



St Aloysius College (Autonomous)
Mangaluru

Re-accredited by NAAC “A++” Grade
Course structure and syllabus of
B.Sc.
ELECTRONICS

Under NEP Regulations, 2021
(2021-22 Batch Onwards)



Re-accredited by NAAC with 'A++' Grade with CGPA 3.67/4 (Cycle 4)

Recognised as Centre for Research Capacity Building under UGC-STRIDE Scheme

Recognised under DBT - BUILDER Scheme, Government of India

College with "STAR STATUS" Conferred by DBT, Government of India

Recognised by UGC as "College with Potential for Excellence"

Date: 17-08-2022

NOTIFICATION

Sub: Syllabus of **B.Sc. ELECTRONICS** under NEP Regulations, 2021.
(As per Mangalore University guidelines)

- Ref: 1. Decision of the Academic Council meeting held on 09-07-2022 vide
Agenda No: 14
2. Decision of the Academic Council meeting held on 02-09-2023 vide
Agenda No: 3
3. Office Notification dated 17-08-2022
4. Office Notification dated 26-09-2023

Pursuant to the above, the Syllabus of **B.Sc. ELECTRONICS** under NEP Regulations, 2021 which was approved by the Academic Council at its meeting held on 09-07-2022 & 02-09-2023 is hereby notified for implementation with effect from the academic year **2022-23**.


PRINCIPAL




REGISTRAR

To:

1. The Chairman/Dean/HOD.
2. The Registrar Office
3. Library

Sl. No.	Semester	Title of thePaper	Teaching Hours	Hour s /wee k		Examination PatternMax. Marks /Paper				Duration of Exam (hours)		Total Marks / paper	Theory Credits	Practical Credits
				Theory	Practical	Theory		Practical		Theory	Practical			
						Exam	IA	Exam	IA					
1	I	ELE-CT1: G 504 DC1.1 FUNDAMENTALS OF ANALOG AND DIGITAL	60	4	4	60	40	25	25	2.5	4	100+50	4	2
		ELE-OE 1.1 Basics of Electronic circuits and PCB Design	36	2	1	40	10	-	-	2	-	50	2	1
2	II	ELE-CT2: G 504 DC1.2 Discrete amplifiers, Operational amplifiers, Combinational circuits and Sequential Circuits	60	4	4	60	40	25	25	2.5	4	100+50	4	2
		ELE-OE 2.1: Renewable Energy and Energy harvesting	36	2	1	40	10	-	-	2*	-	50	2	1
3	III	ELE-CT3: G 504 DC1.3 Power control, Oscillators, wave shaping circuits, Principles of Radio Communication and Digital circuits	60	4	4	60	40	25	25	2.5	4	100+50	4	2
		ELE-OE3.1: Domestic Equipment Maintenance	36	2	1	40	10	--		2	---	50	2	1
4	IV	ELE-CT4: G 504 DC1.4 Electronic Communications and Digital Computers	60	4	4	60	40	25	25	2.5	4	100+50	4	2
5	V	ELECTRONIC COMMUNICATION SYSTEMS	60	4	4	60	40	2	2	2.5	4	100+50	4	2
		8051 MICROCONTROLLER	60	4	4	60	40	2	2	2.5	4	100+50	4	2

Semester	Code	Paper Title
I	G 504DC1.1	Fundamentals of analog and digital
	G 504DC2.1P	Practicals - I
	G 504OE1.1	Basics of Electronic circuits and PCB design
II	G 504DC1.2	Discrete amplifiers, Operational amplifiers, Combinational circuits and Sequential Circuits
	G 504DC2.2P	Practicals - II
	G 504OE1.2	Renewable Energy and Energy harvesting
III	G 504DC1.3	Power control , Oscillators, waves shaping circuits, Principles of Radio Communication and Digital circuits
	G 504DC2.3P	Practicals - III
	G 504OE1.3	ELE-OE3.1: Domestic Equipment Maintenance
IV	G 504DC1.4	Electronic Communications and Digital Computers
	G 504DC2.4P	Practicals - IV
V	G 504DC1.5	ELECTRONIC COMMUNICATION SYSTEMS
	G 504DC2.5P	Practicals - V
	G 504DC16.4	8051 MICROCONTROLLER
	G 504DC2.4P	Practicals - VI

Preamble

This model curriculum content for B.Sc (Honours) as per NEP-2020, is intended to enable the graduates to respond to the current needs of the industry and equip them with skills relevant for national and global standards. The framework encourages innovation in teaching-learning process and appropriate assessment of student learning levels.

Introduction

B.Sc. (Honours) is a program which needs to develop a specialized skill set among the graduates to meet the needs of industries.

The curriculum is designed to help learners to analyze, appreciate, understand and critically engage with learning of the subject and also to provide better learning experience. Apart from imparting disciplinary knowledge, the curriculum is aimed to equip the graduates with competencies like problem solving, Applying the concepts and analytical reasoning which provide them high professional competence.

The Department encourages its concerned faculty to make suitable pedagogical innovations, in addition to teaching/learning processes suggested in the model curriculum, so that the Course/Programme learning outcomes are achieved.

Significance

In recent years, has made unprecedented growth in terms of new technologies, new ideas and principles. The research organizations and industries that work in this frontier area are in need of highly skilled and scientifically oriented manpower. This manpower can be available only with flexible, adaptive and progressive training programs and a cohesive interaction among the institutions, universities, and industries. The key areas of study within subject area of comprise: Semiconductor Devices, analog and digital circuit design, microprocessors & Microcontroller systems, Electronic Communications, Medical and Equipment, computer coding/programming in high level languages etc. and also modern applied fields such as embedded systems, data communication, robotics, VLSI, control systems, etc.

Eligibility criteria

Students who have qualified PUC Science of Karnataka Pre University Education Board or equivalent 10+2, ITI or Diploma in any stream are eligible for opting to B.Sc. / B.Sc. (Hons.) UG program in .

Program Objectives

The overall Objectives of the B.Sc. (Honours) program are to:

- Provide students with learning experiences that develop broad knowledge and understanding of key concepts of and equip students with advanced scientific / technological capabilities for analyzing and tackling the issues and problems in the field of.
- Develop ability in students to apply knowledge and skills they have acquired to solve specific theoretical and applied problems in by providing hands on experience.
- Develop abilities in students to design and develop innovative solutions for benefits of society.
- Provide students with skills that enable them to get employment in industries or pursue Higher studies or research assignments or turn as entrepreneurs.

Program outcome

- Ability to apply knowledge of Logic thinking and basic science for solving related problems
- Ability to perform experiments, as well as to analyse and interpret data.
- Ability to design and manage electronic systems or processes that conforms to a given specification within ethical and economic constraints.
- Ability to identify, formulate, solve and analyze the problems in various subdisciplines of Science.
- Ability to use Modern Tools / Techniques.

