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**GULBARGA UNIVERSITY  
KALABURAGI**



**SYLLABUS FOR B.Sc. ELECTRONICS (SEMESTER SCHEME)**

The syllabus is prepared according to the Regulation for B.Sc. Course (semester scheme). Electronics is one of the three optional subjects of equal importance.

The details of marks for each subject (Theory & Practical) and duration of examination are given on separate sheet.

The Chart showing details of course for subjects and practical is also enclosed. For convenience, optional subject-1 is considered as Electronics.

Semester	No. of Hours	Paper Details
Semester-I	64	1 3- Fundamentals of Electronics <i>2016-17</i>
Semester-II	64	2 3-Electronic Circuits
Semester-III	64	3 3-OP Amps and Linear Integrated Circuits <i>2017-18</i>
Semester-IV	64	4 3-Digital Electronics
Semester-V	48	5 1- Electronic Communication
	48	5 2- Microprocessor and Interfacing
Semester-VI	48	6 1-Advanced Electronic Communication
	48	6 2 - Signal Conditioners and Microcontrollers

Details of Theory Papers & Practicals and Duration of Examination in Each Semester for subjects with Practicals is as shown below:

Semester	Course No	Paper No	Title of the Paper	Duration of Examination		Marks	
				Theory Hrs	Practical Hrs	Theory	Practical
First	1.1	I	Basic English	3	-	100	-
	1.2	I	Ind Language/Addl English	3	-	100	-
	1.3	I	Optional-1	3	3	100	50
	1.4	I	Optional-2	3	3	100	50
	1.5	I	Optional-3	3	3	100	50
Second	2.1	II	Basic English	3	-	100	-
	2.2	II	Ind Language/Addl English	3	-	100	-
	2.3	II	Optional-1	3	3	100	50
	2.4	II	Optional-2	3	3	100	50
	2.5	II	Optional-3	3	3	100	50
Third	3.1	III	Basic English	3	-	100	-
	3.2	III	Ind Language / Addl English	3	-	100	-
	3.3	III	Optional-1	3	3	100	50
	3.4	III	Optional-2	3	3	100	50
	3.5	III	Optional-3	3	3	100	50

Fourth	4.1	IV	Basic English	3	-	100	-
	4.2	IV	Ind Language / Addl English	3	-	100	-
	4.3	IV	Optional-1	3	3	100	50
	4.4	IV	Optional-2	3	3	100	50
	4.5	IV	Optional-3	3	3	100	50
Fifth	5.1	V	Optional-1	3	3	100	50
	5.2	VI	Optional-1	3	3	100	50
	5.3	V	Optional-2	3	3	100	50
	5.4	VI	Optional-2	3	3	100	50
	5.5	V	Optional-3	3	3	100	50
	5.6	VI	Optional-3	3	3	100	50
Sixth	6.1	VII	Optional-1	3	3	100	50
	6.2	VIII	Optional-1	3	3	100	50
	6.3	VII	Optional-2	3	3	100	50
	6.4	VIII	Optional-2	3	3	100	50
	6.5	VII	Optional-3	3	3	100	50
	6.6	VIII	Optional-3	3	3	100	50

Theory: 80 Marks + 20 Marks (IA) = 100 Marks      Practical: 40 Marks + 10 Marks (IA) = 50 Marks

**FIRST SEMESTER**  
**1.3- FUNDAMENTALS OF ELECTRONICS**

**UNIT-I: Passive Components:**

**12 Hrs**

Resistors: Meaning of resistors specification of resistors, types of resistors: Fixed and Variable Fixed resistors-carbon composition and wire wound resistors-constructional aspects and applications. Variable resistors: Potentiometer, -constructional aspect and applications. Color coding of resistors.

Capacitors: Meaning of capacitors, types of capacitors – Fixed and Variable. Fixed capacitors: Ceramic and Electrolytic capacitor - construction and applications

Variable capacitors: constructions and applications of ganged capacitor

Inductors: Air core, iron core, ferrite core-construction and applications. Transformer: Principle, construction and working

Turns ratio, voltage ratio and current ratio - relation between them, Types of transformers (Step up and step down) and applications

**UNIT-II: Transient Analysis of RC and RL Circuits:**

**12 Hrs**

Series RC circuit excited by DC source charging & discharging of a capacitor (derivations) graphical representation, RC time constant and its importance.

Series RL circuit excited by DC source. Growth and decay of current (derivations) graphical representation. RL time constant and its importance

Series RC, RL and RLC circuits excited by AC source. Impedance and phase angle (derivation), study of phasor diagram

Series and parallel RLC circuit. Definition of Resonance, condition of resonance, resonant frequency, bandwidth and quality factor (derivations). Significance of quality factor

Passive Filters: Brief note on filters and its application. Low pass and high pass filters- frequency response graph and Cutoff frequency (no derivation) -applications of filters

**UNIT-III: Network Theorems (DC Analysis Only):**

**10 Hrs**

Kirchhoff's laws -mesh and nodal analysis, voltage divider and current divider theorems, Thevenin's theorem, Norton's theorem, superposition theorem, reciprocity theorem, Maximum power transfer theorem and Millman's Theorem (simple numerical examples)

