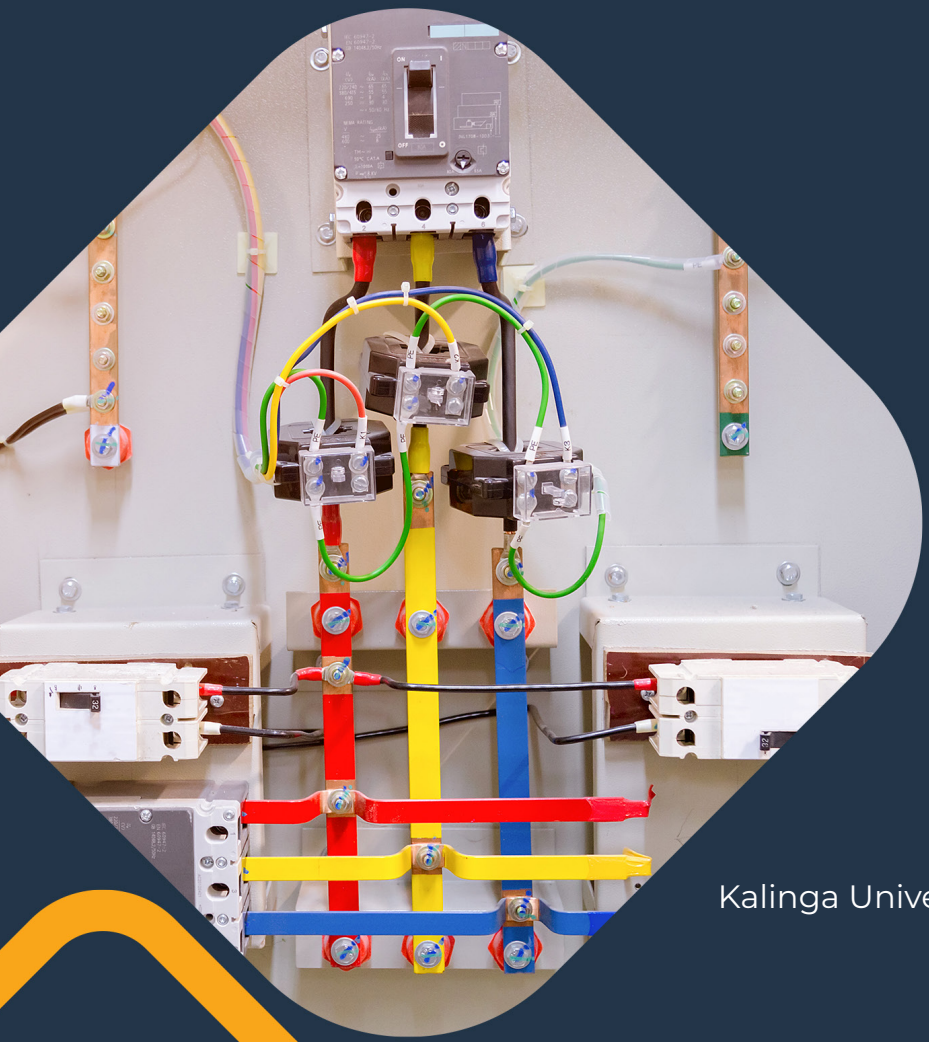
KALINGA UNIVERSITY

RAIPUR | INDIA

SCHEME OF EXAMINATION & DETAILED SYLLABUS

Bachelor of Vocational Studies (B.Voc) Electrical



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Kalinga University, Naya Raipur, Chhattisgarh

KALINGA UNIVERSITY
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BACHELOR OF VOCATIONAL STUDIES (B. VOC.)