B.Sc. / B.Sc. (Hons.) as per NEP (2021-22 and onwards)

SUBJECT:

***Questions from practicals have to be included in theory examinations of
Open Electives (Since is a practical oriented subject)**

Basis for Awarding Theory Internal Assessment Marks:

Sl No	Particulars	IA Marks
1	Minimum of Two internal Tests	20
2	Assignments/Seminar/Case Study /Project work / Reports on - visits to industries/exhibitions/science centres/active participation in competitions, etc.	20
TOTAL Theory IA Marks		40

Basis for Awarding Practical Internal Assessment Marks:

Sl No	Particulars	IA Marks
1	PracticalTest	05
2	Record writing	05
3	Active participation in practical classes	15
TOTAL Practical IA Marks		25

SEMESTER – I
G 504 DC1.1 FUNDAMENTALS OF ANALOG AND DIGITAL

(Credits: Theory – 04, Practical – 02)

Total Teaching hours: 60

Course Objectives

Upon completing this course, the student will be able to

1. Understand fundamentals of network analysis.
2. Be familiar with the basic operation of Electronic devices and circuits which are the building blocks of all Electronic circuits and gadgets.
3. Principles of operation of transistors and their applications
4. Learn the number systems and basics of Digital
5. Boolean algebra, Boolean postulates and simplification of Boolean functions
6. understand Logic gates and their applications

Course Outcomes:

At the end of this Course students will be able to

CO1: Study and analyze basic networks using network theorems in systematic manner.

CO2: Build simple electronic circuits used in various applications.

Co3: Describe the behaviour of basic semiconductor devices

CO4: Reproduce the I-V characteristics of diode/BJT devices

CO5: Explain the behaviour, characteristics and applications of Varactor diode, LED, Zener diodes.

CO6: apply standard device models to explain/calculate critical internal parameters of semiconductor devices.

CO7: Understand and represent numbers in powers of base and converting one from the other, carry out simple arithmetic operations.

CO8: Understand the basic knowledge of Digital system building blocks, effectively can construct simple digital designs with the knowledge of Boolean algebra.

UNIT-I

Chapter1: Electronic Components: Classification: Passive and active, linear and nonlinear, unilateral and bilateral elements, Concept of Voltage and Current Sources, Source transformation principle, electric energy and power.

Resistors: Fixed and variable resistors, Constructional features of carbon composition, metal film and wire wound resistors. Variable resistors: Potentiometer, rheostat and preset - use of potentiometer as a variable resistor and potential divider.

Capacitors: Fixed- various types of fixed capacitors, polar and non polar capacitors-constructional features-electrolytic and non-electrolytic capacitors. Variable capacitors-trimmers and ganged capacitors.

Inductors- Fixed inductors, classification based on the frequency operation.

Transformers-Principles of operation, types, mention of applications.

5hrs

Chaptr2: Network Theorems: Kirchhoff's laws, Mesh analysis, superposition theorem, maximum power transfer theorem, Thevenin's theorem, Norton's Theorem – (2 mesh problems involving maximum of two voltage sources). H-parameters of a two port network. (Illustrative problems to be worked out wherever required.

5hrs

Chaptr3: i. DC and AC Circuits: Transient response of RC, RL and LCR circuits.

AC Circuits: Phasors, AC response of R, L, C, RC, RL, and RLC circuits. Series resonant circuit - Bandwidth, quality factor. Parallel resonant circuit, RC integrator and RC differentiator. RC Filters-Low pass, High pass and Band pass filters. (All ac response should be studied using 'j' operator) **5hrs**

UNIT-II

Chapter1:PN junction diode: Ideal and practical diodes, Formation of Depletion Layer, Diode Equation and I-V characteristics-cut-in voltage, static and dynamic resistance, Reverse saturation current, reverse breakdown voltage. Reverse breakdown- Zener and avalanche breakdown. **5hrs**

Chapter2: Special semiconductor diodes: Zener diode, Varactor diode, Light emitting diode and photo diode- construction, circuit symbol, characteristics, working and applications of each diode.

Chapter3: Rectifiers-Half wave and Full wave (center tap and bridge) rectifiers, expressions for output voltage, output current, frequency, PIV, ripple factor and efficiency (mention only), Shunt capacitor and series inductor filter. **5hrs**

UNIT-III

Chapter1: Bipolar junction Transistors: Introduction, structure and working, unbiased transistor-formation of depletion regions, basic biasing schemes. Transistor configurations, Transistor action and its importance, current gains, relationship between current gains, Characteristics of a transistor, Operating point, transistor as a switch. **8hrs**

Field Effect Transistors (FET): JFET –Construction, Operation. FET Characteristics- drain and transfer. FET parameters, Relationship between FET parameters, Small signal ac model of FET. Comparison between JFET and BJT.**MOSFETs**- Depletion and Enhancement type-basic structure, working, drain and transfer characteristics, Advantages of N-channel MOSFETs over p-channel, handling precautions of MOSFETs **7hrs**

UNIT IV

15hrs

Chapter1: Number System: Introduction to Digital, digital signals, need for representing information in digital form. Decimal, Binary, Octal and Hexadecimal number systems. Conversions of numbers from one base to the other. Representation of signed and unsigned numbers. Binary arithmetics. Representation of negative numbers in binary number system. Subtraction of binary numbers by 1's and 2's complement method. **Binary codes:** BCD codes- weighted and non weighted codes. Self complementing codes-8421, 2421, Excess-3, Gray code, cyclic codes. Alphanumeric codes- ASCII and EBCDIC. **5hrs**

Chapter2: Boolean algebra: Postulates and Theorems of Boolean algebra. Duality principle in Boolean algebra. De Morgan's theorems-statement and proof. Boolean functions-simplification of Boolean

functions using postulates. Logic gates. Universal gates - NOR and NAND gates. Realisation of other gates using only NAND gates. **5hrs**

Chapter3: Standard Forms Of Boolean Functions – Standard SOP and POS, realization of Boolean functions using NAND and NOR gates only. Karnaugh map- Simplification of Boolean functions using K-map (up to 4 variables), don't Care conditions. **5hrs**

Reference Books:

1. Robert L Boylestad, "Introductory circuit analysis", 5th edition., Universal Book 2003.
2. R.S.Sedha, "A Text book of Applied ", 7th edition., S. Chand and Company Ltd. 2011
3. A.P. Malvino, "Principles of ", 7th edition .TMH, 2011.
4. Electronic devices and circuit theory by Boylestad, Robert Nashelsky
5. David A. Bell " Electronic Devices and Circuits", 5th Edition, Oxford Uni. Press, 2015
6. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia (1994)
7. Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw
8. Digital Systems: Principles & Applications, R.J. Tocci, N.S. Widmer, 2001, PHI Learning.