**UNIT-IV: Semiconductor Diodes and Circuits:**

**16 Hrs**

PN junction diode, Zener diode, Tunnel diode, Varactor diode, Schottky diode -construction, working characteristics and applications

Diode circuits and Filters: Rectifiers – Half wave rectifier, Full wave rectifier (center tapped) and bridge rectifier-working and expression for, ripple factor & efficiency (derivations) Zener diode as voltage regulator (study of Load and line regulation)

Filters: Shunt capacitor, series inductor filter and Pi filter – working and applications. Block diagram of regulated power supply

**UNIT-V: Opto-Electronic Devices:**

**06 Hrs**

LED, LCD, Photodiode, Solarcell-Construction, working and characteristics FND: Construction, working and applications

**UNIT-VI: Electronic Instruments:**

**08 Hrs**

Meters: Ammeter, voltmeter-design and construction. Analog multimeter, digital multimeter, function generator (Qualitative study with block diagram). Cathode ray tube (CRT), cathode ray oscilloscope (CRO)-Block diagram

**Text books**

1. A Text book of Electronics, R.S.Sedha, S.Chand and Co. Multicolour, 3<sup>rd</sup> edition, 2012
2. Electronic Principles, Albert Malvino & David J Bates, TMH, 7<sup>th</sup> edition-2010
3. Introductory circuit analysis, Robert Boylestad, PHI 5<sup>th</sup> edition 2010.

**Reference books**

1. Electronic Devices and circuit theory, Robert Boylestad and Louis Nashelsky, 9<sup>th</sup> Edition 2013, PHI
2. Basic electronics- B.L. Theraja - S. Chand and Co. 7<sup>th</sup> edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electrical technology- B.L. Theraja S. Chand & Co
5. Electric circuits, Joseph Edminister, Schaums series
6. Electric circuits Book I, Schaums series - Sved A. Nasar Mc-Graw hill edition
7. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulkshrestha and D.C. Gupta-TMIL
8. Electronic devices, David A Bell, Reston Publishing Company DB Tarapurwala Publ.
9. Principles of Electronics By V.K. Mehta, and Rohit Mehta S Chand & Co
10. Electronic devices, applications and Integrated circuits. Atahur Kulkshrestha and Chadha, Umesh Publications.
11. Instrumentation- Kalasi
12. Instrumentation -Mani Rangan Sharma PHI Publications Ltd



**Semester-I: Practicals (Minimum of 12 experiments to be performed)**

1. Verification of Thevenin's theorem (DC Source only).
2. Verification of Super position theorem (DC Source only).
3. Verification of Maximum power transfer theorem. (DC Source only).
4. Verification of Norton's Theorem (DC Source only).
5. Verification of reciprocity theorem (DC Source only).
6. Verification of Millman's theorem
7. V-I characteristics of Semiconductor Diode-determination of forward resistance
8. V-I Characteristics of a Zener diode and determination of break down voltage.
9. V-I characteristics of Photodiode
10. Half wave Rectifier - without and with shunt capacitance filter. Determination of ripple factor.
11. Centre tapped full wave rectifier - without and with shunt capacitance filter. Determination of ripple factor.
12. Bridge rectifier- without and with shunt capacitance filter. Determination of ripple factor.
13. Zener diode voltage regulator - determination of line and load regulation in percentage.
14. Series resonance (RLC)-Determination of resonant frequency, Bandwidth and Q-factor.
15. Parallel resonance (RLC)-Determination of resonant frequency, Bandwidth and Q-factor
16. Low pass filter-Determination of Cut-off frequency.
17. High Pass filter-Determination of cut-off frequency.
18. Study of I-V Characteristics of LED and Determine of glowing voltage (for any two colours)
19. Seven Segment display- Display of numerals 0 to 9 and alphabets 'a to g' and 'dot point'
20. Display of numbers using LCD
21. Charging and discharging of a Capacitor. Determination of Time constant.
22. Study of CRO to measure  $V_p$ ,  $V_{p-p}$  and time period of sine and square waves.

**SECOND SEMESTER**

**2.3-ELECTRONIC CIRCUITS**

**UNIT-I: Bipolar and Uni-Polar Devices:**

12 Hrs

**Bipolar Junction Transistor:** Construction, principle & working of NPN and PNP transistor. Transistor Configuration - CE, CB and CC (mention only) Definition of  $\alpha$ ,  $\beta$  and  $\gamma$  and their interrelations, leakage currents (mention only) Applications-(transistor series regulator and transistor as a switch). Study of CB, CE and CC Characteristics - different regions. Experimental circuit and procedure.

**Junction Field Effect Transistor (JFET):** Types (mention only), construction and working of N-channel FET, characteristics, FET parameters and their relationships, comparison of FET with BJT

**Uni-Junction Transistor (UJT):** Basic construction, equivalent circuit, intrinsic standoff ratio, working and characteristics.

**UNIT-II: Transistor Biasing:**

12 Hrs

Need for biasing, DC load line, operating point, thermal runaway, stability and stability factor (Definition only)

Different types of biasing- Fixed bias (base-bias) without emitter resistance, collector to base bias, voltage divider bias - circuit diagrams and their working.

