COURSE TITLE : ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT
COURSE CODE : 3001
COURSE CATEGORY : P
PERIODS/ WEEK : 3
PERIODS/ SEMESTER : 45
CREDIT : 3

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Renewable and Non-renewable Resources	12
2	Ecosystems	11
3	Environmental Pollution and its control	11
4	Hazards, Disasters and Mitigation measures	11
TOTAL		**45**

GENERAL COURSE OUTCOME

Sl.	Sub	Student will be able to
1	1	Understand the various types of natural resources and problems due to over exploitation.
	2	The components of various types of ecosystem and interrelation between the components.
	3	Understand various factors which cause environmental pollution and their control measures.
2	1	Understand various hazards & disasters, their affects and mitigation measures.

SPECIFIC COURSE OUTCOME:

MODULE - 1: RENEWABLE AND NON-RENEWABLE RESOURCES

1.1.0 Understand the various types of natural resources and problems due to over exploitation.
1.1.1 List various resources supplied by forest.
1.1.2 Explain various uses of forest resources.
1.1.3 Identify the problems due to over exploitation of forests.
1.1.4 Explain the problems due to de-forestation.
1.1.5 Identify the social and ecological problems due to dams.

1.1.6 Identify various sources of fresh water.
1.1.7 State the importance of water as a resource.
1.1.8 Explain the problems due to over consumption of water.
1.1.9 Identify the causes of flood and drought.
1.1.10 Explain the reasons for the conflicts over water.
1.1.11 Describe the advantages and disadvantages due to large dams.
1.1.12 List various mineral resources.
1.1.13 State the problems due to mining.
1.1.14 Explain the environmental impacts due to mining.
1.1.15 State the reasons for global food crisis.
1.1.16 Explain impacts on food production due to adoption of modern agricultural practices.
1.1.17 Explain the problems due to the use of artificial pesticides and fertilizers.
1.1.18 Identify the causes for water logging, salinity and Eutrophication and the problems due to that.
1.1.19 Explain the world energy scenario and energy demands
1.1.20 List various conventional and non-conventional sources of energy.
1.1.21 Distinguish between renewable and non renewable sources of energy.
1.1.22 State the importance of renewable energy.
1.1.23 Explain the importance of energy conservation.
1.1.24 Define sustainable development and state its importance.
1.1.25 Explain why land is considered as a resource.
1.1.26 List the different types of resources from land.
1.1.27 Identify the causes for land degradation.
1.1.28 State the reasons for soil erosion, land slide and desertification.
1.1.29 Describe the control measures for land degradation.
1.1.30 Describe the role of an individual in conservation of resources and achieving sustainable development

MODULE – 2: ECOSYSTEMS

2.1.0 Understand the components of various types of ecosystem and interrelation between the components.

2.1.1 Define an Ecosystem.
2.1.2 Explain the biotic and abiotic components of an ecosystem.
2.1.3 Identify the producers, consumers and decomposers in an ecosystem.
2.1.4 Explain the role of producers, consumers and decomposers in an ecosystem.
2.1.5 State the meaning of what is meant by Biomes.
2.1.6 Explain the phenomenon Ecological Succession.
2.1.7 Explain food chain and food web.
2.1.8 State the inter dependence of each link in a food chain.
2.1.9 Explain the ecological pyramid.
2.1.10 Explain Biomagnifications and its impacts.
2.1.11 Explain the types, structure and characteristic features of forest ecosystem
2.1.12 Explain the types, structure and characteristic features of grassland ecosystem
2.1.13 Explain the types, structure and characteristic features of desert ecosystem
2.1.13 Explain the types, structure and characteristic features of aquatic ecosystem
2.1.14 Describe the importance of biodiversity and the need to conserve it.
2.1.15 Illustrate the effects of urbanization – Heat islands, stress on land and water
2.1.16 Identify the causes of global warming and the effects due to that.

MODULE – 3: ENVIRONMENTAL POLLUTION AND ITS CONTROL

3.1.0 Understand various factors which cause environmental pollution and their control measures.

3.1.1 Define environmental pollution.
3.1.2 Identify the factors contributing air pollution.
3.1.3 State the role of air pollution in global pollution.
3.1.4 Explain the effectsof air pollution.
5.1.5 State various methods to control air pollution.
5.1.6 Explain the functioning of air pollution control devices.
3.1.7 Identify the sources contributing to water pollution.
3.1.8 State the role of water pollution in global pollution.
3.1.9 Explain theeffectsof water pollution.
5.1.10 State various methods to control water pollution.
5.1.11 Explain the functioning of water pollution control devices.
3.1.12 Identify the sources contributing oil pollution.
3.1.13 State the role of oil pollution in marine pollution.
3.1.14 Explain the effectsof oil pollution.
5.1.15 State various methods to control oil pollution.
3.1.16 Identify the factors contributing marine pollution.
3.1.17 State the role of marine pollution in global pollution.
3.1.18 Explain the effectsof marine pollution.
5.1.19 State various measures to control marine pollution.
3.1.20 Identify the factors contributing noise pollution.
3.1.21 State the role of noise pollution in environmental stress.
3.1.22 Explain the effectsof noise pollution.
5.1.23 State various measures to control noise pollution.
3.1.24 Identify the factors contributing thermal pollution.
3.1.25 State the role of thermal pollution in global warming.
3.1.26 Explain the effectsof thermal pollution.
5.1.27 State various measures to control thermal pollution.
3.1.28 Identify the major nuclear hazards occurred in the world.
3.1.29 State the global affects of nuclear radiation.
3.1.30 Explain the local affects of nuclear pollution.
3.1.31 Identify various categories of solid wastes.
3.1.32 Explain various methods of solid waste management specific to each category of waste.
3.1.33 Explain the effectsdue to solid waste pollution.
3.1.34 Explain EIA and the need for EIA while implementing projects.
3.1.35 Identify the factors to be considered for conducting EIA of a mini-project.
3.1.36 Explain the role ofeach individual to control various aspects of environmental pollution.
3.1.37 Explain the case studies of cause and effect of each category of pollution.

