DEPARTMENT OF PHYSICS
KAKATIYA UNIVERSITY
WARANGAL–506 009

Department of Physics, Kakatiya University offers Electronics as core subject at UG level (3 Year course) with six semesters with internal assessment for theory papers under Choice Based Credit System (CBCS) in University constituent and affiliated colleges for the students admitted in first year from 2016-17 academic year onwards.

1. Each of first four Semesters (i.e I, II III and IV) contains one theory core paper (20 marks for Internal Assessment and 80 marks for Semester End Exam equivalent to 4 credits) as Discipline Specific Course (DSC) and one practical paper (25 marks equivalent to 01 credit), whereas each of last two semesters (i.e V and VI) contains one theory core paper as DSC (15 marks for Internal Assessment and 60 marks for Semester End Exam equivalent to 3 credits), one theory elective paper as Discipline Specific Elective (DSE) (15 marks for Internal Assessment and 60 marks for Semester End Exam equivalent to 3 credits) and two practical papers (One for DSC and the other for DSE carries 25 marks in each paper equivalent to 01 credit). Total marks are 900 and credits are 36 for Electronics course.

2. Internal Assessment examination will be conducted twice in every Semester. Marks will be awarded from the average of the two Internal Assessment Exams in each Semester.

3. Scheme for CBCS, work-load for each paper, distribution of marks and credits; and scheme of question paper are attached herewith.

4. The practical examination will be conducted at the end of each semester. A minimum of 40% marks should be obtained by the student to pass the practical examination of Electronics in all semesters.

5. All the theory papers and practical papers of Electronics in I, II, III, IV and DSC paper of V & VI semesters are common to all students. But, electives (DSE) papers of Electronics in V and VI Semesters are to be chosen by the student from the available options.

6. Elective (DSE) papers of Physics and Electronics will be offered separately at the beginning of Semesters V and VI. Every student has to choose one elective from the Electives being offered.

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Chairman, Board of Studies in Physics, KU, Wgl
Date: 24th Aug., 2016 & 5th June, 2017

KAKATIYA UNIVERSITY, WARANGAL
SCHEME FOR CHOICE BASED CREDIT SYSTEM
B.Sc. (ELECTRONICS)
SEMESTER PATTERN

YEAR	SEM	COURSE (PAPER) TITLE WITH CODE	COURSE TYPE*	HRS/ WEEK	CREDITS	MARKS	
						Internal Assessment	SEM End Exam
FIRST	I	101: Circuit Analysis	DSC-1	4	4	20	80
		101A: Circuit Analysis Lab (Pr)	DSC-1(P)	3	1	-	25
	II	201: Electronic Devices	DSC-2	4	4	20	80
		201A: Electronic Devices Lab (Pr)	DSC-2(P)	3	1	-	25
SECOND	III	301: Analog Circuits	DSC-3	4	4	20	80
		301A: Analog Circuits Lab (Pr)	DSC-3(P)	3	1	-	25
	IV	401: Linear Integrated Circuits and Basics of Communication	DSC-4	4	4	20	80
		401A: Linear Integrated Circuits and Basics of Communication Lab (Pr)	DSC-4(P)	3	1	-	25
THIRD	V	501: Digital Electronics	DSC-5	3	3	15	60
		501(P): Digital Electronics Lab	DSC-5(P)	3	1	-	25
		502: Elective (Theory) – 1 (A/B) A. Digital communication B. Electronic Instrumentation	DSE-1	3	3	15	60
		502(P): Elective (Practical) – 1 (A/B) A. Digital communication Lab B. Electronic Instrumentation Lab	DSE-1(P)	3	1	-	25
	VI	601: 8085 Microprocessor and Applications	DSC-6	3	3	15	60
		601(P): 8085 Microprocessor and Applications Lab	DSC-6(P)	3	1	-	25
		602: Elective (Theory) – 2 (A/B) A. 8051 Microcontroller and Applications B. Optical Fiber communication	DSE-2	3	3	15	60
		602(P): Elective (Practical) – 2 (A/B) A. 8051 Microcontroller and Applications Lab B. Optical Fiber communication Lab	DSE-2(P)	3	1	-	25
		Total			**36**	**140**	**760**
						Grand Total : 900	

*DSC: Discipline Specific Course (Core) DSE: Discipline Specific Elective (Elective)

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B.Sc. (ELECTRONICS)
KAKATIYA UNIVERSITY, WARANGAL