Q-point expressions for voltage divider bias only.

Hybrid parameters - definitions of h-parameters (Two port network) definition of  $h_{ie}$ ,  $h_{re}$ ,  $h_{fe}$  and  $h_{oe}$ , h-parameter equivalent circuit of CE amplifier. Expressions for voltage gain, current gain, input and output impedances of CE amplifier in terms of h-parameters

**UNIT-III: Concept of Feedback:**

06 Hrs

Feedback-concept of feedback, types of feedback-positive & negative feedback, advantages and disadvantages for each, negative feedback configurations- voltage series, voltage shunt, current series and current shunt (block diagram representation for each) Voltage series negative feedback-effect of negative feedback on voltage gain, input impedance, out impedance and bandwidth-description with block diagram only.

**UNIT-IV: Oscillators:**

10 Hrs

Sinusoidal Oscillators-damped and undamped oscillations, basic principle of oscillator, Barkhausen criterion, classification of oscillators (LC, RC and crystal oscillators)

LC oscillators-Collpitt and Hartley oscillators using transistors - circuit diagrams, working (no derivations) RC Oscillators- Phase shift and Wein Bridge oscillators circuit diagrams, working (no derivations)

Crystal Oscillators- Equivalent circuit of a piezo electric crystal, circuit diagram and working of Colpitt crystal oscillator.

UJT relaxation oscillator: Construction and working only.

Multivibrators(MV)-Types of MV, block diagrams of astable, monostable and bistable multivibrators with waveforms Circuit diagram and working of astable and bistable multivibrator using transistors (no derivation)

#### UNIT-V: Small Signal Amplifiers:

12Hrs

Classification of amplifiers based on different criteria, small signal CE amplifier-circuit, working, frequency response. Multistage amplifiers- qualitative study of cascaded stages. Types of coupling-RC coupled, transformer coupled and direct coupled amplifiers (only circuit diagrams and frequency response graph, advantages and disadvantages for each). Darlington amplifier-circuit diagram and its characteristic features. JFET amplifier in CS mode - circuit diagram and operation. Emitter Follower

#### UNIT-VI: Power and Tuned Amplifiers:

12Hrs

Difference between voltage and power amplifier, classification of power amplifiers-Class A, Class B, Class C and their comparisons

Transformer coupled Class A power amplifier-working, overall efficiency (derivation). Circuit operation of complementary symmetry class B push-pull power amplifier (no derivation). Harmonic and crossover distortion, heat sinks

Tuned amplifiers - single tuned and double tuned amplifiers-circuit diagram, working and frequency response for each, limitations of single tuned amplifier.

#### Text books:

1. A Text book of Electronics, R.S Sedha, S Chand and Co., Multicolour, 3<sup>rd</sup> edition, 2012.
2. Electronic Principles, Albert Malvino & David J Bates, TMH, 7<sup>th</sup> edition-2010.
3. Electronic Devices and circuit theory, Robert Boylestad and Louis Nashelsky, 9<sup>th</sup> Edition, 2013, PHI

#### Reference books:

1. Basic electronics- B.L. Theraja - S Chand and Co. 3<sup>rd</sup> edition -2012.
2. Electronics text lab manual, Paul B /bar
3. Basic Electronics and Linear circuits, N N Bhargava, D.C. Kulshrestha and D C Gupta-TMH.
4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ
5. Principles of Electronics By V K Mehta, S Chand & Co.
6. Electronic devices, applications and Integrated circuits, Mathur, Kulshrestha and Chadha, Umesh Publications
7. Electronics Devices and Circuits Allan Motorshed, 11<sup>th</sup> Edition.

#### Semester-II: Practicals (Minimum of 12 experiments to be performed)

- ✓1. Transistor characteristics in CB mode-determination of  $\alpha$  and input resistance
- ✓2. Transistor characteristics in CE mode-determination of  $\beta$  and input resistance
- ✓3. Single Tuned amplifier - frequency response, determination of bandwidth and Q-factor
4. FET characteristics in CS mode-determination of pinch off voltage.
5. UJT characteristics: Determination of firing voltage or threshold voltage
6. SCR characteristics: Determination of firing voltage or threshold voltage
- ✓7. CE Amplifier - frequency response curve and determination of bandwidth
- ✓8. CC amplifier - voltage gain, current gain, input and output impedances at one frequency
9. Common source FET amplifier: frequency response curve and determination of bandwidth
10. Emitter Coupled Differential amplifier.
- ✓11. Hartley Oscillator using transistor.
- ✓12. Colpitt's oscillator using transistor.
- ✓13. UJT relaxation oscillator
- ✓14. Transistor series regulator.
- ✓15. Transistor as a switch.
- ✓16. Phase shift Oscillator using transistor
17. Wein Bridge Oscillator using transistor.
18. Darlington pair amplifier (CC amplifier)
- ✓19. AMV using transistor- wave forms.
20. Full wave rectifier using SCR.
- ✓21. Crystal oscillator
22. Transformer coupled amplifier- frequency response curve.
23. Complementary symmetry push-pull amplifier- frequency response curve

### THIRD SEMESTER

#### 3.3-OP AMPS AND LINEAR INTEGRATED CIRCUITS

##### UNIT-I: Operational Amplifiers:

12 Hrs

Differential Amplifier. Emitter Coupled Differential amplifier-circuit and working.