Pattern of Question Paper:

Time: 2.5hrs. Max. Marks 60

Section-A: Short answer Type Questions

- | | | |
|---------------------------------|-----|--------|
| 1. Multiple choice questions | 6/6 | 1x6 =6 |
| 2. Very short answer questions. | 6/8 | 1x6 =6 |
| 3. Short answer questions | 4/6 | 2x6=12 |

Section B: Analytical/Problem solving/Application type questions 4/6 4x4=16

Section C: Descriptive/Analytical/Problem solving questions 2/4 10x2=20
(Maximum of two sub questions)

- Note
- i) All the sections should cover equal questions from each unit
 - ii) Maximum of 30% problems can be asked

G 504 DC2.1P: PRACTICALS – I

SECTION A. Demonstration Experiments. (ANY SIX EXPERIMENTS TO BE CONDUCTED.)

1. Understanding of Colour coding of resistors and identification of various types of resistors.
2. Understanding of coding various types of capacitors and identification of various types of capacitors.
3. Understanding and using multimeter for device testing.
4. Familiarisation and testing of different types of transistors.

5. Understanding soldering technique and hands on experience on soldering.
6. Understanding CRO and function generator and measurement of voltage and frequency of the signals using CRO
7. Verification of truth tables of NOT, AND and OR gates using TTL ICs.
8. Verification of truth tables of NAND and NOR gates using TTL ICs.

SECTION B: List of Experiments. Any Eight Experiments to be conducted

1. Semi-conductor (RECTIFIER) Diode Characteristics.
2. Zener Diode Characteristics
3. Characteristics of LED-Comparison of cut-in voltages for different colours (3 diff colours).
4. Transistor Characteristics.
5. JFET Characteristics.
6. Study of Bridge rectifier using diodes.
7. Investigation of capacitance and Inductance in ac circuits.
8. Realisation of AND, OR, NOT, NOR, XOR, XNOR using only NAND gates
9. DC load line of transistor switch.
10. DTL AND, OR gates and NOT gate using transistor.

Scheme of valuation:

Part A: Identification of circuit Elements and testing Exercise	06 (split up shown)
Part B : One Experiment of Three Hrs Duration	13(split up shown)
Record	06
Internal Assessment	25

Total	50

Scheme of valuation

Part A: Based on SECTION-A

1. Writing observations and diagrams required for answering the given question -2 marks
2. Conducting and demonstrating the measurement/testing and facing viva -4marks

Total 06

PartB:

Formula/Truth table/specimen graph -----	2
Labelled Circuit diagram/base diagram of key device/ labelled pin diagram	2
Tabular column/Design calculations/selection of components	2
Circuit layout and connections-	1
Obtaining response, recording readings and number of trials-	4
Graph and calculations-	1
Result/accuracy-	1

Total: 13

OPEN ELECTIVE1: G 504 OE1.1

BASICS OF ELECTRONIC CIRCUITS AND PCB DESIGN

Total Teaching hours: 36

Unit-1

12 Hours

Generation of and distribution of electricity: Mention of hydro electric generator, diesel generator, thermal generator, wind power, solar, ocean waves. Generation of DC power – Mention of batteries. Single phase, Two phase and Three phase. Transformers. Power transmission and distribution. Domestic electrical wiring – connection from AC line to the meter, sockets, mention of phase neutral and the need of earthing. Mention of electric shock and safety. Mention of power type (ac or dc) and current ratings for home appliances. Mention of tester. Electric motor working principle.

Unit – 2

12 Hours

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

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

Unit-3

Laminates and photo printing: Manufacture of copper clad laminates – Properties of laminates – Types of Laminates – Manual cleaning process – Basic printing process for double sided PCB's – Photo resists – wet film resists – Coating process for wet film resists – Exposure and further process for wet film resists – Dry film resists.

ETCHING AND SOLDERING: Introduction – Etching machine – Etchant system. Soldering: Principles of Solder connection – Solder joints – Solder alloys – Soldering fluxes. Soldering Tools: Soldering, De-soldering tools and Techniques – Manual Soldering – Solder mask – Safety, health and medical aspects in Soldering practice.

Demonstration Experiments:

1. Understanding voltage, current, frequency etc and use of basic devices and meters used for testing purpose.
2. Types of motors and transformers used in household appliances
3. SMPS: Block diagram and working
4. Inverter-Block diagram, understanding various stages and measurement of voltages at various points
5. PCB design and fabrication
6. PCB testing, soldering and de-soldering

Pattern of Question Paper:**Time: 2.5hrs. Max. Marks 60****Section-A:1. Short answer Type Questions 2marks each 5/7 5X2=10****Section B: long answer type questions 4marks each 5/6 5X4=20****Section C: Descriptive/Analytical/Problem solving questions 10marks each 3/5 3x10=30
(Maximum of two sub questions)****• Reference books:**

1. Electrical Circuits, K.A. Smith and R.E. Alley, 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 ELBSEdition.
5. Basic electrical engineering - V K Mehta and Rohit Mehta, S Chand and Company.
6. Walter C. Bosshart "PCB Design and Technology" Tata McGraw Hill, Publications, Delhi. 1983.
7. Clyde F. Coombs "Printed circuits Handbook" III Edition McGrawhill Kraig Mitzner, "Complete PCB Design Using OrCAD Capture and Layout," Elsevier, Amsterdam,
8. Walter C Bosshart, "Printed Circuit Board Design and Technology", 1st ed., McGraw Hill Education

II SEMESTER**G 504DC1.2****DISCRETE AMPLIFIERS, OPERATIONAL AMPLIFIERS, COMBINATIONAL CIRCUITS
AND SEQUENTIAL CIRCUITS****(Credits: Theory – 04, Practical – 02) Total Teaching hours: 60**

Course Objectives

Upon completing this course, the student will become familiar with various working principles of widely used electronic devices, linear and digital ICs which help the students to build small projects and also be able to answer some basic questions that appear in competitive examinations.

Course Outcomes:

At the end of this course, students will be able to

CO1: design suitable biasing circuit to a transistor for specific application.

CO2: explain performance parameters of any amplifier

CO3: understand and appreciate the Fabrication of ICs

CO4: understand the Fundamentals of Operational Amplifiers.

CO5: interpret the experimental data for better understanding the ICs.

CO6: understand linear and nonlinear applications of operational amplifiers.

CO7: Analyze combinatorial and sequential circuits

CO8: understands and interprets parameters of various Logic families

UNIT-I

Chapter1: Transistor biasing circuits: Stability of Q –point, stability factor, factors affecting Q-point, Thermal runaway. Transistor biasing circuits-Fixed bias, fixed bias with emitter resistor, collector feedback bias, emitter bias and Universal bias. Equation for dc load line, stability of Q-point & design of each biasing circuits to be discussed. **5hrs**

Chapter2: Small Signal Amplifiers: Transistor models: h-parameter model, Ebers' Moll model.