SUMMARY OF CREDITS

SEM	Course Type*	Credits/Marks (Theory) (Internal +Sem End Exam)	HPW (Theory)	Credits/ Marks (Practicals)	HPW (Practicals)	Dept workload per week per section
I	DSC - Core	4 / (20+80)	4	1/25	3	7
II	DSC - Core	4 / (20+80)	4	1/25	3	7
III	DSC - Core	4 / (20+80)	4	1/25	3	7
IV	DSC - Core	4 / (20+80)	4	1/25	3	7
V	DSC - Core DSE - Elective(A/B)	3 / (15+60) 3 / (15+60)	3 3	1/25 1/25	3 3	6 6
VI	DSC - Core DSE - Elective(A/B)	3 / (15+60) 3 / (15+60)	3 3	1/25 1/25	3 3	6 6
	Total	**28 / 700**	**28**	**8 / 200**	**24**	**52**

* DSC: Discipline Specific Course, DSE: Discipline Specific Elective

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SCHEME OF QUESTION PAPER

B.Sc. (Electronics) I/II/III/IV
I - Internal Assessment Examination
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] **[Marks: 20**

Answer ALL questions. Each question carries equal marks (2 x 10 = 20)

1. From Unit 1
2. From Unit 1
3. From Unit 1
4. From Unit 1
5. From Unit 1
6. From Unit 2
7. From Unit 2
8. From Unit 2
9. From Unit 2
10. From Unit 2

SCHEME OF QUESTION PAPER

B.Sc. (Electronics) I/II/III/IV
II - Internal Assessment Examination
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] **[Marks: 20**

Answer ALL questions. Each question carries equal marks (2 x 10 = 20)

1. From Unit 3
2. From Unit 3
3. From Unit 3
4. From Unit 3
5. From Unit 3
6. From Unit 4
7. From Unit 4
8. From Unit 4
9. From Unit 4
10. From Unit 4

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SCHEME OF QUESTION PAPER

B.Sc. (Electronics) V/VI
I - Internal Assessment Examination
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] **[Marks: 15**

Answer ALL questions. Each question carries equal marks (1½ x 10 = 15)

1. From Unit 1
2. From Unit 1
3. From Unit 1
4. From Unit 1
5. From Unit 1
6. From Unit 2
7. From Unit 2
8. From Unit 2
9. From Unit 2
10. From Unit 2

SCHEME OF QUESTION PAPER

B.Sc. (Electronics) V/VI
II - Internal Assessment Examination
Code: Name of the Paper
(Under CBCS Scheme)

Time: 90 Min] **[Marks: 15**

Answer ALL questions. Each question carries equal marks (1½ x 10 = 15)

1. From Unit 3
2. From Unit 3
3. From Unit 3
4. From Unit 3
5. From Unit 3
6. From Unit 4
7. From Unit 4
8. From Unit 4
9. From Unit 4
10. From Unit 4

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SCHEME OF QUESTION PAPER

B.Sc. (ELECTRONICS) I/II/III/IV Semester Examination
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] **[Marks: 80**

SECTION A: SHORT ANSWER QUESTIONS (8 X 4 = 32)

Answer Any EIGHT questions. Each question carries equal marks

1. From Unit 1
2. From Unit 1
3. From Unit 1 (Problem)
4. From Unit 2
5. From Unit 2
6. From Unit 2 (Problem)
7. From Unit 3
8. From Unit 3
9. From Unit 3 (Problem)
10. From Unit 4
11. From Unit 4
12. From Unit 4 (Problem)

SECTION B: ESSAY TYPE ANSWER QUESTIONS (4 X 12 = 48)

Answer Any FOUR questions. All questions carry equal marks

13. (a) From Unit 1

    OR

    (b) From Unit 1

14. (a) From Unit 2

    OR

    (b) From Unit 2

15. (a) From Unit 3

    OR

    (b) From Unit 3

16. (a) From Unit 4

    OR

    (b) From Unit 4

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SCHEME OF QUESTION PAPER
B.Sc. (ELECTRONICS) V/VI Semester Examination
KAKATIYA UNIVERSITY, WARANGAL
Code: Name of the Paper
(Under CBCS Scheme)

Time: 3 Hours] **[Marks: 60**

SECTION A: SHORT ANSWER QUESTIONS (8 X 3 = 24)

Answer Any EIGHT questions. Each question carries equal marks

1. From Unit 1
2. From Unit 1
3. From Unit 1 (Problem)
4. From Unit 2
5. From Unit 2
6. From Unit 2 (Problem)
7. From Unit 3
8. From Unit 3
9. From Unit 3 (Problem)
10. From Unit 4
11. From Unit 4
12. From Unit 4 (Problem)

SECTION B: ESSAY TYPE ANSWER QUESTIONS (4 X 9 = 36)

Answer Any FOUR questions. All questions carry equal marks

13. (a) From Unit 1

    OR

    (b) From Unit 1

14. (a) From Unit 2

    OR

    (b) From Unit 2

15. (a) From Unit 3

    OR

    (b) From Unit 3

16. (a) From Unit 4

    OR

    (b) From Unit 4

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B.Sc. (ELECTRONICS) – I year
Semester - I
Paper - I: Circuit Analysis

Total number of hours: 48
No of hours per week: 4

UNIT - I

AC Fundamentals: Sinusoidal wave – average and RMS values – J-Operator – Polar and Rectangular forms of complex numbers – Phasor diagram – Complex impedance and admittance.

