SEC: ELE611 **Skill Enhancement Course**

TECHNICAL DRAWING

(Credits: 02) Theory: 30 Lectures

Part-A

Introduction:

Drafting Instruments and their uses. lettering: construction and uses of various scales: dimensioning as per I.S.I. 696-1972. Engineering Curves: Parabola: hyperbola: ellipse: cycloids, involute: spiral: helix and loci of points of simple moving mechanism.2D geometrical construction. Representation of 3D objects. Principles of projections.

Projections: Straight lines, planes and solids. Development of surfaces of right and oblique solids. Section of solids.

Object Projections: Orthographic projection. Interpenetration and intersection of solids. Isometric and oblique parallel projection of solids. (15 Lectures)

Part-B

CAD Drawing: Introduction to CAD and Auto CAD, precision drawing and drawing aids, Geometric shapes, Demonstrating CAD- specific skills (graphical user interface. Create, retrieve, edit, and use symbol libraries. Use inquiry commands to extract drawing data). Control entity properties. Demonstrating basic skills to produce 2-D and 3-Ddrawings. 3D modeling with Auto CAD (surfaces and solids), 3D modeling with sketch up, annotating in Auto CAD with text and hatching, layers, templates and design center, advanced plotting (layouts, viewports), office standards, dimensioning, internet and collaboration, Blocks,

Drafting symbols, attributes, extracting data. basic printing, editing tools, Plot/Print drawing to appropriate scale.

Reference Books:

• Engineering Drawing, N.S. Parthasarathy and Vele Murali, 1st Edition, 2015, Oxford University Press
• Computer Aided Electrical Drawing, Yogesh et.al. PHI Learning
• Engineering Graphic, K. Venugopal, and V. Raja Prabhu, New Age International
• AutoCAD 2014 & AutoCAD 2014/Donnie Gladfelter/Sybex/ISBN:978-1-118-57510-9
• Architectural Design with Sketchup/Alexander Schreyer/John Wiley & Sons/ISBN: 978-1-118-12309-6

SEC: ELE612 **Skill Enhancement Course**

WEATHER FORECASTING

(Credits: 02) Theory: 30 Lectures

The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques

Part-A

Introduction to atmosphere:
Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.

Measuring the weather:
Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

Weather systems:
Global wind systems; air masses and fronts: classifications; jetstreams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.
(15 Lectures)

Part-B

Climate and Climate Change:
Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.

Basics of weather forecasting:

Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

Demonstrations and Experiments:

1. Study of synoptic charts & weather reports, working principle of weather station.
2. Processing and analysis of weather data:
(a) To calculate the sunniest time of the year.
(b) To study the variation of rainfall amount and intensity by wind direction.
(c) To observe the sunniest/driest day of the week.
(d) To examine the maximum and minimum temperature throughout the year.
(e) To evaluate the relative humidity of the day.
(f) To examine the rainfall amount month wise.
3. Exercises in chart reading: Plotting of constant pressure charts, surfaces charts, upper wind charts and its analysis.
4. Formats and elements in different types of weather forecasts/ warning (both aviation and non aviation)

Reference books:

1. Aviation Meteorology, I.C. Joshi, 3rd edition 2014, Himalayan Books
2. The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press.
3. Meteorology, S.R. Ghadekar, 2001, Agromet Publishers, Nagpur.
4. Text Book of Agro meteorology, S.R. Ghadekar, 2005, Agromet Publishers, Nagpur
5. Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press.

SEC: ELE613 **Skill Enhancement Course**

PCB FUNDAMENTALS

(Credits: 02) Theory: 30 Lectures

The aim of this course is to enable the students to familiar and experience with PCB Fundamentals

Part-A

Advantages of PCB, components of PCB, Electronic components,
Microprocessors and Microcontrollers, IC's, Surface Mount Devices (SMD).
Classification of PCB - single, double, multilayer and flexible boards, Manufacturing of PCB, PCB standards

Types of PCB:

Single sided board, double sided, Multilayer boards, Plated through holes technology, Benefits of Surface Mount Technology (SMT), Limitation of SMT, Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's.

Layout and Artwork:

Layout Planning: General rules of Layout, Resistance, Capacitance and Inductance, Conductor Spacing, Supply and Ground Conductors, Component Placing and mounting, Cooling requirement and package density, Layout check. Basic artwork approaches, Artwork taping guidelines, General artwork rules: Artwork check and Inspection.

(15 Lectures)

Part-B

Laminates and Photo printing:

Properties of laminates, Types of Laminates, Manual cleaning process, Basic printing process for double sided PCB's, Photo resists, wet film resists, Coating process for wet film resists, Exposure and further process for wet film resists, Dry film resists.

Etching and Soldering:

Introduction, Etching machine, Etchant system. Principles of Solder connection, Solder joints, Solder alloys, Soldering fluxes. Soldering, Desoldering tools and Techniques.

Technology OF PCB:

Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates

(15 Lectures)

Suggested Books:

1. Walter C.Bosshart "PCB DESIGN AND TECHNOLOGY" Tata McGraw Hill Publications, Delhi. 1983
2. Clyde F.Coombs "Printed circuits Handbook" III Edition, McGraw Hill.