MODULE – 4:HAZARDS, DISASTERS AND MITIGATION MEASURES

4.1.0 Understand various hazards & disasters, their affects and mitigation measures.

4.1.1 Define Hazard, Disaster, Vulnerability, Risk and Capacity.
4.1.2 Explain the relation between Hazard, Disaster, Vulnerability, Risk and Capacity.
4.1.3 State the factors influencing vulnerability and risk.
4.1.4 Explain assessment, evaluation and management of risk.

4.1.5 Identify the classifications of hazards based on various aspects.
4.1.6 Explain the causes for different types of disasters.
4.1.7 List the effectsof each type of disaster on human beings and ecosystem.
4.1.8 Illustrate major hazards under each category occurred in world as case study.
4.1.9 Explain the disaster management operation cycle.
4.1.10 Identify and explain various operations to be carried out during pre-disaster phase.
4.1.11 Identify and explain various operations to be carried out during emergency phase.
4.1.12 Identify and explain various operations to be carried out during post-disaster phase.
4.1.13 Explain the relationship between disaster and development.
4.1.14 Illustrate how health and disaster management are interrelated.
4.1.15 Explain the Institutional frame work of disaster management in India at National, state and district level and the role of each body.
4.1.16 Explain hazard zonation map.
4.1.17 Explain new & emerging approach in disaster management – Use of Early warning systems base on IT enabled services like GIS, GPS, MIS, DDS, Remote sensing etc.
4.1.18 Illustrate the community based disaster preparedness programmes as a mitigation measure.
4.1.19 Explain various preventive measures for disaster risk reduction.
4.1.20 Explain the need for safety audit - onsite and offsite safety audits to be done and formulation of emergency plans.
4.1.21 Explain the management plan for transportation accidents.
4.1.22 State the use of TREM card in accidents involving hazardous goods transport.
4.1.23 State the role of regulatory frame work and code of practice in disaster management.
4.1.24 Explain the role played by various acts related to disaster management.

CONTENT DETAILS

MODULE - 1: RENEWABLE AND NON-RENEWABLE RESOURCES

Natural resources and associated problems:

(a) Forest resources: Use and overexploitation, deforestation, case studies, mining, dams and their effects on Forests, Environment and tribal people.
(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral resources: Use and exploitation, environmental effects of Mining and extraction of mineral resources, case studies.
(d) Food resources: World Food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, Genetically modified crops – boon or bane, fertilizer-pesticide problems, water logging, salinity, Eutrophication, Case studies.
(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Importance of energy conservation and sustainable development.
(f) Land resources: Land as a resource, land degradation, role of land use planning in sustainable development, human induced landslides, soil erosion and desertification.
(g) Role of individuals in the conservation of natural resources. Equitable use of resources for sustainable development.

(Students shall conduct a case study of any resource utilization as an assignment)

MODULE - 2: ECOSYSTEMS

Concept of an ecosystem, structure and functions of biotic and abiotic components of an ecosystem, producers, consumers and decomposers. Biomes, Ecological succession.
Food chains, food webs and ecological pyramids, Biomagnifications.
Introduction, types, characteristics features, structure and function of the following ecosystem:

(a) Forest ecosystem
(b) Grassland ecosystem
(c) Desert ecosystem
(d) Aquatic ecosystems (Ponds, streams, lakes, ox-bow lakes, rivers, estuaries, oceans)
(e) Concept of biodiversity - Importance of biodiversity conservation
(f) Urbanization and impacts on environment (Heat island, stress on water and soil), global warming, climate change, sea level rise.

(Students shall study the characteristic features of any local ecosystem as an assignment)

MODULE - 3: ENVIRONMENTAL POLLUTION AND ITS CONTROL

Definition of Environment and Environmental Pollution. Causes, effects and control measures of (a) Air pollution (b) Water pollution (c) Oil pollution (d) Marine pollution e) Noise pollution (f) Thermal pollution g) Nuclear hazards. Case studies in each type of pollution. Environmental stress.
Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Introduction to Environment Impact Analysis. Role of an individual in prevention of pollution.
(Students should conduct the case study of any local pollution issue and suggest remedial measure as an assignment)

MODULE - 4: HAZARDS, DISASTERS AND MITIGATION MEASURES

Define: Hazard, Disaster, Vulnerability (Physical, Economic and Social vulnerability), Risk, Capacity and inter-relationship between them. Factors influencing vulnerability and risk. Risk management, assessment and evaluation.
Classification of disasters, causes and consequences – Natural disasters (cyclone, earth quake, tsunami, flood, drought, land slide, lightning, forest fire, volcanic eruption) and Human-induced disasters (Air, road & rail accidents, boat capsize, oil spill, building collapse, fire, industrial hazards, chemical hazards, explosion, war). Classification of disasters based on the origin (Water & climate based, geological origin, Chemical/industrial/nuclear disasters- Hazchem& MAH(Major Accident hazard) units, biologically related disasters, human induced disasters/accidents) - Case studies of each type of disaster.
Disaster management cycle - Operations in each phase – Pre-disaster phase (Planning, Preparedness, Prevention & Mitigation), Structural and Non-structural mitigation measures (Structural eg. Dams, embankment, stone walls, Installing early warning systems, disaster resistant constructions and non-structural - eg. Insurance, IEC-information-education-communication, land use zoning, preparedness plan, mock drills, costal shelter plantation) – Emergency phase (communication, evacuation, rescue search & relief operation, medical assistance) – Post disaster phase (Reconstruction and rehabilitation, economic & environmental aspects, Administrative & political aspects) - Relationship between disaster and development – Health and disaster management plan, holistic approach.
Disaster profile of India - Institutional frame work of disaster management in India (National, state and district level) – Hazard zonation map - New & emerging approaches in disaster management – Use of

information technology (GIS, GPS etc) in disaster management - Community based disaster preparedness - Disaster risk reduction - Safety audits, onsite and offsite emergency plans – Management of transportation accidents, use of TREM card.
Regulatory frame work and code of practice (Petroleum act-1934, Factories act-1948, Insecticide act-1968, Explosives act-1984, Environmental protection act-1986, Coastal regulation zone (CRZ) Act-1991, Disaster management Act-2005).

