Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

CLASS: B. Sc. SECOND YEAR

Subject : Electronics - Semester III& IV

(W. e. f. June 2017)

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total periods	CA	ESE	Total Marks	Credits
III	CCEIII (Section A)	Amplifiers, Oscillators & Multivibrators (P-VI)	03	45	10	40	50	2
	CCE III (Section B)	Fundamentals of Microprocessors (P-VII)	03	45	10	40	50	2
	CCEP II (Annual Pattern Section A)]	P-X: Practical's based on P-VI	03	24	05	20	25	1
		Practical's based on P-VIII	03	24	05	20	25	1
	CCE S I (Section A)	SEC I (One SEC from any optional)	03	45	25	25	50	2
IV	CCE IV (Section A)	Op-Amp, It's Applications & Some Specilized ICs Theory Paper (P-VIII)	03	45	10	40	50	2
	CCEIV (Section B)	Microprocessor Interfacing (P-IX)	03	45	10	40	50	2
	CCEP III (Annual Pattern Section A)	P-XI : Practical's based on P-VII	03	24	05	20	25	1
		Practical's based on P-IX	03	24	05	20	25	1
	CCESII (Section B)	SEC II (One SEC from any optional)	3	45	25	25	50	2
Total credits semester III and IV								16

CCE: Core course Electronics SEC: Skill Enhancement Course ESE: End Semester Examination C. A.: Continuous Assessment (Internal)

Note : ESC of CCEP II, CCEP III, SEC I and SEC II should be Evaluated at annual

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Second Year (Semester – III)

Semester Pattern effective from June -2017

Electronics

CCE III (Section A)

***Amplifiers, Oscillators & Multivibrators* (P-VI)**

Credits: 02 (Marks: 50) ***Periods*: 45**

Unit I: Load Lines And DC Bias Circuits (14 Periods)

DC Load line, Q-Point and Maximum Undistorted Output, Need for Biasing a Transistor, Factors Affecting Bias Variations, Stability factor, Beta Sensitivity, Stability Factor for CB and CE Circuits, Base Bias with Emitter Feedback, Base Bias with Collector Feedback, Base Bias with Collector and Emitter Feedback, Voltage Divider Bias, Load Line and output Characteristics, AC Load line,
(Numerical Problems) (Book-5)

Unit II: Small Signal Amplifiers (11 Periods)

h-parameters, An equivalent circuit for the BJT, Transconductance Model, Analysis of CE Amplifier, CB Amplifier, CC Amplifier using h-parameters, Gain in decibels
(Numerical Problems)

Unit III: Sine Wave Oscillators (10Periods)

Introduction to Positive and Negative Feedback, Requirement of an Oscillator, Barkhausen Criterion, Hartley Oscillator, Colpitt's Oscillator, R-C Network, Phase Shift Oscillator, Wien Bridge Oscillator (Circuit diagram, Working, Expression of Frequency and Condition for Oscillations)
(Numerical Problems)

Unit IV: Multivibrators And Sweep Circuits(10 Periods)

Transistor as a Switch, Transistorized Astable Multivibrator, Transistorized Monostable Multivibrator, Transistorized Bistable Multivibrator (working and waveforms), Introduction to Sweep Circuits, Sweep Voltage Waveforms, Exponential Sweep, RC Ramp Generator, (Numerical Problems)

References:

1. Introduction To Electronics
   -K. J. M. Rao (Oxford and IBH Publishing Company).
2. Solid State Pulse Circuits
   -David A. Bell (4/e, Prentice-Hall of India Private Ltd.)
3. Electronic Fundamentals And Applications
   -John D. Ryder (Prentice-Hall of India Private Ltd.)
4. Electronics And Radio Engineering
   -M.L.Gupta (Dhanpat Rai and Sons)
5. Basic Electronics (Solid State) [Multicolour Illustrative Edition]
   - B. L. Theraja (S. Chand & Company Ltd)
6. Electronic Principles
   – A.P. Malvino (TMH Publishing Company) Third Edition
7. Principles of Electronics (Vol. II)
   - B.V. Narayanarao (Second Edition) Published by New Age International (P) Ltd.