Block diagram, parameters of op-amp -input bias current, input off-set voltage, output off-set voltage, CMRR, slew rate, SVRR and thermal drift. Characteristics of ideal and practical Op-amp

Open loop gain in inverting and non- inverting mode and differential gain-limitations.

Op-Amp with negative feedback: Inverting amplifier- derivation for  $A_v$ , concept of virtual short and virtual ground. Non- inverting amplifier - derivation for  $A_v$ . Voltage follower-circuit and features

##### UNIT-II: Applications of Operational Amplifier:

12 Hrs

Op-Amp summing amplifier/adder and subtractor - derivation for the output voltage. Averaging amplifier, scale changer

Op-Amp integrator and differentiator- derivation for the output voltage, output waveforms for square wave input

Instrumentation amplifier - circuit and working using Op-Amp.Phase-shift and Wein bridge oscillator using op-amp- circuit & working

##### UNIT-III: IC 555 Timer and Voltage Regulator IC's:

12 Hrs

IC 555 timer functional block diagram Multivibrators -astable, monostable and bistable multivibrators using 555 timer, working, equation for frequency of oscillations (no derivation) Schmitt trigger using IC 555-waveforms, mention of UTP and LTP.

Voltage regulator IC's: Fixed and variable IC regulators IC 78XX and IC79XX. IC LM 317 and LM 337 output voltage equation (mention only) IC 723 general purpose voltage regulator-pin diagram, circuit and working

##### UNIT-IV: Wave form Generators:

06 Hrs

Wave form generators: Square wave generator (AMV using OP-Amp) and triangular wave generator- circuit diagram, working and waveforms, ramp generator (using IC 555), circuit diagram and working

##### UNIT-V: Wave Shaping:

10Hrs

Wave shaping circuits. Clippers-positive, negative, positive biased, negative biased and combinational clippers. Clampers- Positive and negative clampers- circuit diagram, working and waveforms of all circuits. RC differentiator and integrator (Qualitative)

##### UNIT -VI: Special Purpose Devices:

12 Hrs

MOSFET-Types, circuit symbols of depletion type MOSFET (both N-channel and P-channel) Circuit symbols of enhancement type MOSFET (both N channel and P channel) N-channel enhancement type MOSFET-working, characteristic curves.SCR- working, V-I characteristics.

Photo Transistor: circuit symbol, characteristics and applications (mention only)

##### Text Books:

1. A Text book of Electronics, R.S Sedha, S Chand and Co., Multicolour, 3<sup>rd</sup> edition 2012.
2. Operational Amplifier and Linear Integrated circuits - Ramakanth Gavekward PHIL, 5th edition.
3. Electronic Devices and circuit theory, Robert Boylestad and Louis Nashelsky 9<sup>th</sup> Edition, 2013, PHI.

##### Reference Books:

1. Linear Integrated circuits by Roy Choudhury, New age international, 4<sup>th</sup> edition 2010
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3<sup>rd</sup> edition -2012
3. Electronics text lab manual, Paul B. Zbar.
4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ
5. Electronic devices, applications and Integrated circuits, Mathur Kulkshreshtha and Chadha, Umesh Publications.

##### Semester-III: Practicals(Minimum 12 experiments to be performed)

1. Inverting and Non Inverting amplifiers using Op-Amp(Determination of Gain)
2. Frequency Response of Inverting Op-Amp(Determination of Bandwidth)
3. Frequency Response of Non-Inverting Op-Amp(Determination of Bandwidth)
4. Op-Amp as Adder (Two inputs only)
5. Op-Amp as Subtractor (Two Inputs Only)
6. Square Wave Generator using Op-Amp (AMV)
7. Triangular Wave Generator using Op-Amp.
8. Ramp Generator using IC 555.
9. Instrumentation Amplifier using Op-Amp(Three Op-Amp Circuit)
10. Phase Shift Oscillator using Op-Amp( Determination of Frequency of Oscillation)
11. Wein Bridge Oscillator using Op-Amp( Determination of Frequency of Oscillation)
12. Clipping Circuits-Positive and Negative Clippers

13. Clamping Circuits-Positive and Negative Clampers
14. Astable Multivibrator using IC 555
15. Monostable Multivibrator using IC 555
16. Schmitt Trigger Using IC 555-Determination of 1 TP and UTP.
17. Fixed Voltage IC Regulators using 78 Series
18. Fixed Voltage IC Regulators using 79 Series
19. Variable Voltage Regulator using IC LM 317(load Regulation Curve).
20. Variable Voltage Regulator using IC LM 337(load Regulation Curve).
21. Op-Amp as Integrator
22. Op-Amp as differentiator
23. RC Differentiator
24. RC Integrator.
25. V-I Characteristics of Photo Transistor
26. V-I Characteristics of MOSFET
27. Determinations of Op-amp parameters ( $I_b$ ,  $V_{ce}$ ,  $I_c$ , SR, FBW, CMRR).