Ac load line, coupling and bypass capacitors, CE amplifier-working, Graphical explanation, ac analysis using h parameter model, Expressions for gain, input and output impedance, ac model, frequency response of CE amplifier, Design of CE amplifier, CC and CB amplifiers (qualitative). Application of cc amplifiers in impedance matching, Relative merits of CE, CB and CC amplifiers, Mention of applications CB, CC and CE amplifiers. FET amplifiers - CS amplifier – expression for gain, input and output impedances, frequency response, CD and CG amplifiers (qualitative) **8hrs**

Chapter3: Multistage Amplifiers: Need for cascading of amplifiers, coupling schemes, Comparison of different coupling schemes. Two stage CE amplifiers- direct, RC and transformer coupling, Darlington pair, comparison of Darlington pair and cc amplifier. **2HRS**

UNIT-II

Chapter1: Feedback: Feedback in amplifiers: Concept of feedback, positive feedback and negative feedback, general theory of feedback –expression for the gain of an amplifier with feedback, effects of negative feedback (qualitative). Four types of feedback connection-characteristics of each case (block diagram only) **3hrs**

Chapter2: IC fabrication techniques: IC Fabrication Techniques: Monolithic and hybrid Ics, scales of integration. Advantages of ICs. Crystalline and epitaxial growth. Crystalline growth from melted material. Floating Zone Technique. Epitaxial Growth. Metallic films deposition. Basic Principles of Diffusion and ions implantation. Diffusion related processes. Implantation related processes. Lithography techniques. Optical Lithography. Electron and ion beams and X-ray lithography. Chemical etching. Passive components

integration-resistor, capacitor and inductor. Integration of active devices-diode, transistor, NMOS and CMOS. **4hrs**

Chapter2: Operational Amplifiers: Transistor differential amplifiers- Four configurations of differential amplifier using transistors, Dual input balanced output BJT differential amplifier (qualitative). Concept of common mode gain, differential gain and CMRR. Block diagram of OPAMP, characteristics of an ideal opamp Characteristics of practical OPAMP(IC 741)- Input Offset Voltage , Input Offset Current, Bias current, Input and Output resistance, Slew Rate, CMRR, PSRR and frequency response. Amplifiers in open loop configuration-inverting, non inverting and differential amplifiers, limitations of using op-amp in open loop configuration. **8hrs**

UNIT-III

Chapter1: Amplifiers using op-amp: Voltage series feedback amplifier - Derivation of expression for Closed Loop Voltage gain, input and Output Resistance, Voltage follower. Voltage Shunt Feedback Amplifier - Derivation of expression for closed loop voltage gain, expression for Input and Output Resistance. Current to voltage converter, OPAMP inverter. Differential Amplifier - Derivation of expression for gain. **4hrs**

Chapter2: General linear applications of Op-amp: Summing amplifier – using inverting and non-inverting configurations-derivation of expression for output voltage, summing amplifier as adder and averager, Op-amp subtractor, inverter, Integrator and Differentiator- Derivation of expression for output voltage, frequency response, practical circuits. Comparators: Characteristics, OPAMP as comparator, Applications- voltage level detector, zero crossing detector, Inverting and non inverting Schmitt triggers- expression for UTP , LTP and hysteresis voltage **7hrs**

Chapter3:Filters using op-amp: Types, advantages over passive filters. Mention of commonly used active filters- Butter worth, Chebyshev and Cauer filters. First order low pass and high pass Butter worth filters-derivation of expression for gain, operation and design. **4hrs**

UNIT-IV

CHAPTER1: Combinational Logic Circuit: Design procedure with examples –Half Adder, Full Adder, Half subtractor, Four bit parallel binary adder, Parity Bit Generator, 2 bit magnitude comparator, multiplexers – realization of Boolean functions using 4 to 1 MUX, De-multiplexers -1 to 4 DEMUX, Code converters, decoders - 2 to 4 line decoders, encoders. **6hrs**

CHAPTER2:Sequential circuits: Flip Flops – RS Flip Flop – basic type (using NAND gates), pulse and Edge Triggering, clocked RS Flip Flops with timing diagram. D Flip Flop – truth table, timing diagram. JK Flip Flop – truth table, timing diagram, racing in flip-flops, Master slave JK flip flop, T Flip Flops. **6hrs**

CHAPTER3:Logic Families: Pulse characteristics, Logic Families-classification of digital ICs. Characteristics of logic families, circuit description of TTL NAND gate with totem pole and open collector. TTL IC terminology. CMOS NAND, comparison of TTL and CMOS families **3hrs**

Reference Books:

1. Electronic devices and circuit theory by Boylestad, Robert Nashelsky
2. Electronic Devices Conventional Current Version by Thomas L. Floyd
3. David A. Bell “Electronic Devices and Circuits”, 5th Edition, Oxford Uni. Press, 2015

4. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edn, 2000, Prentice Hall
5. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.
6. R.S.Sedha, "A Text book of Applied ", 7th edition., S.Chand and Company Ltd. 2011
7. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia (1994)
8. Digital Principles and Applications, A.P. Malvino, D.P. Leach and Saha, 7th Ed., 2011, Tata McGraw
9. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
10. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
11. Digital Systems: Principles & Applications, R.J. Tocci, N.S. Widmer, 2001, PHI Learning.
12. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)
13. Digital , S.K. Mandal, 2010, 1st edition, McGraw Hill

Pattern of Question Paper:

Time: 3hrs. Max. Marks 100

Section-A: Short answer Type Questions

- | | | |
|-------------------------------------|-------|----------|
| 1. Multiple choice questions | 12/12 | 1x12 =12 |
| 2. One sentence answer questions. | 10/12 | 1x10 =10 |
| 3. Answer in two or three sentences | 10/12 | 1x10=20 |

Section B: Analytical/Problem solving/Application type questions 7/10 4x7=28

Section C: Descriptive/Analytical/Problem solving questions 3/4 10x3=30
(Maximum of two sub questions)

- Note i) All the sections should cover equal questions from each unit
 ii) Maximum of 20% problems can be asked

G 504 DC2.2P PART A (Any 8)

1. Transistor Biasing circuits -fixed bias, emitter feedback bias and universal bias.
2. Study of CE amplifier.
3. Study of CC amplifier.
4. Characteristics operational amplifier.
5. Study of inverting, non-inverting and differential amplifiers using Op-amp.
6. Low pass filters and high pass filters using op-amp.
7. Study of differentiator and integrator using op-amp.
8. Study of Comparator and Schmitt trigger using op-amp

9. Arithmetic circuits- (i) half adder (ii) half subtractor and (iii) full adder.
10. Realization of Boolean functions using multiplexers.