Kirchhoff's Current and Voltage Laws: Concept of voltage and current sources - KVL and KCL - application to simple circuits (AC and DC) consisting of resistors and sources – Node voltage analysis and mesh analysis.

UNIT-II

Network Theorems (DC and AC): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Milliman's theorem,
Application to simple Networks.

UNIT-III

RC and RL circuits: Transient response of RL and RC circuits with step input, Time constants. Frequency response of RC and RL circuits,Types of filters – Low pass filter and High pass filter-frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance: RLC Series and parallel resonance circuits – Resonant frequency – Q-Factor – Bandwidth – Selectivity.

Cathode Ray Oscilloscope: Cathode ray tube (CRT) and its working – electron gun focusing – deflection sensitivity – florescent screen – Measurement of time period, frequency, phase and amplitude.

Text Books:

1) Basic Electronics – Grob, 10th edition(TMH)
2) Circuit Analysis – P .Gnanaswamy, Pearson Education.
3) Circuit and Networks – A. Sudhakar & S. Pallri (TMH)
4) Pulse, digital & switching waveforms – Milliman &Taub.
5) Networks, Lines and Fields – John D Ryder (PHI)
6) Network theory – Smarajit Ghosh (PHI)

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B.Sc. (Electronics Practicals) – I year
Semester - I
Paper – I:: Circuit Analysis Practical Lab

1. Measurement of peak voltage and frequency using CRO.
2. Measurement of phase using CRO.
3. Thevenin's theorem and Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR circuit – Frequency response - (Low-pass and High-pass).
6. CR and LR circuits – Differentiation and integration – tracing of waveforms.
7. LCR – Series resonance circuit – frequency response – Determination of resonant frequency (f_r), Q-factor and band width.
8. Simulation: i) Verification of KVL and KCL.

   ii) Verification of network theorems.

   iii) Study of frequency response (LR).

Note: Student has to perform minimum of six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual – Zbar, Malvino, Miller.

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B.Sc. (ELECTRONICS) – I year
Semester - II
Paper – II :: Electronic Devices

Total number of hours : 48
No. of hours per week : 4

UNIT-I

PN Junction: Formation of PN junction, Depletion region, Junction capacitance, Diode equation (no derivation) Effect of temperature on reverse saturation current , V-I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor(BJT): PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output), Early effect, CB, CC and CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h-parameter model and its equivalent circuit. Determination of h–parameters from the characteristics. Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

UNIT- III

Field Effect Transistor (FET): Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as voltage variable resistor. Advantages of FET over BJT. **MOSFET**: construction and working of enhancement and depletion modes , output and transfer characteristics, Application of MOSFET as a switch .

Uni Junction Transistor (UJT): Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

UNIT- IV

Silicon Controlled Rectifier (SCR): Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.

Photo electronic Devices: Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode(LED).

Books Recommended:

1) Electronic Devices and circuits - Millman and Halkias,(TMH)
2) Principles of Electronics - V.K.Mehta & Rohit Mehta
3) Electronic Devices and Circuits - Allen Moltershed(PHI)
4) Basic Electronics and Linear Circuits - Bharghava U
5) Electronic Devices and Circuits - Y.N.Bapat
6) Electronic Devices and Circuits - Mithal.
7) Electronics Devices and Circuits - Salivahanan and Suresh
8) Experiments in Electronics - S.V.Subramanyam.

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B.Sc. (Electronics Practicals) – I year
Semester - II
Paper – II:: Electronic Devices Lab

1. To draw V-I characteristics of Junction diode and determine the cut-in voltage, forward and reverse resistances.
2. Zener diode V-I Characteristics – Determination of Zener breakdown voltage.
3. Voltage regulator (line and load) using Zener diode.
4. BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
5. FET – Characteristics and determination of FET parameters.
6. UJT characteristics – determination of intrinsic stand-off ratio.
7. UJT as relaxation oscillator.
8. Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

Note: Student has to perform minimum of six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell - PHI

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B.Sc. (ELECTRONICS) – II year
Semester - III
Paper - III: Analog Circuits
(w.e. f. the academic year 2017-18)

Total number of hours: 48
No. of hours per week: 4

UNIT – I

Rectifiers and filters: Rectifiers– half wave, full wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output. **Filters** – choke input (inductor) filter, Shunt capacitor filter, L-section and π-section filters.

UNIT – II

Regulated Power Supplies:: Block diagram of regulated power supply, Series and shunt transistor regulated power supplies, three terminal IC regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS). UPS –Principle and working.