## FOURTH SEMESTER

### 4.3-DIGITAL ELECTRONICS

#### UNIT-I: Number System and Codes: 10 Hrs

Introduction to signed and unsigned numbers-Decimal, binary, octal and hexadecimal number system-their inter conversion. BCD (8421) numbers, Gray, Excess-3. Arithmetic operations in binary, hexadecimal addition, BCD addition and excess-3 addition. 1's and 2' complement subtraction.

#### UNIT-II: Logic Gates and Boolean Algebra: 14 Hrs

Positive and negative logic, basic logic gates- AND, OR and NOT gates (logic symbols and truth tables). Construction of AND, OR using diodes and NOT gate using transistor. NAND, NOR, X-OR and X-NOR gates (logic symbols and truth tables), NAND and NOR as universal gates. Boolean algebra- laws and theorems-De-Morgan's theorems, simplification of logic expressions using Boolean algebra, SOP and POS expressions. Karnaugh maps(K-Map). K-map techniques to solve 3 variable and 4 variable expressions.

#### UNIT-III: Combinational Logic Circuits: 08 Hrs

Arithmetic logic circuits: Half adder, full adder, 4-bit parallel binary adder, 2-bit digital comparator. Decoders- 1 of 4 and 1 of 16 line decoders, Encoders-Decimal to BCD encoder Priority encoder using IC 74147.

#### UNIT-IV: Sequential Logic Circuits: 10 Hrs

Flip-flops: Basic RS latch(using NOR gates). Clocked RS flip-flop (using NAND gates). D-flip flop, edge triggered D-flip flop. preset and clear functions, JK-flip flop, T-flip flop, master-slave JK flip-flop.

#### UNIT-V: Registers and Counters: 12 Hrs

Registers: 4-bit serial-in-serial-out, serial-in-parallel out, parallel-in-serial out and parallel-in-parallel-out registers.

Counters: 3-bit asynchronous / ripple counter, 3-bit synchronous / parallel counter, 4-bit synchronous up-down counter Synchronous modified counter: mod-6 counter. Decade counter- mod-10 counter

#### Unit-VI: Introduction to IC Logic Families: 10 Hrs

Digital IC terminology-TTL logic family, standard TTL series characteristics, TTL open collector outputs, CMOS series and characteristics



**Text Books:**

1. Digital Fundamental, Floyd, CBS Publication (Unit-I).
2. Digital Principles & Applications Malvino & Leach- TMH, 3<sup>rd</sup> Edition.

**Reference Books:**

1. Modern digital Electronics, RP Jain, TMH Publication, 2<sup>nd</sup> Edition.
2. Digital Logic & Computer Design M. Morris Mano-PHI, New Edition.
3. Digital Systems- Principles & Applications, Ronald J Tocci, P-III, 9<sup>th</sup> Edition, Pearson Education (Unit II-VI).
4. Digital Computer Electronics Malvino- III edition, TMH, New Delhi.
5. Digital Computer Fundamentals Thomas C Bartee-IV edition, TMH.
6. Experiments in Digital Principles Malvino & Leach-V edition TMH.

**Semester-IV: Practicals (Minimum 12 Experiments to be performed)**

1. Construction of basic gates AND, OR using diodes and NOT using Transistor.
2. Verification of truth table of AND, OR, NOT gates using ICs.
3. Verification of truth tables of NAND, NOR, XOR and XNOR gates using ICs.
4. IC 74LS00- Realization of AND, OR, NOT and X-OR gates.
5. IC 74LS02- Realization of AND, OR, NOT and X-NOR gates.
6. Verification of De-Morgan's Theorems.
7. Construction of half adder and full adder using IC 74LS86, IC 74LS02 and IC 741.S32
8. Binary to Grey code and vice-versa using IC 74LS86.
9. BCD to seven segment conversion using IC 74LS47.
10. Digital comparator using IC 7485
11. Construction of JK flip-flop using logic gates and its truth table verification.
12. Conversion of JK flip-flop into D- and T- flip-flop and its truth table verification
13. Construction of clocked R-S D and T flip-flop using ICs.
14. Study of 4-bit binary ripple counter using IC 74LS76 (or equivalent).
15. 4-bit parallel binary adder using 741.S83
16. Characteristics of TTL gates
17. Study of working of 3 to 8 decoder using IC 74LS138.
18. Study of working of priority encoder using IC 74LS147.

**FIFTH SEMESTER**

**5.1- ELECTRONIC COMMUNICATION**

**UNIT-I: Antennas and Wave Propagation:**

08 Hrs

Introduction, antenna parameters - Gain, directive gain, power gain, bandwidth, beam width, polarization, efficiency, radiation pattern, radiation resistance and total effective resistance. Dipole antenna, radiation mechanism. Derivation for the power radiated and radiation pattern of Di-pole antenna. Folded di-pole antenna. Yagi-Uda antenna, dish antenna (Qualitative).