REFERENCE BOOKS

1.Environmental studies–From Crisis to Cure,R. Rajagopalan,Oxford UniversityPress, 2005
2.Environmental Science & Engineering, P. Anandan, R. Kumaravelan, Scitech.
3.Environmental Studies for Undergraduate courses, ErachBharucha, UniversitiesPress.
4.R.B.Singh (Ed). Disaster Management, Rawat Publication, New Delhi, 2000
5.H.K.Gupta (Ed). Disaster Management, Universities Press India, 2003

COURSE TITLE : COMMUNICATION ENGINEERING
COURSE CODE : 3041
COURSE CATEGORY : B
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60/3
CREDITS : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Radiation and wave propagation.	15
2	Modulation techniques.	15
3	Radio transmitters.	15
4	Radio receivers.	15
	TOTAL	**60**

Course General Outcome:

Module	GO	On completion of this course the student will be able:
1	1	To understand the Electro-Magnetic Radiation and Wave Propagation.
	2	To understand Antenna.
2	3	To comprehend Modulation Techniques in Communication.
	4	To understand Pulse Modulation Schemes.
3	5	To understand the working of Radio Transmitters.
	6	To understand noise in Communication Systems.
4	7	To understand Demodulation And Radio Receivers.

GO - General Outcome

On completion of this course the student will be able:

MODULE I : Radiation and Wave Propagation.

1.1.0 To understand Electro Magnetic Radiation and Wave Propagation.

1.1.1 To define ELECTRIC AND MAGNETIC fields.
1.1.2 To define EM wave.
1.1.3 To explain types of EM wave.
1.1.4 To list the types of Wave Propagation.
1.1.5 To explain Ground Wave Propagation.
1.1.6 To describe the factors affecting the field strength in Ground Wave Propagation.
1.1.7 To explain the Space Wave Propagation.

1.1.8 To describe the factors affecting the Space Wave Propagation (effect of curvature of earth).
1.1.9 To explain Layers Of Ionosphere, its significance in communication.
1.1.10 To define- Skip Distance, Max Usable Frequency (MUF), Critical Frequency, Virtual Height.
1.1.11 To explain Atmospheric effect such as Refraction, Diffraction and Reflection.

1.2.0 To understand Antenna.

1.2.1 To explain the physical concept Of Radiation Of Electromagnetic Energy.
1.2.2 To describe Radiation Patterns.
1.2.3 To explain the different types of Antenna such as Half Wave Dipole, Folded Dipole.
1.2.4 To explain the working Of Parabolic Antenna.
1.2.5 To define Smart Antenna.
1.2.6 To define MANET and its applications.

MODULE II Modulation Techniques

2.1.0 To Comprehend Modulation Techniques in Communication.

2.1.1 To state the need for Modulation.
2.1.2 To state the basic principle of Amplitude Modulation, Frequency Modulation and Phase Modulation.
2.1.3 To define AM, FM and PM.
2.1.4 To draw the waveform of AM.
2.1.5 To deduce expression for Amplitude Modulated Wave.
2.1.6 To define Modulation Index of AM.
2.1.7 To describe Frequency Spectrum of AM.
2.1.8 To explain the AM Modulator Circuits (Collector Modulation).
2.1.9 To explain Balanced Modulator.
2.1.10 To illustrate the Frequency Spectrum of DSBSC, SSBSC and VSB.
2.1.11 To draw the modulated waveform of FM.
2.1.12 To define modulation index of FM.
2.1.13 To describe Frequency Spectrum and Band Width of FM.
2.1.14 To compare AM and FM.

2.2.0 To understand Pulse Modulation Schemes.

2.2.1 To state Sampling Theorem and its significance.
2.2.2 To list various Pulse Modulation Schemes.
2.2.3 To illustrate different Pulse Modulation Techniques.
2.2.4 To explain Pulse Code Modulation.
2.2.5 To list different Digital Carrier Modulation Schemes.

MODULE III Radio Transmitters

3.1.0 To understand the working of Radio Transmitter.

3.1.1 To explain the Block Diagram of AM Transmitter.
3.1.2 To explain the Block Diagram of FM Transmitter (direct FM and indirect FM).
3.1.3 To define Pre-Emphasis and De-Emphasis.
3.1.4 To describe AFC.

3.2.0 To understand noise in Communication System.

3.2.1 To explain different types of noises.
3.2.2 To define signal to noise ratio.
3.2.3 To state the different measures to improve signal to noise ratio.

MODULE IV Radio Receivers

4.1.0 To understand Demodulation and Radio Receivers.

4.1.1 To define Demodulation.
4.1.2 To explain Super Heterodyne Receiver.
4.1.3 To explain AM Demodulation Circuits using Diode Detector.
4.1.4 To explain simple and delayed AGC.
4.1.5 To define Selectivity, Sensitivity, Fidelity and Noise Figure of Radio Receivers.
4.1.6 To explain the operation of FM Radio Receiver.
4.1.7 To state the need of limiter in FM receiver.
4.1.8 To compare AM & FM Receivers.