UNIT – III

Transistor amplifier: Classification of amplifiers (Based on type of coupling and frequency range), Hybrid π-model of a transistor, RC-coupled CE amplifier – frequency response, analysis.

Feedback in amplifiers: Positive and negative feedback, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower and Darlington pair and its advantages.

UNIT – IV

Oscillators:: Barkhausen criterion for sustained oscillations, RC oscillators- RC phase shift and Wien's bridge oscillators, LC oscillators- Hartley and Colpitt, derivation for frequency oscillation.

Multivibrators:: Astable, Monostable and Bistable multivibrators – Qualitative treatment only.

Recommended Books:

1. Electronic Devices and Circuits-Millman and Halkias (TMH)
2. Basic Electronics and linear circuits - Bhargava, Kulshreshta& Gupta TMH
3. A first course in Electronics-AA Khan and KK Dey-PHI
4. Electronic Devices and Circuit Theory-Robert L Boylestad & Louis Nashelsky
5. Pulse, Digital and Switching circuits - Milliman and Taub

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B.Sc. (Electronics Practicals) – II year
Semester - III
Paper - III:: Analog Circuits

1. Study of HWR, FWR and bridge rectifier, determination of ripple factor.
2. Series inductor, shunt capacitor, L-section and π-section filters; determination of ripple factor using Full wave Rectifier.
3. Study of voltage regulator using IC's - 78XX & 79XX.
4. Colpitt's oscillator – determination of frequency.
5. RC Phase shift oscillator - determination of frequency
6. Astable multivibrator – determination of time period and duty cycle.
7. RC-coupled amplifier – frequency response
8. **Simulation experiments ::**
   - i) Rectifiers
   - ii) RC-coupled amplifier
   - iii) Wein's bridge oscillator
   - iv) Colpitt's oscillator
   - v) RC phase shift oscillator
   - vi) Astable multivibrator

Note: Student has to perform minimum of six experiments

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

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B.Sc. (ELECTRONICS) – II year
Semester - IV
Paper - IV:: Linear Integrated Circuits and basics of Communication
(w.e.f the academic year 2017-18)

Total number of hours: 48
No. of hours per week: 4

UNIT – I

Operational Amplifiers: Emitter Coupled Differential amplifier, Block diagram of Op. Amp., Characteristics of Op. Amp, .Op. Amp. Parameters - Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, Offset voltages, Input bias current, Basic Op-Amp circuits - Inverting Op-Amp, Virtual ground, Non-inverting Op-Amp, Frequency response of Op-Amp. Op Amp as: Summing amplifier, subtractor, Comparator, Voltage follower, Integrator, and Differentiator.

UNIT- II

Applications of Op-Amps: Logarithmic amplifier, Sine wave [Wien Bridge] generator and square wave [Astable] generator, Triangular wave generator, Mono stable multivibrator, Solving of simple second order differential equations. Basic Op-Amp series regulator and shunt regulator, IC 555 Timer [Block diagram and its working], IC 555 as mono stable and astable multivibrators.

UNIT – III

Modulation: Need for modulation- Types of modulation- Amplitude, Frequency and Phase modulation.

Amplitude modulation: Analysis of Amplitude modulation, side bands, modulation index, AM modulator, Balanced modulator, Demodulation – diode detector.

UNIT – IV

Frequency modulation: Analysis of FM**.** Working of simple frequency modulator, detection of FM waves – FM Discriminator. Advantages of frequency modulation.

AM and FM Transmitters and radio receivers [Block diagram approach]. Introduction to PAM, PPM, PWM, and PCM , Delta modulation.

Reference Books:

1. Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI
2. Linear Integrated Circuits – Coughlin and Driscoll
3. Linear Integrated Circuits- D Roy Choudhury and Shail B Jain
4. Electronic Communication Systems-George Kennedy & Bernard Davis
5. Principles of Electronic Communication Systems-Louis E Freznel, TMH

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B.Sc. (Electronics Practicals) – II year
Semester - IV
Paper - IV:: Linear Integrated Circuits and Basics of Communication Lab

Practicals : Using IC 741 OpAmp and IC 555 Timer ::

1. Op amp as inverting Amplifier- Study of frequency response
2. Op amp as non-inverting Amplifier- Study of frequency response.
3. OP Amp as Summing amplifier and comparator(Zero crossing detector)
4. Astable multivibrator – determination of time period and duty cycle.
5. Monostable multivibrator- determination of gate width.
6. Integrator/ Differentiator – study of wave forms.
7. Astable multivibrator using IC 555
8. Monostable multivibrator using IC 555.
9. AM modulator and detector

Simulation of all the above experiments::

1. Inverting and Non inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein's bridge oscillator
4. Astable multivibrator using Op Amp
5. Astable multivibrator using IC 555

Note: Student has to perform minimum of six experiments

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2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

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B.Sc. (ELECTRONICS) – III year
Semester - V
Paper - V:: Digital Electronics
(DSC – Compulsory)
(w.e.f the academic year 2018-19)

Total number of hours : 42
No of hours per week: 3

UNIT-I (11 Hrs)

Number system and Logic gates: Conversion of binary, octal, decimal & hexadecimal number systems, Binary addition and subtraction (1's and 2's complement methods).