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Second Year (Semester – III)

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Electronics

CCE III (Section B)

***Fundamentals of Microprocessors* (P-VII)**

Credits: 02 (Marks: 50) **Periods: 45**

Unit I: Introduction To Microprocessor Intel 8085 (12 Periods)

Semiconductor Memories (RAM, ROM, PROM, EPROM, EEPROM), Block Diagram of Microcomputer (Microprocessor Based System), Block Diagram of Intel 8085, Function of Each Block, Functional Pin Diagram of Intel 8085, Features of Intel 8085

Unit II: Instruction Set Of Intel 8085 (12 Periods)

Instruction Format (1 byte, 2 byte, 3 byte), Addressing Modes, Classification of Instructions, Instruction Set of 8085

Unit III: Programming And Interrupts of 8085 (13 Periods)

Simple Programs Based on Data Transfer, Arithmetic, Logical, Branching and Machine Control Instructions, Interrupts:-Hardware Interrupts, Software Interrupts, Priority Structure of 8085 Interrupts

Unit IV: Introduction To Microprocessor Intel 8086 (08 Periods)

Block Diagram of Intel 8086, Function of Each Block, Functional Pin Diagram of Intel 8086, Features of Intel 8086

References:

1. Fundamentals Of Microprocessors And Microcomputers
   -B. Ram (6/e, Dhanpat Rai, Publications)
2. Microprocessor
   -Borole and Vibhute (2/e, Technova Publications)
3. Microprocessor Architecture, Programming And Applications With The 8085
   -Ramesh S. Gaonkar (3/e, Penram International Publishing)
4. 8085 Assembly Language Programming
   -Lance A. Leventhal (McGraw Hill International Editions)
5. Advanced Microprocessor
   -Ajay K. Ray & Kishor M. Bhurchandi (TMH Publication, 7th Revised Edition)
6. Microprocessors & Interfacing
   -Douglas V. Hall & S S S P Rao (TMH Publication, 3rd Edition,2012)

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Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
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Electronics
CCE IV (Section A)
***Op-Amp, It's Applications & Some specialized ICs* (P-VIII)**

Credits: 02 (Marks: 50) **Periods: 45**

Unit I: Operational Amplifier (13 Periods)

Theory of Differential Amplifier, Block Diagram of Op-Amp, Schematic Symbol, Ideal Characteristics, Input Offset Voltage, Input Offset Current, Input Bias Current, Input Impedance, Output Impedance, Open Loop Gain, CMRR, Slew Rate, Numerical Problems

Unit II: Applications of Operational Amplifier (13 Periods)

Inverting Amplifier, Non-inverting Amplifier, Op-Amp as Adder, Op-amp as Subtractor, Op-Amp as Integrator, Op-Amp as Differentiator, Op-Amp as Comparator, Op-Amp as Schmitt's Trigger, Solving Differential Equation, Numerical Problems

Unit III: Active Filters (13 Periods)

Introduction, First Order Low-Pass Butterworth Filter, Second Order Low-Pass Butterworth Filter, First Order High-Pass Butterworth Filter, Second Order High-Pass Butterworth Filter, Numerical Problems

Unit IV: Specialized ICs (06 Periods)

Block Diagram of IC555, IC 555 as Astable Multivibrator, IC555 as Monostable Multivibrator, IC566 (Pin Diagram, Block Diagram and Use as VCO), Numerical Problems

References:

1. Op-Amps And Linear Integrated Circuits
   `-Ramakant Gayakwad (Prentice Hall of India Private Limited)
2. Electronic Fundamentals And Applications
   -John D. Ryder (Prentice Hall of India Private Limited)
3. Electronic Principles
   -A. P. Malvino (TMH Publishing Company)
4. Electronics and Radio Engineering
   -M.L.Gupta (Dhanpat Rai and Sons)

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Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCE IV (Section B)
***Microprocessor Interfacing* (P-IX)**

Credits: 02 (Marks: 50) **Periods: 45**

Unit I: Basic Interfacing Concepts (10 Periods)

Introduction, memory mapped I/O scheme, I/O mapped I/O scheme, Data Transfer Schemes:- Synchronous, Asynchronous, Interrupt Driven and DMA

Unit II: Interfacing Chips (15 Periods)

Schematic Diagram (Functional Pin Diagram), Block diagram and Operating modes of the ICs- 8253, 8255, 8259, 8257, Control registers of 8255 and 8253

Unit III: Microprocessor Applications (10 Periods)

Demultiplexing of AD_7-AD_0 bus, Interfacing concepts of I/O devices using decoder (74LS138), Chip Select logic, Generation of $\overline{MEMR}$, $\overline{MEMW}$, $\overline{IOR}$ and $\overline{IOW}$ signals, Tristate buffer (74LS244), Latches (74LS373), Interfacing switches, LED, relays

Unit IV: Data Converters (10 Periods)

Interfacing of ADC 0808 & DAC 0808 using 8255

References:

1. Fundamentals Of Microprocessors and Microcomputers:
   - B. Ram (Dhanpat Rai Publications)
2. Microprocessor Architecture, Programming And Applications With 8085:
   - Ramesh S. Gaonker (3/e, Penram International Publishing)
3. Introduction to 8085, 8086 Microprocessors And Peripherals
   - K. M. Bakwad & A. K. Deshmane (Nikita Publcations, Latur)
4. Microprocessor:
   - Borole and Vibhute (2/e, Technova Publications)

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Second Year (Semester – III &IV)

Semester Pattern effective from June -2017

Electronics

Practical Paper P-X: ***Practical's based on P-VI & P-VIII***

(Annual practical's Based on [CCE III& IV (Section A & B))

Credits: 02 (Marks: 50) **Periods : 45**

Note:

1. Every student must perform at least TEN experiments (At least FIVE from each group)
2. Use graphs wherever necessary

List of Experiments:

Group I:

1. Op-Amp as Inverting Amplifier (DC Gain Verification)
2. Op-Amp as Non-inverting Amplifier(DC Gain Verification)
3. Op-Amp as Inverting Amplifier (Study of Frequency Response, Gain & -3db Band Width)
4. Op-Amp as Non-inverting Amplifier (Study of Frequency Response, Gain & -3db Band Width)
5. Op-Amp as Adder
6. Op-Amp as Subtractor
7. Op-Amp as Integrator
8. Op-Amp as Schmitt's Trigger
9. Op-Amp as Comparator
10. Op-amp as Analog Computer
11. IC555 Timer as Astable Multivibrator (Measurement of Pulse Width , Space Width, Time Period, Frequency and Mark to Space Ratio)
12. VCO using IC566 (Measurement of Frequency with Change in Control Voltage)

Group II:

13. Study of Transistorized CE Amplifier (Frequency Response, Gain & -3db Band Width)
14. Transtorized Hartely oscillator (Measurement of Frequency and Amplitude of Waveforms)
15. Transtorized Colpitt's Oscillator (Measurement of Frequency and Amplitude of Waveforms)
16. Transtorized Phase Shift Oscillator (Measurement of Frequency and Amplitude of Waveforms)
17. Wein Bridge Oscillator using Op-Amp (Measurement of Frequency and Amplitude of Waveforms)

18. Transistorized Astable Multivibrator.(Measurement of Pulse Width, Space Width, Time Period, Frequency and Duty Cycle)
19. Transistorized Mono stable multivibrator (Measurement of Gate Width)
20. Transistorized Bistable Multivibrator
21. RC Ramp Generator using Transistor. (Measurement of Rise Time, Fall Time and Frequency)

Paper-XI

LAB-III

(Practical Based On Papers **VII** And **IX)**

(50 Marks)

Note:

1. Every student must perform at least 10 experiments.
2. Use flow-chart wherever necessary.

List of Experiments:

1. ALP to Transfer a block of data from one location to another location
2. ALP for addition of two byte and result 8-bit
3. ALP for addition of two byte and result 16-bit numbers
4. ALP for subtraction of two bytes
5. ALP for decimal addition of 8 bit numbers
6. ALP for 1's complement of 8-bit and 16-bit numbers
7. ALP to find 2's complement of 8-bit and 16-bit numbers
8. ALP for shifting of 8-bit number:
    a. Left by one bit position
    b. Left by two bit position
9. ALP to find sum of series of 8-bit numbers
10. ALP to find multiplication of two 8-bit numbers
11. ALP to find division of two 8-bit numbers
12. ALP for masking off:
    a. Four LSBs of 8-bit numbers
    b. Four MSBs of 8-bit numbers
13. ALP to find smallest number of the series
14. ALP to find largest number of the series
15. ALP to generate square wave using IC 8255. Determine frequency
16. Interfacing of 7-segment display with 8085 using IC 8255

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Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. Second Year (Semester – IV)

Semester Pattern effective from June -2017

Electronics

CCESI (Section A)

***Skill Enhancement Course* SEC I**

Credits: 02 (Marks: 50) **Periods: 45**

Skill Enhancement Course-I (Credit:2) B. Sc. III SEM

Physics Workshop Skill Credit: 02 45 Lectures (Theory + Lab)	Maximum Marks: 50 C. A. (Internal): 25 ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Mesaruement Skill : Measureing units, conversion to SI and CGS. Familiarization with meter scale, vernier caliper, Screw gauge and their vtility. Measure the dimension of solid bulk, volume of cylindrical beaker / glass, diameter of thin wire, thickness of metal sheet etc. **(15 Lectures)**

UNIT-II: Electric and Electronic Skill : Use of multimeter, soldering of electrical circuits having discrete components (R, L, C, diode) and ICS on PCB. Operation of oscilloscope. Making regulated power supply.l Timer circuit, electronic switch using transistor and relay. **(15 Lectures)**

Hands on Exercises:

(15 Lectures)

1. Meassurement of ac and dc voltages/ currents by using analogue multimeter
2. Measurement of ac and dc voltages / currents by using digital multimeter
3. Testing of electronic components by using multimeter such as diodes, transistors FETs etc.
4. Measurement of voltage, time period and frequency using CRO.
5. Measurement of rise and fall time using CRO.
6. Study wave forms generated by a function generator.