ELECTRICAL

Semester I							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE101	Communication Skills	3	0	3	30	70	100
BVE102	Fundamentals of Information Technology	3	0	3	30	70	100
BVE103	Basic Electrical Concept	3	0	3	30	70	100
BVE104	Electrical Material & Wiring	3	0	3	30	70	100
BVE105P	Project-I	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester II							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE201	Electrical Appliances	3	0	3	30	70	100
BVE202	Environmental Studies	3	0	3	30	70	100

BVE203	Electrical Power Generation	3	0	3	30	70	100
BVE204	Basic Electronic Concept	3	0	3	30	70	100
BVE205P	Project-II	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester III							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE301	DC Machine & Transformer	3	0	3	30	70	100
BVE302	Industrial Management & Safety	3	0	3	30	70	100
BVE303	Electrical Transmission & Distribution	3	0	3	30	70	100
BVE304	Basic Protective Devices	3	0	3	30	70	100
BVE305P	Project-III	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester IV							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE401	Switchgear & Protection	3	0	3	30	70	100

BVE402	Network Analysis	3	0	3	30	70	100
BVE403	AC Machine	3	0	3	30	70	100
BVE404	Analog Digital Integrated Circuit	3	0	3	30	70	100
BVE405P	Project-IV	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester V							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE501	Control System	3	0	3	30	70	100
BVE502	Computer Aided Power System Studies	3	0	3	30	70	100
BVE503	Testing & Maintenance	3	0	3	30	70	100
BVE504	Digital Signal Processing	3	0	3	30	70	100
BVE505P	Project-V	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester VI							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVE601	Electrical Traction & Utilization	3	0	3	30	70	100
BVE602	MATLAB & Embedded System	3	0	3	30	70	100
BVE603	Entrepreneurship	3	0	3	30	70	100
BVE604	Fire and Safety Technology	3	0	3	30	70	100
BVE605P	Project-VI	0	36	18	50	150	200
	Total	**12**	**36**	**30**	**170**	**430**	**600**

KALINGA UNIVERSITY
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DETAILED SYLLABUS

1ST SEMESTER

BVE101

COMMUNICATION SKILLS

Unit-1 The phonology of English

1.1 Introduction to phonology of English - International Phonetic Alphabet [IPA]

1.2 consonants, vowels, Diphthongs and Consonant Clusters.

1.3 Places and manners of articulation of sounds.

Unit II The syllable and stress patterns

1.1 Introduction to syllable and stress patterns

1.2 strong and weak forms. Sentence-stress-pause.

1.3 Intonation: patterns of intonation and use of them for reading and speaking purposes

Unit-III Parts of speech,

1.1 Introduction to Parts of speech, articles, tenses, verbs and modals.

1.2 Practice of daily use words, numerals and tongue twisters

1.3 Vocabulary building, construction of simple sentences: Basic sentence pattern, subject and predicate.

1.4 Sentence construction – simple, complex and compound

Unit-IV English communication-

1.1 About myself

1.2 Let's talk, making conversation, meeting and greeting

1.3 Introduction myself, my family and my friends

1.4 My opinions, my likes and dislikes

1.5 Life at college, hostel and workplace

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BVE102
FUNDAMENTALS OF INFORMATION TECHNOLOGY

Unit I: Computer characteristics

1.1 Introduction to Computer characteristics: Speed, storage, accuracy, diligence

1.2 Digital signals, Binary System, ASCII

1.3 Historic Evolution of Computers

1.4 Classification of computers: Microcomputer, Minicomputer, mainframes, Supercomputers; Personal computers: Desktop, Laptops, Palmtop, Tablet;

1.5 Hardware & Software; Von Neumann model.

Unit II: Hardware

1.1 Introduction to Hardware: CPU, Memory, Input devices,

1.2 output devices. Memory units: RAM (DRAM,ADRAM, SDRAM,RDAM, SRAM, DDR- SDRAM); ROM- different types: Flash memory; Auxiliary storage;

1.3 Input devices - keyboard, mouse, scanner, speech input devices, digital camera, Touch screen Voice Input, Joystick, Optical readers, bar code reader

1.4 Output devices: Display device, size and resolution; CRT, LCD, LED; Printers: Dot-matrix, Inkjet, Laser; Plotters, Sound cards & speaker.