Logic gates- OR, AND, NOT, XOR, NAND, NOR gates and their truth tables – Design of basic gates using the universal gates- NAND and NOR gates, half adder, full adder and parallel adder logic circuits. Logic families and their characteristics – TTL, CMOS and ECL logic circuits.

UNIT-II (10 Hrs)

Boolean algebra and Combinational logic circuits: Boolean algebra - Laws and identities, DeMorgan's Theorems. Simplification of Boolean expressions using Boolean identities- Reduction of Boolean expressions using Karnaugh Maps - Sum of Products (SOP) representation (up to four variables). Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder(8 to 3).

UNIT-III (10 Hrs)

Sequential logic circuits: Flip-flops:- SR, D, JK, T, JK and JK Master-Slave; **Registers** - Shift registers - SISO,SIPO, PISO and PIPO registers, Universal shift register(IC 7496), **Shift register counters-** Ring counter , Johnson Counter.

UNIT-IV (11 Hrs)

Counters and Semiconductor memories:

4-bit Asynchronous (Ripple) counter, Modulo-N counter, synchronous counter. Up/down counters – ripple counter IC7493 - Decade counter IC7490 – working, truth tables and timing diagrams.

Semiconductor memories :: Organization and working of ROM, types of ROM's - PROM, EPROM, EEPROM, FLASH, RAM- static and dynamic.

Books Recommended:

1. Digital Principles and Applications – Malvino& Leach - TMH.
2. Digital Principles and Applications-Ronald J.Tocci-– Pearson Education.
3. Text book of Electronics Bsc III year (vol.III)-Telugu Akademi
4. Digital Fundamentals – F.Loyd& Jain – Pearson Education.
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
4. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
5. Digital Electronics - Gothman

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B.Sc. (Electronics Practicals) – III year
Semester - V
Paper - V:: Digital Electronics Lab

1. Verification of truth tables of AND, OR, NOT, NAND, NOR, XOR Gates using IC 74XX series.
2. Construction of basic gates using NAND and NOR gates.
3. Construction of Half Adder using gates. Verification of truth table.
4. Construction of Full Adder using gates and verification of truth table.
5. Verification of truth tables of flip flops: RS, D, and JK using IC's.
6. Construction of binary counters 7493

Simulation experiments:

1. 4bit parallel adder using Full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Up/down counter using 74193
5. Multiplexer/DeMultiplexer.
6. Encoder.

Note: Student has to perform minimum of eight experiments

1. Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2. Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

B.Sc. (ELECTRONICS) – III year
Semester - V
Paper – VI(A):: Digital Communication
(DSE – Elective-1)
(w.e.f the academic year 2018-19)

Total number of hours : 42
No of hours per week: 3

Unit -I: (10 Hrs)
Signals Analysis: Fourier series, Complex Fourier spectrum, Fourier transform, Continuous spectrum, Properties of Fourier transform, Fourier transform of periodic functions, Convolution, sampling theorem, random signals and noise, correlation and power spectrum.

Unit- II: (11 Hrs)
Pulse modulation systems: Introduction, pulse amplitude modulation (PAM) – Natural sampling, Flat-top sampling, Demodulation of PAM signals, pulse code modulation (PCM), Quantization, Encoding, Line codes; Noise in PCM systems – Transmission noise, Quantizing noise; Bandwidth of PCM; pulse width modulation (PWM), pulse position modulation (PPM), delta modulation and their quantization and noise consideration.

Unit - III: (10 Hrs)
Digital Transmission: Timing, base band systems, amplitude shift keying (ASK), frequency shift keying (FSK), phase shift keying (PSK), quadrature phase shift keying (QPSK) – Transmitter and receiver, differential phase shift keying (DPSK), base band signal receiver, probability of error in FSK, PSK and DPSK.

Unit - IV: (11 Hrs)
Error detection and coding: Introduction, coding efficiency, parity check, cyclic redundancy check (CRC), Hamming distance, Hamming codes, Cyclic codes, line synchronization codes, Manchester code, Non-Return to Zero (NRZ) coding, Walsh codes.