CONTENT DETAILS

MODULE I Electromagnetic Radiation and Wave Propagation.

Electric and magnetic fields - electromagnetic wave - polarization types of EM wave - types of wave propagation - ground wave propagation - factors affecting the filed strength in groundwave propagation - spacewave propagation - factors affecting the spacewave propagation - atmospheric effects - refraction, diffraction and reflection- ionosphere and its layers - layer characteristics - skip distance - MUF - critical frequency - virtual height - antenna - physical concepts of radiation of electromagnetic wave - radiation pattern - half wave dipole, folded dipole and parabolic antenna - smart antenna - definition - MANET – definition - applications.

MODULE II Modulation Techniques

Need for modulation - AM, FM and PM – basic principle - definition - AM – waveform - expression for AM voltage - modulation index - significance of side bands - frequency spectrum - AM modulator circuit - balanced modulator - DSBSC, SSBSC and VSB - frequency spectrum - FM - definition - waveform - modulation index - frequency spectrum and band width - comparison of AM and FM - sampling theorem

- pulse modulation schemes - PAM, PWM and PPM - waveforms - pulse code modulation (PCM) - digital carrier modulation schemes

MODULE III Radio Transmitters

Block diagram of AM transmitter - function of each block - block diagram of a FM transmitter - direct and indirect FM generation - pre-emphasis and de-emphasis - AFC - noise in communication systems - different types of noise - signal to noise ratio - methods to improve signal to nose ratio

MODULE IV Demodulation and Radio Receivers.

Need for demodulation - principles of superhetrodyne receiver - block diagram of superhetrodyne receiver - AM demodulator circuits - diode detector - simple and delayed AGC - choice of IF in super heterodyne receiver - characteristics of radio receiver - selectivity, sensitivity, fidelity and noise figure - block diagram of FM receiver - need for limiter in FM receiver - comparison of FM and AM receiver

TEXT BOOKS

1. Electronic Communication Systems - Frank R Dungan - 3rd Edition – Thomson.
2. Electronic Communication Systems – George Kennedy – TMH.

REFERENCE

1. Electronic communications - Roddy and Coolen – PHI.
2. Electronic Communication Systems - Blake - Thomson and Delmar.
3. Electronic Communication Systems - Wayne Thomasi.
4. Principles of Electronic Communications –pradeep Kumar Ghosh

COURSE TITLE : DIGITAL ELECTRONICS
COURSE CODE : 3042
COURSE CATEGORY : B
PERIODS PER WEEK : 4
PERIODS PER SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Number systems and logic gates	15
2	Logic families and combinational logic circuits	15
3	Sequential logic circuits	15
4	Counters, ADC and DAC	15
	TOTAL	**60**

Course Outcome :

MODULE	GO	On completion of the study of this course the students will be able:
1	1	To understand various number systems
	2	To understand the simplification of Boolean expressions
2	3	To comprehend various logic families
	4	To understand combinational logic circuits
3	5	To understand the working of flip-flops
	6	To comprehend shift registers
4	7	To understand the working of various counters
	8	To understand ADC and DAC

GO - General Outcome

Specific outcome:

MODULE I Number system and logic gates

1.1.0 To understand various number systems

1.1.1 To state the need of a binary number system in modern digital technology

1.1.2 To describe the features of a binary number system with examples

1.1.3 To compare binary number system with decimal number system

1.1.4 To explain the conversion from decimal to binary and vice versa with suitable examples

1.1.5 To list the features of Hexadecimal number system with suitable examples

1.1.6 To explain the Conversion of hexadecimal into decimal and binary and vice versa

1.1.7 To state the need for binary codes

1.1.8 To describe BCD codes, excess-3 code, Gray code

1.1.9 To describe alpha numeric codes such as ASCII code and EBCDIC

1.1.10 To explain binary arithmetic such as addition, subtraction, multiplication and division with examples

1.1.11 To explain binary subtraction using 1's complement and 2's complement method

1.2.0 To understand the simplification of Boolean expressions

1.2.1 To explain the operation of AND, OR, NOT, NAND, NOR, EXOR and EXNOR with their symbols and truth tables

1.2.2 To realize AND,OR, NOT, EXOR and EXNOR using universal gates

1.2.3 To state Demorgan's theorems

1.2.4 To state the rules and laws of Boolean algebra

1.2.5 To explain Sum Of Product (SOP) expression, Product Of Sum (POS) expression , minterms and maxterms

1.2.6 To state the need for simplifying Boolean expression

1.2.7 To simplify Boolean expressions with the help of logic rules and truth tables

1.2.8 To state the basic principle of Karnaugh map

1.2.9 To explain two variables, three variables and four variables K-maps and their reductions with the help of suitable examples

1.2.10 To state Don't care terms and their role in solving K-maps

1.2.11 To list the advantages and disadvantages of K-map

MODULE II Logic families and combinational logic circuits

2.1.0 To comprehend the various logic families

2.1.1 To state various scales of Integration- SSI, MSI, LSI, VLSI and ULSI

2.1.2 To explain the circuit of TTL inverter

2.1.3 To define the terms VIL, VIH, VOL, VOH, Noise margin, noise immunity, propagation delay, fan- in and fan-out

2.1.4 To explain the working principle of CMOS NAND gate

2.1.5 To list the features of CMOS logic family

2.1.6 To list the features of ECL logic family

2.1.7 To compare TTL, ECL and CMOS logic families with respect to current sourcing and current sinking, fan in, fan-out and power dissipation