Propagation of radio waves - Ground wave, sky-wave and space wave propagation, ionosphere and its effects.

**UNIT-II: Analog Modulation (AM):**

10 Hrs

Block diagram of electronic communication system, transmitter - channel - receiver characterization, modulation-Need for modulation and types of modulation-(AM, FM & PM).

Amplitude modulation - Representation of AM, expression for amplitude modulated wave. Modulation index, frequency spectrum, band width, power relations, current calculations. Examples.

AM modulators - Types, working of collector modulators. AM transmitter: Block diagram function of each block. AM detector: Linear diode detector and square law detector- principle and working.

**UNIT- III: Analog Modulation (FM):**

10 Hrs

Definition, representation of FM, expression for frequency modulated wave, Modulation index, bandwidth requirements, frequency deviation, carrier swing and deviation Ratio.

FM generation - Varactor diode modulator and BJT reactance modulator, FM transmitters-Block diagram, function of each block FM detector: Foster-Seeley discriminator. Comparison of AM and FM.

**UNIT-IV: Radio Receivers:**

06 Hrs

Characteristics of receiver-Sensitivity, selectivity, signal to noise ratio, fidelity, stability, principle of super heterodyne. AM and FM super heterodyne receiver: Block diagram, function of each block. Comparison of AM and FM receivers.



**UNIT-V: Monochrome Television:**

08 Hrs

Introduction, sound and picture transmission in TV. Definition of scanning-progressive scanning and interlaced scanning, aspect ratio, interlace ratio, trace, retrace, blanking T V camera tubes: Camera tube characteristics, principle, construction and working of image orthicon camera tube. Composite video signal Monochrome TV receiver: Block diagram and functions of each block.

**UNIT-VI: Colour Television:**

06 Hrs

Introduction, compatibility, primary and secondary colours, additive and subtractive mixing of colours Characteristics of colour Luminance hue, saturation, colour TV camera system Luminance and chrominance signal. PAL- System. PAL-Encoder, PAL-Decoder, block diagram and functions of each stage CCTV (qualitative).

**Text Books:**

1. Electronic Communication - Sanjeev Gupta, Khanna Publishers Delhi, III Edition
2. Radio Engineering - G K Mithal - Khanna Publishers, Delhi.
3. Electronic Communication - George Kennedy, TMH, V Edition, 2012
4. Electronic Communication - Roddy & Coolen - PHI, IV Edition, 2001.
5. Monochrome and colour television - R.R Gulati New Age International (P) Ltd. Publishers New Delhi, Revised Second Edition.
6. Basic TV transmission and reception - A.K. Maini, III Edition.
7. Electronics Communication and Microwave devices - B. Basavaraj. Omkar Publishers.

**Reference Books:**

1. Antenna and Wave propagation - K. D Prasad Satya Prakashan, New Delhi
2. Electronics Communications Systems Fundamentals through advanced - Wayne Thomas, Pearson Ed.
3. Communication Electronics - Principles and Applications - Louis. E. Frenzel, TMH.
4. Electronics Communications Modulation and transmission - Robert. J. Schenbeck, - Universal Book Stall New Delhi.
5. Basic Television and Video System - Bernold Grob, TMH.
6. Television Engineering - Arvind M Dhake, TMH.

**Semester-I: Practicals (Minimum 8 Experiments to be performed)**

1. Audio Frequency (Two stage RC-Coupled) Amplifier-Determination of band width
2. Complementary Symmetry Class-B Push Pull Power Amplifier-Determination of Efficiency.
3. Buffer Amplifier (Emitter follower) -Determination of Voltage gain, Input & Output impedance and current gain
4. Construct Amplitude modulator using transistor -Determination of Modulation Index
5. Construct Frequency Modulator Circuit-Determined modulation index for different modulating amplitude and frequency.
6. Construct AM Linear diode detector and trace of Input & Output waveforms
7. Construct I.F (Single tuned) amplifier-Determination of I.F frequency, Band Width and Q-factor.
8. Construct Pre-Emphasis and De-Emphasis circuits and verify cutoff frequency
9. Study of Characteristics of Equalizer(Passive components).
10. Construct Double Tuned I F Amplifier and determination of I.F frequency, Band Width and Q-factor.
11. Construct AGC Circuit for AM detector and trace the response curve
12. Construct Frequency Mixer circuit using transistor and Verify Output frequency for different Input frequencies
13. Study of frequency of Twin- T Filter.
14. Frequency response of Cross over Network. Determination of crossover frequency
15. Construct R F (Class-C) Amplifier determine the conversion efficiency
16. Study of Squelch Circuit
17. Construct Harmonic Generator/ (Class-C Tuned) amplifier and trace the Input & Output waveforms.
18. Construct Single slope detector for FM and trace the Output waveforms for different modulating amplitude and frequency.
19. Blocking Oscillator
20. Characteristics of Loud Speaker
21. Characteristics of Microphone

## FIFTH SEMESTER

### 5.2- MICROPROCESSOR AND INTERFACING

**UNIT-I: Memory Devices:** 06 Hrs  
Primary and secondary memories, semiconductor memories, RAM, ROM, PROM, EPROM and EEPROM and flash memory

**UNIT-II: Introduction to Microprocessor:** 08Hrs  
Block diagram of micro computer, features and architecture (block diagram-explanation of each block) of 8085 $\mu$ p, pin description of microprocessor 8085, Flags of 8085, Instruction format, generation of operation codes for different mnemonics.