Unit III:Software

1.1 Introduction to Software: System software, Application software;

1.2 Concepts of files and folders, Introduction to Operating systems, Different types of operating systems;

1.3 Basic features of two GUI operating systems: Windows & Linux (Basic desk top management);

1.4 Programming Languages, Compiler, Interpreter, Databases; Number System- Decimal, Binary, Octal, Hexadecimal

1.5 Application software: Word documents (MS Word), spread sheets (MS Excel) and Presentation software (MS PowerPoint) and it's working

Unit IV Computer Networks and Internet

1.1 Connecting computers, Requirements for a network: Server, Workstation, switch, router, network operating systems;

1.2 Internet: brief history, World Wide Web, Websites, URL, browsers, search engines, search tips;

1.3 Internet connections: ISP, Dial-up, cable modem, WLL, DSL, leased line Wireless and Wi-Fi connectivity

1.4 Email, email software features (send receive, filter, attach, forward, copy, blind copy);

1.5 Characteristics of web-based systems, Web pages, Web Programming Languages;

1.6 Computer Viruses & Protection.

Unit V Information Technology and Society

1.1 Indian IT Act, Intellectual Property Rights.

1.2 Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies.

Unit VI Programming Concepts &

1.1 Techniques: Program Concept, Characteristics of Program, Stages in Program Development, Tips for Program Designing

1.2 Algorithms, Pseudo code, Flowcharts, Symbols, Rules, compiler & Interpreter.

1.3 Introduction to programming techniques, Top-down & Bottom-up approach, Unstructured, & Modular programming, Cohesion, Coupling, Debugging, Syntax, Testing and Debugging, Documentation.

KALINGA UNIVERSITY
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BVE103

BASIC ELECTRICAL CONCEPT

Chapter 1 –Current Electricity

1.1 Introduction to Electricity, Sources of Electricity

1.2 Generation of Electricity Nature of Electricity and it's types Electron theory-Structure of Atom

1.3 Effects of Electric current Factors affecting resistance of a conductor

1.4 Important Definitions Difference between AC and DC

1.5 Electric Circuits

Chapter 2-DC circuits

1.1 Electrical Circuits,

1.2 Ohm's Law ,

1.3 Resistance in Series combination

1.4 Kirchhoff's circuit Law

Chapter 3 Capacitors

3.1 Capacitors Introduction to capacitors

3.2 Construction of Capacitors

3.3 Capacitance of capacitor

3.4 Standard Units of Capacitance

3.5 Capacitance of parallel plate capacitor

3.6 Different types of capacitors

3.7 Charging and Discharging of capacitors

3.8 Capacitors in Series

3.9 Capacitors in parallel

Chapter 4-Electromagnetic Effects

4.1 Magnets Working of magnets

4.2 Different types of magnets

4.3 Permanent magnet and Electromagnets

4.4 Faraday's Law of Electromagnetic Induction

4.5 Mutual Inductance,

4.6 Self Inductance

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BVE104
ELECTRICAL MATERIAL & WIRING