Part B: Guided Mini project:

Project Title “Design, fabrication and testing of a Regulated power supply (RPS)”. The PCB required for the given project should be fabricated in the lab. Once the RPS is fabricated, its performance should be analysed by studying load regulation and source regulation. A project report duly signed by the Batch in charge staff and Head of the Depart is required to be produced during the End semester Practical Examination for Evaluation.

Scheme of valuation

Practical II – G 504.2P

Part A:	One Experiment of Three Hrs Duration	13(split up shown)
Part B:	Presentation of Mini project	06 (split up shown)
	Record	06
	Internal Assessment	25

	Total	50

Part A: Based on SECTION-A

Formula/Truth table/specimen graph -----	2
Labelled Circuit diagram/base diagram of key device/ labelled pin diagram	2
Tabular column/Design calculations/selection of components	2
Circuit layout and connections-	1
Obtaining response, recording readings and number of trials-	4
Graph and calculations-	1
Result/accuracy-	1
	Total: 13

Part B: Valuation of mini Project

Presentation	-2marks
Viva	-2marks
Project Report(Dissertation)	-2marks
	Total: 06

ELE-OE1.2: RENEWABLE ENERGY AND ENERGY HARVESTING
G 504 OE1.2

(Credits: Theory – 02, Demonstration Lab – 01)

Total Teaching hours: 36

Unit-1

12Hours

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

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

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

Unit – 2

12 Hours

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics, and Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, OceanBio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies.

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources. ***Piezoelectric Energy harvesting:*** Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power. ***Electromagnetic Energy Harvesting:*** Linear generators, physics

mathematical models, recent applications,; Carbon captured technologies, cell, batteries, power consumption, Environmental issues and Renewable sources of energy, sustainability.

Demonstration Experiments: 12 Hours

1. Demonstration of training modules on solar energy, wind energy etc.
2. Conversion of vibration to voltage using piezoelectric voltages
3. Conversion of thermal energy into voltage using thermoelectric module.

Pattern of Question Paper:

Time: 2.5hrs. Max. Marks 60

Section-A:1. Short answer Type Questions 2marks each 5/7 5X2=10

Section B: long answer type questions

Section C: Descriptive/Analytical/Problem solving questions 10marks each 3/5 3x10=30
(Maximum of two sub questions)

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, Oxford University Press.
4. Renewable Energy Sources and Emerging Technologies, Kothari et.al., PHI Learning.
5. Solar Energy: Resource Assessment Handbook, P Jayakumar.
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. http://en.wikipedia.org/wiki/Renewable_energy
8. Non-conventional energy sources, B.H. Khan, McGraw Hill.
9. Solar energy, Suhas P Sukhative, Tata McGraw - Hill Publishing Company Ltd.
10. Renewable Energy, Power for a sustainable future, Godfrey Boyle, Oxford University Press.
11. Renewable Energy Sources and Emerging Technologies, Kothari et.al., PHI Learning.
12. Solar Energy: Resource Assessment Handbook, P Jayakumar.
13. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
14. http://en.wikipedia.org/wiki/Renewable_energy

SEMESTER - III

POWER CONTROL, OSCILLATORS, WAVE SHAPING CIRCUITS,

PRINCIPLES OF RADIO COMMUNICATION AND DIGITAL CIRCUITS

Course Objectives:

1. To understand the structure of various power control devices and realize their applications

2. To understand the principles of oscillators and learn different Oscillators
3. To learn the clippers and clampers using diodes and op-amps.
4. To understand the communication system, Principle and working communication system, means and medium of communication.
5. To understand the Principle and working of different modulation techniques.
6. To understand characteristics of computer memory and learn the different types of memories.
7. To learn the circuits of various memory cells.

➤ **Course Outcomes (COs):**

After the successful completion of the course, the student will be able to:

CO1: Know the basic concept of breakdown devices.

CO2: Understand the principles Oscillators.

CO3: Analyse any wave shaping circuit.

CO4: Understand the working of various types of Computer memories.

CO5: Analyse the working of various memory organization.

CO6: Understand the principles of Radio Communications.

CO7: Familiar with “AM” and “FM” techniques.

CO8: Understand Registers and Counters

UNIT-I

Chapter1: Breakdown devices:

Diac: Construction, equivalent circuit, operation, V-I characteristics, mention of applications

Triac: Construction, equivalent circuit, operation, V-I characteristics, mention of applications, power control using triac, phase control circuit using triac- single and double time constant, comparison of SCR and Triac. **5HRS**

CHAPTER 2:

Power amplifiers: Classification on the basis of placement of Q point- Graphical representation, Single ended power amplifiers-class A resistive load and inductive load - efficiency. Class B push pull amplifier – efficiency. Mention of typical applications. Audio amplifier using IC. **5hrs**

CHAPTER 3:

Voltage regulators: Block diagram of regulated power supply, Line and Load regulation, Zener diode as voltage regulator – circuit diagram, load and line regulation, disadvantages. Fixed and Variable IC Voltage Regulators (78xx, 79xx, LM317).**5hrs**

UNIT-II

Chapter1:

Oscillators: Classification, Principles of oscillators-Barkhausen criterion. **1hr**

RC oscillators-phase shift oscillator and Wein bridge oscillator using op-amp.

LC Oscillators: Principles of generation of oscillations in a tank circuit. Hartley and Colpitt’ s oscillators using op-amp. Square wave, ramp and triangular waveform generators using op-amp. Crystals as source of oscillations and crystal oscillator **6HRS**

IC 555-internal structure, working. Astable and Monostable multivibrators–working, waveforms mention of expression for frequency/pulse width **3HRS**

Chapter2: Instrumentation Amplifier: Expression for output voltage, application as temperature indicator, temperature controller. Signal converters-digital to analog and analog to digital converters **2hrs**

CHAPTER 3: Wave shaping circuits: Clippers and clampers using diodes and Voltage Multipliers.