**UNIT-III: Intel 8085 Instructions:** 10 Hrs  
Classification of instructions based on word size and function - Data transfer group of instructions, arithmetic group of instructions, increment & decrement group of instructions, logical group of instructions, branch group of instructions and machine control group of instructions

**UNIT-IV: Addressing modes, Interrupts and Timing Diagram:** 06 Hrs  
Addressing modes, interrupts in 8085, stack operations, subroutine, call and return operations, Timing diagrams-instruction cycle, fetch and execute operations, machine cycle.

**UNIT-V: Microprocessor Programming:** 08 Hrs  
Programs for data transfer and memory operations (direct & indirect addressing), addition and subtraction of two 8-bit & 16-bit numbers, 1's and 2's complements, Verification of truth tables of logic gates, multiplication of two 8-bit numbers, Division of 8-bit numbers, Finding of larger of two numbers, Display of smallest / largest number in a given array of numbers, sorting of numbers in descending / ascending order.

**UNIT-VI: I/O Instructions and Interfacing:** 10 Hrs  
I/O instructions and basic interfacing concepts, memory interfacing, input/output Interfacing, IC 8237, 8251, 8253, 8255, and 8259 (features, pin diagram, brief description of block diagram)

#### Text Books:

1. Microprocessor Architecture, Programming and Applications with 8085 Ramesh S. Gaonkar-Wiley Eastern Limited- IV Edition
2. Fundamentals of Microprocessor & Microcomputer, B. Ram-Danpat Rai Publications, V Edition, 2000
3. Introduction to Microprocessor Aditya P. Mathur-TIIM-III Edition.
4. Microprocessor Lab Manual- G. T. Swamy- Lakshmi Publications, 2006.

#### Reference Books:

1. Microprocessor and its Applications-R. Theagarajan, and S. Dhanasckaran
2. Microprocessor 8085 & Peripherals- A.P. Godse and D.A. Godse.

#### Semester-II: Practicals (Minimum of 8 Experiments to be performed)

1. Transfer of data in various registers.
2. Program to add & subtract two 8-bit numbers (with carry).
3. Program to add two 16-bit numbers (with carry).
4. Program to subtract two 16-bit numbers.
5. Program to multiply two 8-bit numbers.
6. Program to find the division of two 8-bit numbers.
7. Program to implement logical OR, AND and inversion of an 8 bit number
8. Program to implement logical XOR and XNOR of an 8 bit number.
9. Program to find the number of 1's & 2's compliment of a number
10. Program to find of larger of two 8 bit numbers.
11. Program to find the smallest number in a given array of numbers
12. Program to sort the given array of numbers in descending order
13. Program to find the largest number in a given array of numbers

## SIXTH SEMESTER

### 6.1-ADVANCED ELECTRONIC COMMUNICATION

**UNIT-I: Digital Communication System: 09 Hrs**

Block diagram, different modulation techniques: PAM, PWM, PPM, PCM and delta modulation Synchronous and asynchronous transmission. Probability of bit error in base band transmission, matched filter, optimal terminal filter, bit timing recovery, eye diagram.

**UNIT-II: Digital Carrier System: 05 Hrs**

ASK, FSK, PSK, DPSK and QPSK. Carrier recovery circuits.

**UNIT-III: Microwave Communication System: 07 Hrs**

Introduction, block diagram, Introduction to microwave devices. Klystron, Gunn Diode, microwave repeaters-basic principle and operation, diversity-basic principle and operation, protection switching Microwave radio station, applications (mention only)

**UNIT-IV: Radar Systems: 10 Hrs**

Basic principles Fundamentals, radar range equation, radar performance factors Pulsed radar systems: Basic, antenna, scanning and display methods of pulsed radar systems. Moving target indication (MTI) and radar beacons.

**UNIT-V: Multiple Access and Mobile Communication: 12 Hrs**

Introduction, block diagram, satellite orbits, satellite links, link stations, transponders, multiple access methods, FDMA, TDMA and CDMA (Qualitative analysis only).

Basic telephone, cellular phone operation, LAN, WAN, preliminary ideas of ARPANET, INTERNET

**UNIT-VI: Optical Fiber Communication System: 05 Hrs**

Block diagram, types, fiber materials, modes, acceptance angle and numerical aperture

**Text Books**

1. Electronic Communication - Roddy & Coolen, IV Edition, 2001 ( Unit-I)
2. Electronic Communication Systems - George Kennedy , McGraw Hill Company, V<sup>th</sup> Edition, 2012. (Unit-III)
3. Advance Electronic Communications Systems Wayne Tomasi -Prinice Hall, V Edition, 2001 ( Unit II , IV & V )
4. Introduction to Digital Communication -Bernard sklar, II Edition, 2009

**Reference Books :**

1. Radio Engineering Vol II - G K Mithal and Ravi Mithal, 14<sup>th</sup> Edition, 1987.
2. Introduction to Radar Systems - Skolink, TMH, 3<sup>rd</sup> Edition, 2001.
3. Fiber Optics Communication. -G. Kiser, 3<sup>rd</sup> Edition.