Reference Books:
1. Communication systems – R P Singh and S D Sapre, 2nd edn, McGraw-Hil.l
2. Digital Communications, Simon Haykin, John Wiley, 2nd Edition , 2007
3. Analog and Digital Communication systems- M.S. Roden, 3rd Edition, Prentice Hall of India.
4. Modern Digital and Analog Communication Systems-B.P. Lathi.
5. Communication Techniques for digital and Analog signals – M. Kanefsky, John Wiley and Son.
6. Telecommunication – T.H. Brewster, McGraw Hill.
7. Principles of Digital communication, Das, Chatterjee and Mallick, Wiley Eastern Ltd.

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B.Sc. (Electronics Practicals) – III year
Semester - V
Paper – VI(A):: Digital Communication Lab

I Experiments on Internet working:

1) Testing of RJ-45 Cable (Straight/ Cross)
2) Introduction to LAN cable and Hub.
3) Verifying physical and logical address.
4) Sending data/ Data transfer from system to system.
5) Concept of HTTP.
6) File transfer FTP.
7) Introduction to server and client.
8) Introduction to network IP address.
9) Identification of NET ID using masks.
10) Mail transfer using SMTP.
11) Encryption (plain text to Hypertext).
12) Study of Router configuration.
13) Study of two networks between LAN and LAN/ MAN and MAN/ WAN and WAN.
14) Introduction to network devices.
15) Static Routing.
16) Basic RIP (observe RIP routers and understand the commands)
17) RIP V2.
18) OSPF (Open Shortest Path First)

II Experiments in Data Communication.

1) Study of serial communication.
2) Study of protocol in communications.
3) Study of Fiber optic communications.
4) Study of wireless communications.
5) Study of parallel communication.

Note: Minimum of 8 experiments to be performed.

B.Sc. (ELECTRONICS) – III year
Semester - V
Paper – VI(B):: Electronic Instrumentation
(DSE – Elective-1)
(w.e.f the academic year 2018-19)

Total number of hours: 42
No of hours per week: 3

Unit – I: CHARACTERISTICS OF AN INSTRUMENT (11 Hrs)
Functional elements of a measurement system – Static characteristics – Accuracy, precision, bias, linearity, threshold, resolution, hysteresis, dead space, scale readability, span, static stiffness, input impedance, repeatability and reproducibility - Errors and calculation of errors in overall system – Dynamic characteristics – Zero, first and second order instruments - Responses for step, impulse, ramp and sinusoidal inputs.

Unit –II: TRANSDUCERS AND SENSORS (11 Hrs)
Definition of transducer and sensor – Classification of transducers – Pressure (strain gauge, piezoelectric transducer), displacement (potentiometric, LVDT), temperature (thermometer, thermistor, thermocouple) and photosensitive (Vacuum & gas filled phototubes, photomultiplier, photoconductive cell, photovoltaic cell) transducers.

Unit –III: BRIDGE MEASUREMENTS (10 Hrs)
Introduction - Wheatstone bridge - Kelvin bridge – Guarded Wheatstone bridge - AC bridges and their applications – Maxwell bridge – Hay bridge - Schering bridge - Wien bridge.

Unit – IV: TESTING INSTRUMENTS (10(Hrs)
Oscilloscopes – Block diagram – CRT Circuits – Vertical and horizontal deflection systems – Delay line, Multiple trace – Probes – Special oscilloscopes.

Text Books:
1. C. S. Rangan, G. R. Sarma and V. S. V. Mani, 1999, Instrumentation Devices and Systems, *Tata McGraw-Hill, New Delhi.*
2. A. D. Helfrick and W. D. Copper, 1992, Modern Electronic Instrumentation and Measurement Techniques, *Prentice-Hall of India, New Delhi.*
3. A. K. Sawhney, A Course in Electrical and Electronic Measurement andInstrumentation, *Dhanpat Rai & Sons.*

Reference Books:
1. E. O. Doebelin, 1983, Measurement Systems Application and Design, *3rd Ed., McGraw-Hill*
2. D. V. S. Moorthy, 1995, Transducer and Instrumentation, *Prentice-Hall of India, NewDelhi.*
3. J. W. Dalley, W. F. Riley and K. G. McConnel, 1993, Instrumentation for Measurements,*Wiley, NY.*
4. B. C. Nakre and K. K. Chaudry, Instrumentation Measurements and Analysis, *Tata McGraw-Hill, New Delhi.*

Dr. B. Venkatram Reddy
Chairman, Board of Studies in Physics, KU, Wgl
Date: 24th Aug., 2016 & 5th June, 2017

B.Sc. (Electronics Practicals) – III year
Semester - V
Paper – VI(B):: Electronic Instrumentation Lab

I Analog Experiments:

1.Power control by SCR using UJT.
2. PLLas FM detector (using IC 565).
3.Active high pass filter.
4.Active low pass filter.
5.Calibration of Strain gauge.
6. LVDT.
7. AC Bridges: Maxwell and Wein bridge.