2.2.0 To understand the combinational logic circuits

2.2.1 To describe combinational logic circuits

2.2.2 To design half adder, full adder, half subtractor, and full subtractor

2.2.3 To explain parallel adder

2.2.4 To explain the operation of 4x1 Multiplexer and 1x4 De-multiplexer

2.2.5 To list the various applications of Multiplexers and De-multiplexers

2.2.6 To explain the operation of 3 bit encoder

2.2.7 To explain various decoders such as BCD to decimal, binary to gray code and gray to binary

MODULE III Sequential logic circuits

3.1.0 To understand the working of flip-flops

3.1.1 To describe sequential logic circuits

3.1.2 To distinguish between synchronous and asynchronous sequential logic circuits

3.1.3 To explain latches & flip-flops

3.1.4 To explain SR flip flop using NAND & NOR gates

3.1.5 To explain JK flip-flop using NAND with the help of truth table

3.1.6 To state the race around condition in JK flip flop

3.1.7 To list the methods for eliminating race around condition

3.1.8 To explain the working of master slave JK flip flop (block level explanation only)

3.1.9 To explain D and T flip flops with their characteristic tables

3.2.0 To comprehend shift registers

3.2.1 To explain the functions of Shift registers

3.2.2 To explain the working of shift registers:-serial-in serial-out, parallel-in parallel-out, parallel-in serial-out and serial- in parallel-out

3.2.3 To differentiate between right shift and left shift registers

3.2.4 To explain the working of ring counter and its applications

3.2.5 To explain the working of Johnson counter and its applications

MODULE IV Counters, ADC and DAC

4.1.0 To understand the working of various counters

4.1.1 To differentiate between synchronous and asynchronous counters

4.1.2 To implement mod-10 asynchronous counter using JK flip flop

4.1.3 To explain mod-8 synchronous counter and its realization using JK flip flop

4.1.4 To explain 3 bit up-down counter using JK flip flop

4.2.0 To understand ADC and DAC

4.2.1 To list the different types of ADC and DAC

4.2.2 To state DAC specifications - resolution, accuracy and settling time

4.2.3 To explain Weighted resistor DAC and R-2R ladder type DAC

4.2.4 To explain different types of ADCs - Counter type, Successive approximation type and Flash type

CONTENT DETAILS

MODULE I - Number systems and logic gates

Number systems - decimal, binary and hexa decimal number systems - conversion - use of binary codes - types of binary codes - binary coded decimal, excess 3 code, gray code, ASCII code and EBCDIC - binary addition, subtraction, multiplication and division - 1's complement and 2's complement subtraction -

introduction to logic gates - AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR operations - universal property of NAND and NOR gates - realization of AND, OR, NOT, EX-OR and EX-NOR - laws of boolean algebra and De-morgan's theorems - Sum Of Products (SOP) expression, Product Of Sum (POS) expression - min term and max term - simplification of boolean expressions using logic rules - truth tables - Karnaugh map - 2, 3, 4 variables - K-map reduction - don't cares in K-map

MODULE II - Logic families and combinational logic circuits

Logic families - SSI, MSI, LSI, VLSI and ULSI - transistor transistor logic - VIL, VIH, VOL, VOH, noise margin, noise immunity, propagation delay, fan-in and fan-out - TTL inverter - features of CMOS logic gates and ECL logic family - comparison of TTL, ECL and CMOS logic families with respect to current sourcing and current sinking, fan in, fan-out and power dissipation - combinational logic circuits - introduction - design half adder, full adder, half subtractor and full subtractor - parallel adder-multiplexer / data selector - 4 to 1 MUX - applications of MUX - demultiplexer - 1 to 4 demultiplexer - 3 bit encoder - decoders - BCD to decimal, binary to gray code and gray to binary

MODULE III - Sequential logic circuits

Sequential logic circuits - introduction - synchronous and asynchronous sequential logic circuits - SR flip flop - SR latch - SR flip flop using NAND & NOR gates - JK flip flop with preset and clear inputs - D flip flop - T flip flop - master slave JK flip-flop - flip flop IC 7476 - shift registers - serial in serial out, parallel in parallel out, serial in parallel out, parallel in serial out shift registers - left shift and right shift registers - applications of shift registers - ring counter - Johnson counter

MODULE IV - Counters, ADC and DAC

Binary counters - implementation of asynchronous mod-10 counter - implementation of mod-8 synchronous counter - 3-bit up down counter - DAC - specifications - resolution, accuracy, settling time - different types - binary weighted resister method and R-2R ladder type - ADC - counter type - successive approximation type - flash type

TEXT BOOKS

1. M Morris Mano and Michael Cilettio - Digital Design - Pearson- 5th Edition
2. Floyd and Jain -Digital Fundamentals - Pearson- 8th Edition
3. Malvino and Leach -Digital Principles and Applications - Tata McGraw-Hill

REFERENCE

1. A Anand Kumar- Fundamentals of digital circuits PHI
2. Anil K Maini -Digital Electronics .Weiley

COURSE TITLE : ELECTRICAL TECHNOLOGY
COURSE CODE : 3043
COURSE CATEGORY : B
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60
CREDITS : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	AC fundamentals and earthing	15
2	Network theorems and transformers	15
3	DC generators and DC motors	15
4	Alternators and AC motors	15
TOTAL		60

Course General Outcome:

MODULE	GO	ON COMPLETION OF THE STUDY OF THIS COURSE THE STUDENT WILL BE ABLE :
1	1	To understand about AC fundamentals
	2	To understand the need for earthing and protection of equipments
2	1	To study the network theorems
	2	To know the operations and uses of transformers
3	1	To understand DC generators
	2	To understand DC motors
4	1	To understand alternators
	2	To understand AC motors

GO - General Outcome

On completion of the study of this course the student will be able :