Voltage limiters- one side and two side limiting using op-amp.**3HRS**

UNIT III

CHAPTER 1: Amplitude Modulation: Need for modulation. Amplitude modulation – Expressions for AM wave, Modulation index, bandwidth, frequency spectrum, power relations, Schemes of AM, Modulation circuits –Collector modulation. Balanced modulator, AM transmitter (Block diagram). **6HRS**

CHAPTER 2: Frequency modulation: Expression for FM wave, reactance modulator-varactor diode and FET. Pre – emphasis and de – emphasis (circuits), FM transmitter (block diagram) with AFC. Comparison of AM and FM. phase modulation (Qualitative). **4HRS**

CHAPTER 3: Antennas: Introduction – basic action of a dipole antenna - Calculation of electric field intensity at a distance 'r' from a transmitting antenna, total power radiated, radiation resistance, Aperture of an antenna, Bandwidth, Beamwidth, Directivity, Directive gain, efficiency. Resonant antenna, folded dipole, characteristic impedance, parasitic elements-directors and reflectors, Yagi-Uda antenna, parabolic reflector. **5HRS**

UNIT IV

CHAPTER 1: Registers: Serial load and Parallel load shift registers using D -FF. **2hrs**

CHAPTER 2: Counters: Synchronous and Asynchronous counters, mod-16 and mod10 (decade) asynchronous counter using T flip flops , mod-16 and mod10 (decade) synchronous counter using T flip flops. Design of synchronous counters using JK flip flops. **5Hrs**

CHAPTER 3: Memory: Characteristics of memory. Semiconductor memories – RAM - a bipolar memory cell - Read/Write operation. Dynamic MOS storage Cell and Static MOS cell - Read/Write operation in a Dynamic MOS cell and static memory cell. Read only memory types – ROM, EPROM, and EEPROM. 4×4 bit diode ROM – Read operation. Bulk storage devices –Hard disk and optical disks. Flash memory. **8hrs**

Reference Books:

1. Electronic Communication - George Kennedy – 3rd edition – TMH edition
2. Satellite Communication – Dr D C Agarwal – Khanna Publishers
3. Electronic Communication – Dennis Roddy& John Coolen – 4th edition – PHI.
4. Electronic Communication – Miller, 6th edition – PHI.
5. Digital systems, principles and applications – Ronald J Tocci, Neal S Widmer, Printice Hall of India, New Delhi
6. An Introduction to Digital Computer Fundamentals – Rajaraman & Radhakrishnan – 3rd edition – PHI publications
7. Digital Design – Thomas L Floyd – 8th edition – Pearson Education.
8. Electronic Communication, Modulation and Transmission – Robert J Schoenbeck – Universal Book Stall
9. Wireless communication Technology – Roy Blake – Thomson & Blar

PRACTICALS

SECTION-A (Any 6)

1. Square wave generator

2. Triangular wave generator
3. Study of zener diode regulator
4. Verification of characteristics table of DFF
5. Verification of characteristics table of JKFF
6. Two bit serial shift register using DFF
7. Two bit serial shift register using DFF

SECTION-B (Any 8)

1. Series transistor Regulators.
2. Study of adjustable voltage regulator using IC.
3. Study of power amplifier using IC
4. Band pass and band stop filters using op-amp.
5. Amplitude modulation.
6. Study of IF amplifier.
7. Clippers and clampers.
8. Mod-16 ripple counter using JKFF.
9. 4-bit serial shift register using DFF
10. Study of Universal shift register.

Scheme of valuation:

Part A: One Experiment of one Hr Duration	06 (split up shown)
Part B : One Experiment of Three Hrs Duration	13split up shown)
Record	06
Internal Assessment	25

Total	50

Part A:

Formula/Truth table/specimen graph -----	1
Labelled Circuit diagram/base diagram of key device/ labelled pin diagram	1
Tabular column/Design calculations/selection of components	
/circuit connections	1
Obtaining response, recording readings and number of trials-	1
Graph and calculations-	1
Result/accuracy-	1
Total:	06

Part B: Based on SECTION-B

Formula/Truth table/specimen graph -----	2
Labelled Circuit diagram/base diagram of key device/ labelled pin diagram	2
Tabular column/Design calculations/selection of components	2
Circuit layout and connections-	1
Obtaining response, recording readings and number of trials-	4
Graph and calculations-	1
Result/accuracy-	1
Total:	13

ELE-OE3.1: DOMESTIC EQUIPMENT MAINTENANCE**(Credits: Theory – 02, Demonstration Lab– 01)****Total Teaching hours: 36****Unit-1**

Geyser: Construction and working, parts and manufacturing process, types. Common faults and their troubleshooting: Dripping geyser overflow, overheating, steam or hot water escaping from overflow, water leaking through the ceiling, no hot water, water not hot enough, poor hot water pressure. Induction cooker: Construction and working, parts and manufacturing process, types.

Common faults and their troubleshooting: Cooker fuse blown, cooker buttons not working, cooktop shuts off while cooking, food not get cooked or heated properly, overheating and uneven heating, display keep flashing, weird noises–crackling, fan noise, humming sound, clicking.

Microwave Oven: Working, raw material and manufacturing process, types, Common faults and their troubleshooting: Microwave does not heat, runs then stops, buttons do not work, plate do not spin, bulb does not turn ON during operation, sparking inside, shuts OFF after few seconds

15 Hours**Unit – II**

Refrigerator: Working, raw material and manufacturing process, electrical wiring diagram, types of refrigerator. Common faults and their troubleshooting: fridge not cooling, fridge not defrosting, leaking water, freezing food light not working, freezer is cooled but fridge stays warm, dead refrigerator, not enough cooling, keeps running, leakage, makes noise. Replacement procedure for: seal (gasket), evaporator fan motor, PTC relay, thermostat, compressor, bulb.

Air Conditioner: Working, raw material and manufacturing process, electrical wiring diagram, types. Common Faults and their troubleshooting: Faults in following parts of AC:

Filter, thermostat, refrigerant leaks, breakers, capacitors, compressor, evaporator coils, condenser coils, warm contactor. General faults :AC unit has an odour, shuts ON and OFF repeatedly, does not blow cold air, repeatedly tripping a circuit breaker, indoor unit is leaking water inside the room, outdoor unit is making an unusually loud sound, room is not getting cold enough, AC not turning ON. **15Hrs**

Demonstration Experiments:

15 Hours

1. Working of Air Conditioner
2. Working of Refrigerator
3. Working of Geyser
4. Working of Microwave Oven
5. Working of Induction Cooker

Pattern of Question Paper:

Time: 2.5hrs. Max. Marks 60

Section-A:1. Short answer Type Questions	2marks each	5/7	5X2=10
Section B: long answer type questions	4marks each	5/6	5X4=20
Section C: Descriptive/Analytical/Problem solving questions	10marks each	3/5	3x10=30
(Maximum of two sub questions)			

References:

1. Electronic instruments and systems: Principles, maintenance and troubleshooting by R. G. Gupta Tata McGraw Hill
2. Modern electronic equipment: Troubleshooting, repair and maintenance by Khandpur, Tata McGraw Hill
3. Electronic fault diagnosis by G. C. Loveday, A. H. Wheeler publishing

IV SEM

Electronic Communications and Digital Computers

UNIT I

15 Hrs

Ionosphere: Different modes of radio wave propagation, allotment of frequency in the electromagnetic spectrum. Ionosphere – Formation, composition and variation. Mention of expression for refractive index of ionosphere. Mechanism of reflection of radio wave, role of Ionospheric layers in radio communication. Critical frequency, MUF, skip distance, skip zone and Secant Law. Satellite