Unit 1: Electricity

1.1 Electricity Generation Concept

1.2 Basic Units and Effects of Electric Current

1.3 Concept of Electrical Power and Energy

1.4 Importance of Earthing System

Unit 2: Handling of Tools and Equipment

1.1 Tools and Equipment

1.2 Tools and Equipment used for Cable Laying

Unit 3: Electrical Wiring Components and Accessories

3.1 Identifying and Selecting the Wiring

3.2 Materials and Components

3.3 ICTP Switch and Distribution Board

3.4 Workplace Health and Safety Measures

Unit 4: Repair and Maintenance of Power Distribution Lines

1.1 Preparation for Repair and Maintenance

1.2 Power Distribution Lines- Specific Terminology in Distribution Line-Construction

1.3 Activities-Distribution Line Maintenance

Unit 5: Installation of Cables

1.1 Laying of Underground Cables-Laying of AB Cables

Unit 6: Repairing of Cable Joints

1.1 Electrical Cable Jointing Methods

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BVE105P
PROJECT-I

PRACTICAL

BASIC ELECTRICAL CONCEPT

1) To know about electric laboratory.
2) Measure of emf or de source and calculate its internal resistance.
3) Determine equivalent resistance of series connection.
4) Determine equivalent resistance of parallel connection.
5) Use KCL and KVL to determine current and voltage in electric circuits
6) In series connected circuits determine equivalent capacitance
7) For given magnetic material find B-H curve and Hysteresis loop -1
8) For given magnetic material find B-H curve hysteresis loop -2
9) use faraday's law of EMI of statically and dynamically induced emf in Given circuit
10) Determine series and parallel magnetic circuits.
11) Determine frequency, time period, peak value, RMS value, peak factor on CRO.

ELECTRICAL MATERIAL AND WIRING

1) To connect the wire lamp holder To connect the fuse wire
2) To connect the wire sockets
3) Godown wiring
4) To connect the wire 3 pin
5) Staircase Wiring
6) Hospital wiring
7) To connect the wire to Adaptors.

8) To connect the wire to connectors.

9) To connect the wire to the ceiling rose.

10) To measure the gauge of standard wires 1/18, 3/20, 7/20

11) Study of Safety precautions while working on electrical installation and necessary of earthing

12) Personal Protection, Basic Injury protection symbol and sign of danger, warning & caution and elementary first aid

13) Artificial Respiratory technique of separating person in contact with live wire

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2ND SEMESTER
BVE201
ELECTRICAL APPLIANCES