II Analog Simulation Experiments (S/W):

1) Active filters using Op-Amp.
2) Frequency modulation and detection.
3) Amplitude modulation and detection.
4) Solution of differential equation using analog computation (using TUTSIM).

III Digital Experiments (H/W & S/W)

1. Construction of synchronous Up/Down Counter using IC 74192 and display using 7-segment display.
2. Implementation of Boolean functions using multiplexer.
3. Construction of shift registers using IC7495.
4. Construction of an 8-bit full adder using two 4-bit adders.
5. Given a four variable Boolean function design and simulate the circuit using gates.
6. Simulate a 4-bit binary/BCD decade counter.
7. Simulate a full adder circuit using Decoder/ Demodulator.
8. Simulate a 4-bit shift register.
9. Simulate a Johnson counter.

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Note: Minimum of 8 experiments to be studied

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B.Sc. (ELECTRONICS) – III year
Semester - VI
Paper – VII:: 8085 Microprocessor and Applications
(DSC – Compulsory)
(w.e.f the academic year 2018-19)

Total number of hours : 42
No of hours per week: 3

UNIT-I (11 Hrs)
Introduction to 8085 Microprocessor & its architecture:: Introduction to Microcomputer, Intel 8085 Microprocessor – Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle , Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts – Hardware and Software. Address space partitioning – Memory mapped I/O & I/O mapped I/O.

UNIT-II (10 Hrs)
Instruction set of 8085 microprocessor: Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations. Stack and Subroutines, Addressing modes.

UNIT-III (10 Hrs)
Programming of 8085 microprocessor: Assembly language programming, addition (8 and 16 bit), 8 bit - subtraction, multiplication and division. Finding the largest and smallest number in data array. Program to arrange the given numbers in ascending and descending order. Counters and Time delays.

UNIT-IV (11 Hrs)
Interfacing of peripherals: Types of programmable and non programmable interfacing peripherals- 8212 (I/O port) – programmable peripheral interface 8255.
D/A Converters: (Binary weighted, R-2R ladder network), A/D Converters (Dual slope, Successive approximation), Closed loop and open loop process control systems (concept only), Stepper motor control.

Books Recommended:

1) Microprocessor Architecture and Programming – Ramesh S.Goanker – Penram.
2) Fundamentals of Microprocessors and Micro controllers – B.Ram, - Dhanpat rai & sons.
3) Text book of Electronics B.SC III year (Vol.III)-Telugu Academy.
4) Introduction to Microprocessor – Aditya P.Mathur – TMH.
5) Microprocessor Lab Premier – K.A. Krishnamurthy.

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B.Sc. (Electronics Practicals) – III year
Semester - V
Paper – VII:: 8085 Microprocessor and Applications Lab

I. 8085 – Software Experiments :

1. Binary addition (8 bit and 16 bit)and subtraction (8 bit).
2. Decimal Addition (DAA).
3. Multiplication and Division (8 bit).
4. Picking of largest/Smallest number from the given data.
5. Arranging the given data in ascending/descending order.
6. Time Delay generation.

II. 8085 - Hardware Experiments:

1. R – 2R ladder network (DAC) (4 bits).
2. Interfacing a Stepper motor and rotating it clockwise/anticlockwise direction through a known angle.
3. Interfacing a seven segment display.
4. Interfacing ADC for temperature measurement.

Note: Student has to perform minimum of eight experiments

B.Sc. (ELECTRONICS) – III year
Semester - VI
Paper – VIII(A) :: 8051 Microcontroller and Applications
(DSE – Elective-2)
(w.e.f the academic year 2018-19)

Total number of hours: 42
No of hours per week: 3

UNIT-I (11 Hrs)
The Microcontroller 8051: Overview and block diagram of 8051. Architecture and pin diagram of 8051. Data types and directives, Memory organization, register banks and Stack Pointer. PSW Register, other special function registers, I/O port organization. Interrupts and Timer/Counter modules.

UNIT-II (10 Hrs)
Instruction set of 8051 microcontroller: Classification- Data transfer, Arithmetic, logical, Single Bit, Jump, Loop and CALL instructions and their usage. Addressing modes - Immediate, Register, Direct, Indirect, Absolute addressing, Relative addressing, Indexed Addressing and accessing memory using various addressing modes.

UNIT-III (11 Hrs)
Programming examples of microcontroller 8051:
Addition, Subtraction, division, picking the smallest/largest number among a given set of numbers, arranging a given a set of numbers in ascending/descending order, subroutines, I/O Programming, Bit manipulation. Accessing a specified port terminal and generating wave forms.
Timer/Counter Programming in 8051: Programming 8051 timers- basic registers of timers- Timer 0, Timer 1 registers. TMOD register, TCON register. Timer modes - Mode1, Mode2 programming. Counter mode programming. Program to generate time delay.