5 hrs

communication–Basics of Satellite communications, Basic block diagram, Linkages, transponder (Block diagram), station keeping, frequency bands used in satellite communication

Transmission lines and Waveguides: Wires and cables, single ended and differential lines, basic transmission line-types structure, characteristics, applications, balanced and unbalanced lines, BALUNs, characteristic impedance of transmission line, factors which determine the characteristic impedance, basic transmission line equations, incident wave, reflected wave and standing wave, reflection coefficient, standing wave ratio, open circuited and short circuited lines, standing waves in transmission lines, resonant and non resonant lines, mismatch and its effects, losses in transmission lines, types of waveguides, modes of propagation, Comparison of wave guides and transmission lines

6hrs

Radio Receivers: super heterodyne receiver with block diagram, RF stage , mixer-self excited and separately excited mixers, IF amplifier, Demodulation - AM diode detector, practical diode detector (actual circuit diagram of each stage) receiver characteristics, AGC - types, characteristics of radio receiver, FM detectors – Slope detector, Balanced Slope detector, Foster – Seeley discriminator, ratio detector (Qualitative) . Noise in electronic circuits.

4hrs

UNIT II

15 Hrs

Television transmission: principles of scanning, interlaced scanning, Camera tubes – Plumbicon & CCD Camera, Composite Video signal (CVS), VSB transmission, TV channel allocation (CCIR-B), positive and negative modulation, allotment of frequency, B/W TV transmitter (block diagram).

6hrs

Principles of Color TV – compatibility, mixing of colors – additive & subtractive, luminance & Chrominance signals, Color camera tube, Color systems – NTSC & PAL, Modulation of color Signals in NTSC system.

5hrs

Television Receivers: Monochrome picture tube. Block diagram of monochrome TV receiver. Colour Picture tube and Colour killer. Separation of chrominance and luminance signals. Principles of operation of LCD and LED TVs, Remote control. Control knobs and explanation of adjustments like -colour, brightness, sharpness and contrast.

4

UNIT III

15 Hrs

Digital Computers: Analog and Digital computers, Introduction, Block diagram of digital computer- characteristics and functions of various stages, Generations of digital computers, microcomputer system – input / store / output –operation. **5hrs**

Micro processors: Introduction, Block diagram of a general microprocessor, Evolution of microprocessors, microcomputer with a microprocessor, Microprogramming – fetch and execute cycles. **4hrs**

8085 micro-processor: architecture of 8085 MP, Pins and signals of 8085, Serial input and serial output, interrupts. **6hrs**

UNIT IV

Instruction set – Data transfer, arithmetic and logic instructions. Addressing modes. 15 hrs
Branch instructions. Stack and its operation. Subroutines and Interrupts –simple programs

Pattern of Question Paper:

Time: 2.5hrs. Max. Marks 60

Section-A:1. Short answer Type Questions **2marks each** **5/7** **5X2=10**

Section B: long answer type questions **4marks each** **5/6** **5X4=20**

Section C: Descriptive/Analytical/Problem solving questions **10marks each** **3/5** **3x10=30**
(Maximum of two sub questions)

PRACTICALS

ANY 8 EXPERIMENTS TO BE DONE

- RF amplifier
- Study of a power amplifier used in Radio
- FM detectors
- Losses in transmission lines
- Design and study of a binary adder
- Synchronous 4 bit counter
- Study of an ALU
- Design and study of an 4 bit register (universal shift, parallel and serial load)
- Construction and demonstration of standard fm broadcast Radio Receiver
- Assembling a desktop PC

V SEMESTER
G504.5A: ELECTRONIC COMMUNICATION SYSTEMS
COURSE OUTCOMES

C01:	The history and development of Electronic communication system, various types of Electronic communication system and their areas of application, different channels of signal propagation in electronic communication systems
C02:	Concept, theory and circuits of various techniques of modulation.
C03:	the mechanism of signal transmission in different media the basics of analog transmission and digital transmission
C04:	working principles of common communication systems like Radio, television and cell phones
C05:	the elements of satellite communication systems
C06:	Elements of wireless communication and fibre optic communication systems principles of digital communication-mobile communication, internet and social media.

UNIT I

Opto-Electronic Devices: Direct and indirect energy gap materials, Photo conduction, Solar cell, Optocouplers, LASCR, Solid State Relays, Photo Transistor. **4HRS**

Optical fibers: Introduction to optical fiber communication system – optical communication link. Principles of light transmission through fibers, Advantages of fibers, Structure of optical fibers. Fiber types -single mode, multi mode, step index, graded index fibers. Attenuation and losses in fibers, pulse distortion in fibers. Fiber couplers, connectors and splices.

6hrs

Optical sources - LED, Laser diode - construction, characteristics, optical amplifiers. LED modulation circuits, Laser diode modulation, and Laser diode frequency modulation.

Optical detectors - Photo diodes, PIN and Avalanche, construction and characteristics. **5hrs**

UNIT II

Digital communication: Block diagram of digital transmission and reception, Bit Rate, Baud Rate Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK). Advantage and

disadvantages of digital transmission, characteristics of data transmission circuits – Shannon limit for information capacity, bandwidth requirements, data transmission speed, noise, crosstalk, echo suppressors, distortion and equalizer, MODEM– modes, classification.

Digital Communication: Types, Sampling Theorem – Nyquist rate, Pulse Analog Modulation - PAM, PTM – PPM, PWM generation, detection and application. Pulse Digital Modulation – PCM – Generation, detection, Companding

6hrs

3hrs

UNITIII

15 Hrs

Cellular Communication System: Overview of wireless communication System-Block diagram, Cell Principles - cells, cell clusters, cell sites, frequency reuse, cell splitting, call handoff, frequency spectrum. Block diagram of a typical handset.

5hrs

GSM System: GSM architecture-mobile station, base station subsystem and network subsystem. GSM interfaces, Mobile Identities-SIM, IMEI, MSI and LAI. Block diagram of outgoing and incoming calls in GSM.

4hrs

INTERNET: Terms used in connection with internet, Internet Architecture, MODEMs, domains Internet services-email, www, search engine, news, FTP, internet telephony, internet protocols and internet banking.

6hrs

UNIT-IV

Microwave devices for Communication: GUNN diode, READ diode, IMPATT diode, BARITT diode, PIN diodes, Schottky barrier diodes, Multicavity Klystron, Magnetron, block diagram of Microwave communication and working, Applications.