## SIXTH SEMESTER

### 6.2 – SIGNAL CONDITIONERS AND MICROCONTROLLERS

- UNIT-I: Signal Conditioners:** 06 Hrs  
Introduction to Signal conditioners: Precision rectifier, peak detectors, sample and hold circuits, phase sensitive detector, isolation amplifiers, lock-in-amplifier
- Unit-II: Data Acquisition System:** 10 Hrs  
Data acquisition system (DAS): introduction, multiplexer and de-multiplexers, D/A conversion- types of D/A conversion, binary weighted and R-2R ladder method of D/A conversion. A/D conversion- dual slope integrating type A/D converter and flash type converter (block diagram, explanation) Objectives of DAS.
- UNIT – III: 8051 Microcontroller:** 06 Hrs  
Microcontroller and embedded processors, overview of 8051 family (8051, 8052, 8031), 8051 architecture and pin configuration. The 8051 oscillator and clock
- UNIT – IV: Registers and Memories:** 08 Hrs  
Registers in 8051 Program counter and data pointer. A & B CPU registers, flags and program status word (PSW) register Internal memories, internal RAM, register banks, stack and stack pointer, special function registers (SFRs-mention only). Internal ROM, I/O Ports. Data types and directives
- UNIT – V: Instruction Set and Addressing Modes of 8051:** 10 Hrs  
Instruction Set Data transfer instructions, arithmetic instructions, logical instructions, JUMP, LOOP and CALL instructions, I/O Programming, I/O bit manipulation programming, addressing modes Programming using 8051(assembly language only) data transfer, 1s & 2s complement, addition of 8-bit and 16-bit no's, subtraction of 8 bit no's, multiplication (8 bit x 8 bit) and division (16-bit/ 8 bit), logical AND, OR, inversion, XOR and XNOR of 8-bit.
- UNIT VI: 8051 Timer/Counter Programming and Interfacing:** 08 Hrs  
Introduction to 8051 timer and counter and their control logic. Timer 0 and 1- TMOD and TCON control register Interfacing-ADC 0804, ADC 0808/0809, MC 1408 DAC (or DAC0808).
- Textbooks**
1. Operational Amplifier and Linear Integrated Circuits Ramakanth Gayekwad PHI 5<sup>th</sup> Edition

2. Electronics Devices and Circuit Theory – Robert Boylestad and Louis Nashelsky, 9<sup>th</sup> Edition
3. Digital Electronics and Applications – Malvino and Leach, 3<sup>rd</sup> Edition(UNIT-2)
4. The 8051 Microcontroller Architecture, Programming and Applications- K J Ayala, 3<sup>rd</sup> Edition
5. The 8051 Microcontroller and Embedded systems- M A Mazidi & J G Mazidi, 2<sup>nd</sup> Edition, 2000

#### Reference Books:

- 1 Programming and customizing the 8051 Microcontroller- Myke Predko, TMH
- 2 Microcontrollers, Theory and Applications – Ajay and Deshmikh, TMH, Edition, 2005.

#### Practical-1: (Minimum 8 experiments to be performed)

- 1 Precision Full-wave rectifier using Op-Amp
- 2 Study of PAM (Using Trainer Kit or Discrete Components)
- 3 Study of PWM (Using Trainer Kit or Discrete Components)
- 4 Study of PPM (Using Trainer Kit or Discrete Components)
- 5 Study of ASK (Using Trainer Kit or Discrete Components)
- 6 Study of FSK (Using Trainer Kit or Discrete Components)
- 7 Study of PSK (Using Trainer Kit or Discrete Components)
- 8 Multiplexer using IC 74150.
- 9 De multiplexer using IC 74154.
- 10 Binary weighted register D/A conversion
- 11 R-2R conversion D/A conversion.
- 12 1's & 2's compliments of 8-bit numbers using 8051
- 13 Addition and subtraction of two 8-bit numbers using 8051.
- 14 Addition of two 16-bit numbers using 8051
- 15 Program to find largest number among given series of hexadecimal numbers using 8051(8-bit).
- 16 Logical AND, OR and inversion of 8-bit No Using 8051
- 17 Logical XOR and XNOR of 8-bit No Using 8051
- 18 Multiplication of two 8-bit Numbers using 8051
- 19 Division of two 8-bit Numbers using 8051
- 20 Program to find smallest number among given series of hexadecimal numbers using 8051(8-bit).
- 21 Arrange the given hexadecimal numbers in ascending order using 8051.
- 22 Arrange the given hexadecimal numbers in descending order using 8051

#### Practical-2: Students have to construct and demonstrate a simple project.

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*"Learning gives creativity,  
creativity leads to thinking,  
thinking provides knowledge,  
Knowledge makes you great"*

*- A.P.J. Abdul Kalam*



*"Be the change you want to see in the world"*

*- Mahatma Gandhi*