Unit – IV (10 Hrs)
Serial communications: Serial communication, Types, modes and protocols, Data transfer rates, serial communication program- SBUF and SCON registers, RS232 standards,Programming timer Interrupts,
Applications of Micro controller: Displaying information on a LCD, Interfacing a keyboard, Interfacing a temperature sensor,Interfacing of DAC 0808 to microcontroller, Interfacing of ADC 0804 to microcontroller,Seven segment LED.

Books Recommended:

1) The 8051 Microcontrollers and Embedded Systems – Muhammad AliMazidi and Janice gillipsieMazidi – Pearson Education Asia, 4th Reprint, 2002.
2) Text book of ElectonicsBsc III year (vol.III)-Telugu Akademi.
3) Fundamentals of Microprocessors and Microcontrollers – B.Ram.
4) The 8051 Microcontroller – architecture, programming and applications KennthJ.Ayala-Penram International Publishing, 1995.
5) Micro controllers-Theory and Applications-Ajay V.Deshmukh.

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B.Sc. (Electronics Practicals) – III year
Semester - V
Paper – VIII(A) :: 8051 Microcontroller and Applications Lab

Experiments using 8051 microcontroller:

1. Multiplication of two numbers using MUL command (later using counter method for repeated addition).
2. Division of two numbers using DIV command (later using counter method for repeated subtraction).
3. Pick out the largest/smallest number among a given set of numbers.
4. Arrange the given numbers in ascending/descending order.
5. Generate a specific time delay using timer/counter.
6. Interface ADC and a temperature sensor to measure temperature.
7. Interface DAC and generate a staircase wave form with a step duration and number of steps as variables.
8. Flash a LED connected at a specified out port terminal.
9. Interface stepper motor to rotate clock wise / anti clock wise through a given angle steps.

Experiments with Keil Software:

1. Write a program to pick out largest/smallest number among a given set of number.
2. Write a program to arrange a given set of numbers in ascending/descending order.
3. Write a program to generate a rectangular/square wave form at specified port.
4. Write a program to generate a time delay using timer registers.

Note: Student has to perform minimum of eight experiments

B.Sc. (ELECTRONICS) – III year
Semester - VI
Paper – VIII(B) :: Optical Fiber Communication
(DSE – Elective-2)
(w.e.f the academic year 2018-19)

Total number of hours: 42
No of hours per week: 3

Unit 1: (11 Hrs)
Introduction: Historical developments, optical fiber communication system, advantages of optical fiber communication, total internal reflection, acceptance angle, numerical aperture, skew rays, cylindrical fiber, single mode fibers. Transmission characteristics of optical fibers: Attenuation, material absorption losses in silicon glass fibers, linear scattering losses, non linear scattering losses, fiber bend loss.

Unit 2: (11 Hrs)
Transmission characteristics of optical fibers (B): mid-infrared and far-infrared transmission, intermodal and intra-modal dispersion, overall fiber dispersion, polarization. Optical fibers and cables: preparation of optical fibers, liquid phase (melting) techniques, vapor phase deposition techniques, fluoride glass fibers, optical fibers.

Unit 3: (10 Hrs)
Optical fiber connection: joints and couplers, fiber alignment and joint loss, splices, connectors, couplers. Optical sources and detectors: Absorption and emission of radiation, Einstein's relation, population inversion, optical emission from semiconductors, semiconductor injection laser, LED power and efficiency characteristics.

Unit 4: (10 Hrs)
Optical detection principles, absorption, quantum efficiency, responsivity, long wavelength cutoff, p-n photodiode, p-i-n diode, photo transistors.
Optical fiber measurements: Fiber attenuation measurements, dispersion measurements, refractive index profile measurements, cut-off wavelength measurements, numerical aperture measurements.

Reference books:
1. Optical fiber communications, Principles and Practice, John M. Senior, PHI.
2. Optical fiber systems: Technology, design and applications, Charles K Kao, McGraw Hill International Edition.
3.Optical fiber communications, Gerd Keiser, Mc-GrawHill International Edition.
4.Optical fiber communication, J. Gower, PHI.

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B.Sc. (Electronics Practicals) – III year
Semester - V
Paper – VIII(C) :: Optical Fiber Communication Lab

I. Fiber Optic Analog Link (using both 660nm and 850nm)

1. Losses in Optical Fibers.
2. Characteristics of Electrical to Optical Converters.
3. Characteristics of Optical to Electrical converters .
4. Measurement of Numerical Aperture(NA)
5. Intensity Modulation.

II . Fiber Optic Digital Link (Using both 660nm and 850nm)

1. Study of Fiber optic analog Link.
2. Estimation of rise time and fall time distortions.
3. Estimation of propagation delay.
4. Encoding methods for fiber optic digital transmission.

Note: Student has to perform minimum of eight experiments.

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