6HRS

RADAR Communication Systems: RADAR principles, frequencies and powers used in RADAR, maximum Unambiguous range, detailed block diagram of pulsed RADAR system, RADAR range equation-derivation, factors influencing maximum range, effect of ground on RADAR antenna characteristics, doppler effect, expression for Doppler frequency. MTI RADAR-block diagram, working, CW RADAR-block diagram, working, advantages, applications and limitations, FM CW RADAR-block diagram, numerical examples wherever

Applicable 9HRS

Reference Books:

1. Monochrome and Colour Television – R R Gulati – Willey Eastern Limited.
2. Television Engineering - Arvind M Dhake – Tata McGraw Hill.
3. Television Engineering – Bernard Grob
4. Electronic Communication - George Kennedy – 3rd edition – TMH edition
5. Fiber Optic Communication – Joseph C Palais – Pearson Education Asia
6. Optic Fiber Communication – Gerd Keiser– Mc GrawHill– 3rd edition
7. Computer Network- Tanabaum

Pattern of Question Paper:

Time: 2.5hrs. Max. Marks 60

Section-A: Short answer Type Questions

- | | | |
|---------------------------------|-----|--------|
| 1. Multiple choice questions | 6/6 | 1x6 =6 |
| 2. Very short answer questions. | 6/8 | 1x6 =6 |
| 3. Short answer questions | 4/6 | 2x6=12 |

Section B: Analytical/Problem solving/Application type questions	4/6	4x4=16
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Section C: Descriptive/Analytical/Problem solving questions (Maximum of two sub questions)	2/4	10x2=20
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Note i) All the sections should cover equal questions from each unit
ii) Maximum of 30% problems can be asked

Semester-V	
G 504.5B: 8051 MICROCONTROLLER	
COURSE OUTCOMES	
CO1:	understand the architecture of basic micro processors.

C02:	understand their instruction set and write simple programs in them
C03:	Know the application of microcontrollers in various fields
C04:	understand the architecture of any micro controller,
C05:	Understand the architecture of basic micro processors.
C06:	understand instruction set of microcontrollers and and write simple programs in them.

UNIT I

15 Hrs

Introduction – Microcontroller internal block diagram, Comparison of microcontroller and microprocessors, microcontroller family. **3hrs**

Architecture of 8051: 8051 block diagram, 8051 programming model, oscillator and clock, program counter and data pointer, registers, Flags and PSW, Internal memory, Stack and stack pointer, SFRs, Pins and signals of 8051, input- output ports and circuits. Timers and Counters. Memory, I / O addressing by 8051, interrupts of 8051.

UNIT II

15 Hrs

Data transfer instructions: Addressing modes: immediate, register, direct and indirect, external data moves, push and pop, data exchange-example programs. **5hrs**

Logical Instructions: byte-level, bit level, rotate and swap- example programs. **3hrs**

Arithmetic instructions: Flags, increment and decrement, addition-unsigned and signed, multiplication and division, subtraction programs- example programs. **7hrs**

UNIT III

15 Hrs

Jump and call instructions: The Jump and call program range, Jumps-bit jumps, byte jumps and unconditional jumps-example programs. **10hrs**

Calls and subroutines: Subroutines, calls and stack, calls and returns, interrupt returns **5hrs**

UNIT IV

8051 applications - Time delays, interfacing ADC, LCD and Keyboard.

15hrs

Reference Books:

1. Microprocessor and Microcontrollers 8085, 8086 and 8051- Amar K. Ganguly and Anuva Ganguly- Narosa Publication.
2. The Intel Microprocessor – Barry B Brey – PHI edition
3. Microprocessors and Interfacing programming and Hardware – Douglas V Hall 2nd edition.
4. The 8051 microcontroller (II Edn.) - Kenneth J. Ayala
5. The 8051 microcontroller and embedded systems - Mazidi & Mazidi

Pattern of Question Paper:**Time: 2.5hrs. Max. Marks 60****Section-A: Short answer Type Questions**

- | | | |
|---------------------------------|-----|--------|
| 1. Multiple choice questions | 6/6 | 1x6 =6 |
| 2. Very short answer questions. | 6/8 | 1x6 =6 |
| 3. Short answer questions | 4/6 | 2x6=12 |

Section B: Analytical/Problem solving/Application type questions 4/6 4x4=16**Section C:** Descriptive/Analytical/Problem solving questions 2/4 10x2=20
(Maximum of two sub questions)

- Note
- i) All the sections should cover equal questions from each unit
 - ii) Maximum of 30% problems can be asked

G 504.5P: PRACTICALS V

Semester-V	
G501.5P: Practical V	
COURSE OUTCOMES	
CO1:	Analyze and relate the working of Opto-electronic devices.
CO2:	Understand and relate the characteristics of optical fibers and their simple applications,
CO3:	Write programs in microcontrollers using the instruction set, code and execute the program.

PRACTICALS V

List of Experiments (Minimum of Eight experiments to be done FROM EACH Section. 4 hrs duration per week)

SECTION-A

1. Setting up of a fiber optic analog link
2. Setting up of a fiber optic digital link
3. Determination of attenuation factor
4. Study of bending losses
5. Determination of numerical aperture of plastic fibers
6. Study of frequency modulation and demodulation
7. Study of pulse width modulation and demodulation
8. Study of pulse position modulation and demodulation

SECTION-B

1. Characteristics of photo transistor
2. Characteristics of fiber optic sources
3. Characteristics of fiber optic detectors
4. Characteristics of LASCR
5. Optical modulation using transistor
6. Characteristics of solar cells
7. Study of ASK generation and Detection
8. Study of FSK generation and Detection
9. Study of PSK generation and Detection
10. Study of Time Division Multiplexing and Demultiplexing
11. Study of Frequency Multiplier.
12. QPSK modulator and demodulator
13. Determination of V-I Characteristics curve of a Gunn Diode

Scheme of Examination

Se Section-A:One experiment -10 marks

ction-B:One experiment -10 marks

Records

5 marks

Internal Assessment-

25 marks

TOTAL:50 MARKS

PRACTICALS VI

1. 8051 Microcontroller - Minimum of 18 programs. Two hrs duration per week

Scheme of examination:

Duration of Practical Examination - 4 hrs

Two programs from Section-A and one experiment from Section-B:

19 MARKS

Records

6 marks

Internal Assessment-

25 marks

TOTAL:50 MARKS

Scheme of valuation:

Formula-	04
Circuit diagram-	04
Tabular column/Design calculations -	06
Circuit layout, connections-	06
Observation and number of trials-	10
Graph and calculations-	06
Result/accuracy-	04
Total:	40

PRACTICALS VI:4 hrs duration per week

1. 8051 Microcontroller - Minimum of 18 programs.

2. Experiments on Interfacing

Scheme of examination:

Duration of Practical Examination - 4 hrs

Two PROGRAMS should be conducted in four hrs:40 MARKS

Records

10 marks

Internal Assessment-

50 marks

Scheme of valuation :

1. 8051 Microcontroller – 2 Programs – 40 marks
2. One experiment on interfacing-----40 marks

40% Marks should be awarded for writing part and 60% for coding, editing and

execution