MODULE I AC FUNDAMENTALS AND EARTHING

1.1.0 To understand about AC fundamentals

1.1.1 To explain the concept of alternating voltage and current
1.1.2 To Illustrate complex waveforms and representation of alternating quantities
1.1.3 To define the terms, cycle, time period, frequency, amplitude, phase, rms value, form factor
1.1.4 To describe AC through resistance, inductance, and capacitance and solve simple problems
1.1.5 To define power factor and calculation of power in an RLC circuit
1.1.6 To illustrate series AC circuits and solve simple problems

1.1.7 To illustrate parallel AC circuits and solve simple problems

1.2.0 To understand the need for earthing and protection of equipments

1.2.1 To State the necessity of earthing of equipments and lightning protection of installation

1.2.2 To test insulation resistance using megger

MODULE II NETWORK THEOREMS AND TRANSFORMERS

2.1.0 To study the network theorems

2.1.1 To state and explain Ohm's law, Kirchoff's law

2.1.2 Superposition theorem, Thevenins theorem, Maximum power transfer theorem (Solve simple problems)

2.2.0 To know the operations and uses of transformers

2.2.1 To explain the working principle of transformer

2.2.2 To illustrate the construction of transformer

2.2.3 To illustrate the elementary theory of an ideal transformer

2.2.4 To state voltage transformation ratio and rating of a transformer

2.2.5 To derive the emf equation of transformer

2.2.6 To explain types of losses in transformer

2.2.7 To identify the different types and applications transformers

MODULE III DC GENERATORS AND D C MOTORS

3.1.0 To understand DC generators

3.1.1 To explain the working principle of DC generator

3.1.2 To compare output waveforms of a DC generator and a pure DC waveforms

3.1.3 To list different types of DC generator

3.1.4 To derive emf equation of a DC generator

3.1.5 To explain the armature reaction and it's effects

3.1.6 To explain the no load characteristics of a DC generator

3.2.0 To understand DC motors

3.2.1 To list the types of DC generators

3.2.2 To explain the working principle of DC motor

3.2.3 To illustrate the significance of back emf in DC motor

3.2.4 To explain the necessity of starter in a DC motor

3.2.5 To compare different types of DC motors with characteristics and speed

MODULE IV ALTERNATORS AND AC MOTORS

4.1.0 To understand alternators

4.1.1 To explain the working principle of an alternator
- 4.1.2 To derive the emf equation of an alternator
- 4.1.3 To explain synchronous speed and the determination of frequency (Solve simple problems)
- 4.1.4 To illustrate the open circuit characteristics of an alternator

4.2.0 To understand AC motors
- 4.2.1 To explain the working principle and classification of AC motors
- 4.2.2 To explain the working principle of stepper motor and its applications
- 4.2.3 To explain the working principle universal motor and its applications
- 4.2.4 To explain the working principle servo motor and its applications
- 4.2.5 To explain the working principle of single phase and three phase induction motor and their applications

CONTENT DETAILS

MODULE I AC FUNDAMENTALS & TRANSFORMERS

Concept of alternating voltage and current - complex waveforms - representation of alternating quantities - defining the terms cycle, time period, frequency, amplitude, phase, rms value, form factor - AC through resistance, inductance, and capacitance (Solve simple problems) - power factor definition - calculation of power in an RLC circuit - series and parallel AC circuits (simple problems) - earthing of equipments and lightning protection of installation - megger

MODULE II NETWORK THEOREMS AND TRANSFORMERS

Ohm's law - Kirchoff's law- Superposition theorem - Thevenin's theorem - Maximum power transfer theorem (Solve simple problems) - working principle of transformer - construction of transformer - elementary theory of an ideal transformer - voltage transformation ratio and rating of a transformer - emf equation derivation - losses in transformer - types, applications of transformers

MODULE III DC GENERATORS AND MOTORS

Working principle of DC generator - different types of DC generators - emf equation of a DC generator - armature reaction - no load characteristics - types of DC motors - working principle of DC motor - significance of back emf in DC motor - starters - necessity of starter in DC motor - 3 point starter - comparison of DC motors with characteristics and speed.

MODULE IV ALTERNATORS AND AC MOTORS

Alternators - working principle of an alternator- emf equation of an alternator - synchronous speed and frequency - the open circuit characteristics of an alternator - AC motors - working principle and classification of AC motors - working principle and applications of stepper motor, universal motor, servo motor - working principle and applications of single phase and three phase induction motor

TEXT BOOKS.

1. B L Theraja- Electrical Technology (Vol 1 and 2). S. Chand
2. D C Kulshreshtha- Basic Electrical Engineering.- TMH.

REFERENCE BOOKS.

1. J B Gupta- Electrical Machines .- S K katareia
2. V K Metha- Objective Electrical Engineering - S Chand and company

COURSE TITLE : ELECTRONIC DEVICES AND CIRCUITS
COURSE CODE : 3044
COURSE CATEGORY : B
PERIODS PER WEEK : 5
PERIODS PER SEMESTER : 75
CREDITS : 5

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Transistor as amplifier.	18
2	Tuned amplifier and power amplifier.	19
3	UJT, FETs and feedback amplifiers.	19
4	Oscillators and wave shaping circuits.	19
	TOTAL	**75**

Course Outcome :

Module	GO	On completion of the study of this course the students will be able:
1	1	To comprehend the operation of transistor as an amplifier.
	2	To understand the operation of multistage amplifiers.
2	3	To comprehend the operation of tuned voltage amplifier.
	4	To understand the operation of power amplifiers.
3	5	To understand feedback amplifiers.
	6	To understand the working of UJT, FET and MOSFET.
4	7	To comprehend the working of various oscillator circuits.
	8	To understand the working of wave shaping circuits.