Reference Books:

1. A text book in Electrical technology – B L Theraja – S. Chand and Company.
2. Performance and design of AC machines – M.G. Say, ELBS Edn.
3. Mechanical workshop practice, K.C.John, 2010, PHI Learning Pvt. Ltd.
4. Workshop processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN : 0750660732]
5. New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN : 0861674480]

OR

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Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCES II (Section B)
***Skill Enhancement Course* SEC II**

Credits: 02 (Marks: 50) **Periods: 45**

Skill Enhancement Course-I (Credit: 02) B. Sc. III SEM

Optics and Lasers Credit: 02 45 Lectures (Theory + Lab)	Maximum Marks: 50 C. A. (Internal): 25 ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Semiconductor Sources and Detectors: Construction of LED**,** Working principleof LED, Types of LED, Construction of LDR, Working principle of LDR, Construction of photovoltaic cell & its working principle. **Polarization of Light:** Polarization of transverse wave, Plane of polarization, Brewster law, Malus law, specific rotation, Laurent's half shade polarimeter.
(10 Lectures)

UNIT-II: Refraction Through Lenses: Types of lenses, The sign convention, principal foci, Deviation produced by a thin lens, Power of a lens, Principal planes and focal planes, Dispersion by prism, Dispersive power, Huygens eyepiece, Ramsden eyepiece.
(10 Lectures)

UNIT-III: Laser: Lasers, spontaneous and stimulated emission, Theory of laser action, Einstein's coefficients, Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers. (**10 Lectures)**

Hands on Exercises: (15 Lectures)

1. Determination of focal length of a biconvex lens.
2. Determination of radius of curvature of a lens using a spherometer.
3. Determination of power of a lens.
4. Determination of the grating radial spacing of a compact disc (CD) by reflection using a laser source.
5. To find the width of the slit using diffraction pattern obtained by a laser.
6. To find angle of polarization using Brewster law.
7. Study the characteristics of solid state laser.
8. Study the characteristics of LDR.

Reference Books:

1. Fundamentals of optics, F. A. Jenkins & H. E. White, 1981**,** Tata McGraw Hill.
2. LASERS: Fundamentals & applications, K. Thyagrajan & A. K. Ghatak, 2010, Tata McGraw Hill.
3. A Text Book of Optics**,** Brij Lal & Subramanyam, 1989, S Chand & Co
4. Laser & Non- linear optics, B. B. Laud, New Age International Publisher

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Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCESI (Section A)
***Skill Enhancement Course* SEC II**

Credits: 02 (Marks: 50) **Periods: 45**

Skill Enhancement Course-II (Credit:2) B. Sc. IV SEM

Electrical Circuits & Network Skills Credit: 02 45 Lectures (Theory + Lab)	Maximum Marks: 50 C. A. (Internal): 25 ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: 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.
Basic electric circuit elements and their combination.

(20 Lectures)

UNIT-II: 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.

(10 Lectures)

Hands on Exercises:
(15 Lectures)

1. To Study charging and discharging of a condenser through resistor R.
2. Determinations of parameters of Op-Amp.
3. Study of transducers.(Thermistor, LDR, Photodiode photo transistor etc.)
4. Study frequency response of a microphone.
5. Soldering Skills.
6. Trouble Shooting of simple electronic circuits.
7. Design and development of low voltage power supply.
8. Solving differential equation by using Op-Amp.
9. Study of response of inductors and capacitors with DC or AC sources.
10. Study of capacitance by using LCR meter.

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.

OR

Skill Enhancement Course-II (Credit: 02) B. Sc. IV SEM

Renewable Energy & Energy Harvesting Credit: 02 45 Lectures (Theory + Lab)	Maximum Marks: 50 C. A. (Internal): 25 ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: 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. **(15 Lectures)**

UNIT-II: 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. **(15 Lectures)**

Hands on Exercises: **(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.
4. Teacher can allot any exercise related with topic.

Reference Books:

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