GO - General Outcome

Specific outcome:

MODULE I TRANSISTOR AS AMPLIFIER

1.1.0 To comprehend the operations of transistor as an amplifier.

1.1.1 To define load line.
1.1.2 To draw AC and DC load lines.
1.1.3 To define operating point.
1.1.4 To explain the need for stabilization of operating point.
1.1.5 To list the different transistor biasing circuits.
1.1.6 To illustrate the behaviour of common emitter configuration with fixed and potential divider biasing.
1.1.7 To explain the principles of operation of transistor amplifier in common emitter configuration.
1.1.8 To derive the expression for voltage gain, current gain, power gain, input and output impedances of CE configuration.
1.1.9 To define frequency response and bandwidth of an amplifier.
1.1.10 To list the features and applications of emitter follower.
1.1.11 To explain the working of emitter follower.

2.1.0 To understand the operation of multistage amplifiers.

2.1.1 To identify the need of multistage amplifier.
2.1.2 To explain the concept of multistage amplifiers.
2.1.3 To list the different methods of interstage coupling.
2.1.4 To explain the working principle of RC coupled, transformer coupled and direct coupled multistage amplifiers.
2.1.5 To illustrate the frequency response of RC coupled, transformer coupled and direct coupled multistage amplifiers.
2.1.6 To list the applications of RC coupled, transformer coupled and direct coupled multistage amplifiers.
2.1.7 To compare the performance of the RC coupled, transformer coupled and direct coupled multistage amplifiers.

MODULE II TUNED AMPLIFIER AND POWER AMPLIFIER

2.1.0 To comprehend the operation of tuned voltage amplifiers.

2.1.1 To explain series and parallel resonant circuits.
2.1.2 To derive the expression for the resonant frequency of series and parallel circuits.
2.1.3 To write the relation between resonance frequency, “Q” and bandwidth.
2.1.4 To explain the operation and frequency response of single tuned amplifier.
2.1.5 To list the applications of tuned amplifier.

2.2.0 To understand the operation of power amplifiers.

2.2.1 To distinguish between voltage amplifier and power amplifier.
2.2.2 To illustrate the importance of impedance matching in power amplifier.
2.2.3 To classify power amplifiers.
2.2.4 To explain the operation of single ended power amplifier.
2.2.5 To state the importance of heat sinks and heat dissipation in power amplifiers.
2.2.6 To explain the operation of class B push pull power amplifier.
2.2.7 To list the advantages, disadvantages and applications of the push pull amplifier.

MODULE III FETS AND FEEDBACK AMPLIFIERS

3.1.0 To understand feedback amplifiers.

3.1.1 To define positive and negative feedbacks in amplifiers.
3.1.2 To derive the expression for the gain of feedback amplifier.
3.1.3 To illustrate the types of negative feedback in amplifiers.
3.1.4 To explain the operation of typical voltage and current feedback amplifier circuits.
3.1.5 To explain the effects of negative feedback.

3.2.0 To understand UJT, FET and MOSFET.

3.2.1 To explain the working principle of UJT.
3.2.2 To explain the working of relaxation oscillator using UJT.
3.2.3 To explain the working principle and construction of JFET.
3.2.4 To compare BJT and JFET.
3.2.5 To list different types of MOSFETs.
3.2.6 To explain the working principle and construction of MOSFET (Depletion type only).

MODULE IV OSCILLATORS AND WAVE SHAPING CIRCUITS

4.1.0 To comprehend the working of oscillators.

4.1.1 To explain the basic principle of operation of oscillators.
4.1.2 To state the Barkhausen criterion for oscillation.
4.1.3 To explain the working of RC phase shift oscillator.
4.1.4 To explain the working of Wien Bridge oscillator.
4.1.5 To list the applications of RC oscillators.
4.1.6 To explain the basic principle of LC oscillators.
4.1.7 To explain the working of Hartley and Colpitt's oscillators.
4.1.8 To list the applications of LC oscillator.
4.1.9 To define piezoelectric effect.
4.1.10 To explain the operation of Crystal oscillator.
4.1.11 To list the advantages and applications of Crystal oscillator.

4.2.0 To understand the working of multivibrators and wave shaping circuits.

4.2.1 To list the types of multivibrators.
4.2.2 To explain the operation of Astable multivibrator with the help of circuit diagram and waveforms.
4.2.3 To explain the working of Monostable multivibrator with the help of circuit diagram and waveforms.
4.2.4 To explain the operation of Bistable multivibrator with circuit diagram and waveforms.
4.2.5 To list the applications of multivibrators.
4.2.6 To explain the working of Schmitt trigger with circuit diagram and waveforms.
4.2.7 To define LTP and UTP.
4.2.8 To describe the RC differentiating and Integrating circuits.
4.2.9 To state the conditions for proper integration and differentiation.
4.2.10 To list the applications of integrator and differentiator circuits.

CONTENT DETAILS

MODULE I Transistor as amplifier

Load line - operating point - need for stabilization of operating point - transistor biasing circuits - CE configuration with fixed and potential divider biasing - transistor amplifier (CE) - principle of operation - expression for voltage gain, current gain, power gain, input and output impedances - frequency response and bandwidth - emitter follower - multistage amplifier - methods of interstage coupling - RC coupled, transformer coupled and direct coupled multistage amplifiers - working principle - frequency response - applications - comparison

MODULE II Tuned amplifier and power amplifier

Series and parallel resonant circuits - expression for resonant frequency - relation between resonant frequency, “Q” and bandwidth - single tuned amplifier - operation, frequency response, applications - voltage amplifier and power amplifier - comparison - impedance matching in power amplifier - classification of power amplifiers - single ended power amplifier - class B push pull power amplifier - operation - advantages and disadvantages - applications - heat sinks and heat dissipation in power amplifiers

MODULE III FETs and feedback amplifiers

Positive and negative feedback - expression for the gain of feedback amplifier - types of negative feedback - operation of typical voltage and current feedback amplifier circuits - effects of negative feedback - working principle of UJT - UJT relaxation oscillator - working principle and construction of JFET - comparison of BJT and JFET - types of MOSFETs - working principle and construction of MOSFET (depletion type only).

MODULE IV Oscillators and wave shaping circuits

Oscillators - principle of operation - Barkhausen criterion for oscillation - RC phase shift oscillator - Wien Bridge oscillator - applications of RC oscillators - principle of LC oscillators - Hartley and Colpitts oscillators - applications of LC oscillator - piezo-electric effect - crystal oscillator - operation - advantages - applications - multivibrators - types - operation- waveforms - applications -Astable multivibrator - Monostable multivibrator - Bistable multivibrator - Schmitt trigger - LTP and UTP - RC differentiator and integrator - conditions for proper integration and differentiation – applications.

TEXT BOOK

1. Robert Bolestad Electronic Devices and Circuits PHI
2.N N Bhargava, Kulshreshtha and S C Gupta- Basic Electronics and Linear Circuits- TMH.
3. Anil K Maini and Varsha Agarwal- Electronic Devices and Circuits - Wiley India.

REFERENCE

1. David A Bell Electronic Devices and Circuits PHI

COURSE TITLE : ELECTRONIC CIRCUITS LAB
COURSE CODE : 3047
COURSE CATEGORY : B
PERIODS/WEEK : 5
PERIODS/SEMESTER : 75
CREDITS : 3

LIST OF EXPERIMENTS

On completion of the course the student will be able:

1.0 To construct and test various electronics circuits using discrete components
1.1 To design and construct (i) RC differentiator circuit (ii) RC integrator circuit and study its pulse response (for 3 sets of RC values)
1.2 To setup a transistor as switch and observe its performance
1.3 To setup a single stage RC coupled CE amplifier with potential divider bias and
(i) observe the phase difference between input and output wave forms
(ii) Measure mid band gain
(iii) Plot its frequency response and determine the band width
1.4 To construct an emitter follower circuit and
(i) Measure the gain
(ii) Plot its input / output waveforms
1.5 To construct a single stage tuned amplifier circuit and
(i) Plot its frequency response
(ii) Measure its peak gain and bandwidth
1.6 To setup a RC phase shift oscillator and
(i) Plot the output waveform
(ii) Measure the frequency of oscillation
1.7 To construct a Wien bridge oscillator and
(i) Plot the output waveform
(ii) Measure the frequency of oscillation
1.8 To setup a Hartley oscillator and
(i) Plot the output waveform
(ii) Measure the frequency of oscillation
1.9 To setup a Colpitts oscillator and
(i) Plot the output waveform
(ii) Measure the frequency of oscillation
1.10 To construct a transistor astable multivibrator circuit and
(i) Plot the collector and base waveforms
(ii) Measure the frequency of oscillation
1.11 To setup a transistor monostable multivibrator circuit
(i) Plot the collector and base waveforms
(ii) Measure the time period (delay)
1.12 To setup a Schmitt trigger circuit using BJT and
(i) Plot the input output waveforms
(ii) Measure the UTP and LTP voltages

1.13 To setup a UJT relaxation oscillator and plot the waveforms at emitter, base1 and base2

1.14 To construct a two stage RC coupled Amplifier

(i) Plot the frequency response curve

(ii) Measure the mid band gain

(iii) Find the 3dB bandwidth

1.15 To setup a two stage direct coupled amplifier

(i) Plot the frequency response curve

(ii) Find the gain and bandwidth

COURSE TITLE : DIGITAL ELECTRONICS LAB
COURSE CODE : 3048
COURSE CATEGORY : B
PERIODS/WEEK : 5
PERIODS/SEMESTER : 75
CREDITS : 3

LIST OF EXPERIMENTS

On completion of the course the student will be able:

1. To familiarize
   (i) TTL and CMOS Logic ICs for AND, OR, NOT, NAND, NOR and XOR by verification of truth tables
   (ii) Universal gates for implementing other logic functions
2. To construct half and full adder circuits
3. To construct half and full subtractor circuits
4. To construct binary to gray and gray to binary converter and verify the truth table
5. To implement combinational logic circuits from Boolean equation
6. To familiarize 4-bit adder and subtractor using ICs 7483
7. To construct 4 to 1 MUX and 1 x 4 Demux using NAND Gates
8. To study the multiplexer IC 74151
9. To verify the truth table of RS, D, and T Flip flops using NAND gate
10. To construct asynchronous mod-10 counter using flip-flops
11. To construct synchronous mod-8 counter using flip-flops
12. To study 7490 and 7492 counter ICs
13. To construct 4 bit shift register using flip flops
14. To study the operation of shift register ICs
15. To construct Johnson counter
16. To construct Ring counter

COURSE TITLE : ANALOG COMMUNICATION LAB
COURSE CODE : 3049
COURSE CATEGORY : B
PERIODS/WEEK : 5
PERIODS/SEMESTER : 75 /3
CREDITS : 3

List of Experiments

On completion of the course the student will be able:

1. To setup active filters LPF,HPF and BPF
2. To setup audiopower amplifier
3. To setup AM generator using transistor
4. To setup AM generator using IC AD633
5. To setup AM demodulator
6. To setup FM modulator usin IC 566
7. To setup FM demodulator usind IC 565
8. To setup mixer stage using discrete components
9. To setup an IF tuned amplifier
10. To setup pre-emphasis and de emphasis circuits
11. To setup pulse amplitude modulator and demodulator
12. To setup a pulsewidth modulator using 555
13. To setup a pulse position modulator using 555
14. To setup a frequency multiplier using IC 565
15. To study the CMOS PLL 4046