1. **Winding Insulating Materials**

1.1 Introduction

1.2 Electrical properties

1.3 Classification

1.4 Characteristics

1.5 Application areas insulation materials

1.6 Insulating material

1.7 Insulation Materials

1.8 Plastics

1.9 Insulating varnishes

1.10 Types of insulating varnishes

2. **Winding Wire**

2.1 Introduction

2.2 Properties , Characteristics

2.3 Choice of Conductor material

2.4 Enamelled wire, Grades

2.5 Properties

2.6 Types & shapes of winding wires

2.7 Gauge plate

3. **Rewinding and Testing of Electric Motors**

3.1 Methods of Rewinding

3.2 Testing the new winding

3.3 Testing of Armature

3.4 Growler test

3.5 Drop test.

4. **Instruments and Testing**

4.1 Introduction , Voltage tester screwdriver

4.2 Continuing Test

4.3 Insulation test

4.4 Measurement of Power for DC & AC Circuits.

5. **Electrical Cooking Appliances**

5.1 Introduction

5.2 Types

5.3 Construction

5.4 Electric Toaster

5.5 Types -- Automatic and Non-Automatic.

6. **Electric Iron Box**

6.1 Types

6.2 Non-Automatic

6.3 Automatic

6.4 Comparison

6.5 Stream iron

6.6 Trouble Shooting

7. **Water Heaters & Coffee makers**

7.1 Water Heater Function

7.2 Types

7.3 Electric Kettle

7.4 Immersion water heater , Construction and working

7.5 Storage water heaters , Non pressure type , pressure type

7.6 Repairs & remedies

7.7 Coffee maker

7.8 Types, construction and working of percolator type.

8. **Electric Mixer & Egg beaters**

8.1 Electric Maker , Function

8.2 Construction

8.3 General Operating Instruction, Caution

8.4 Cleaning

8.5 Repairs and Remedies

8.6 Egg beaters

8.7 Hand operated crank type

8.8 Hand operated - Electric type

9. **Vacuum Cleaner and washing machine**

9.1 Vacuum Cleaner, Function

9.2 Principle

9.3 Main components

9.4 Features

9.5 Types - working

9.6 Accessories

9.7 Capacity

9.8 Filters

9.9 Repairing.

9.10 Washing Machine – Function

9.11 Types – Semi and Fully Automatic – Top and Front loading

9.12 Washing technique

9.13 Working cycle

9.14 Construction and working of semi auto washing machine

9.15 Basic Structure of Top loading washing machine

9.16 Construction and Working of Front loading washing machine

9.17 Top and front loading machines – Problems and Remedies.

10. **Electric Fan & Hair Drier**

10.1 Electric Fan – Function

10.2 Terminology

10.3 Construction and Working of Ceiling Fan

10.4 Table fans

10.5 Exhaust Fan

10.6 General Fault and Remedy.

10.7 Hair Drier – Function

10.8 Types

10.9 Construction

10.10 Working

10.11 Safety features

10.12 Repairs & remedies.

11. **Centrifugal Pump**

11.1 Introduction

11.2 Constructional features

11.3 Working

11.4 Friction lead

11.5 Static suction head

11.6 Static delivery lead

11.7 Automatic operation of pump

11.8 Troubleshooting.

KALINGA UNIVERSITY
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BVE202

ENVIRONMENTAL STUDIES

Unit – I Environmental Studies

1.1 Definition, Scope and Importance

1.2 Need for public awareness

1.3 Renewable & Non-renewable Resources (Definition & Importance)

1.4 Consumerism & Waste Products

Unit - II Natural Resources and Sustainable Development :

1.1 Meaning and definitions

1.2 Classification and types of resources,

1.3 Factors influencing resource utilization;

1.4 Resource conservation- meaning and methods - conventional and non-conventional resources,

1.5 Problems associated with and management of water, forest and energy resources - resource utilization and sustainable development

Unit - III Populations and Emerging Issues of Development :

1.1 Population explosion in the world and in India and arising concerns-

1.2 DemographicTransition Theory - pattern of population growth in the world and in India and associated problems

1.3 Human population and environment

1.4 Environment and Human Health

1.5 Human Development Index – The World Happiness Index.

Unit – IV Environmental Pollution

1.1 Definition, Cause, effects and control measures of Air pollution,

1.2 Water pollution, Soil pollution, Noise pollution,

1.3 Nuclear hazards. Role of an individual in prevention of pollution. -

1.4 Solid Waste Management: Sources, classification,

1.5 effects and control measures of urban and industrial solid wastes.

Unit - V Urbanization and Environment :

1.1 Concept of Urbanization

1.2 Problems of migration and urban environment- changing land use, crowding and stress on urban resources, degradation of air and water, loss of soil cover impact on biodiversity,

1.3 Urban heat islands

1.4 Emerging Smart Cities and safe cities in India - Sustainable Cities.

KALINGA UNIVERSITY
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BVE203

ELECTRICAL POWER GENERATION

Unit 1: Basic Power Generation

1.1 Importance of electrical power in day today life

1.2 Types of fuels (Solid, liquid, gases)

1.3 Advantages & Disadvantages of fuels

1.4 Types of renewable sources such as solar, wind, ocean, geothermal

Unit 2: Thermal Power Station

1.1 Factors governing selection of site for thermal station

1.2 Block diagram of coal fired power station Power plant components & applications

1.3 Ash disposal & dust collection Merits & Demerits of steam power plant

1.4 List of thermal power plants in Maharashtra

Unit 3: Hydro Electric Power Plant

1.1 Factors governing selection of site for hydro electric power plant Schematic Arrangement of Plant

1.2 Function of elements (Storage reservoir, Dam, Fore bay, spill way, intake, surge tank, penstock, prime mover, power house)

1.3 Classification of plants

1.4 Advantages & Disadvantages of hydro power plant

1.5 List of hydro power plants in Maharashtra

Unit 4: Nuclear Power Plant

1.1 Factors governing selection of site for Nuclear power plant Nuclear fuels, uranium, thorium, plutonium

1.2 Main parts of reactors & their function

1.3 Fuel, Reactor, moderator, shielding

1.4 Main parts of nuclear reactor

Unit 5: Diesel Power Plant

1.1 Elements of diesel electrical power plant with their function Diesel engine

1.2 Fuel system, air intake system, exhausts system Layout of medium size

1.3 Different types of engines Applications

1.4 Advantages & Disadvantages of power plant

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BVE204

BASIC ELECTRONIC CONCEPT

UNIT-I P-N Junction diode:

1.1 Qualitative Theory of P-N Junction, P-N Junction as a diode , diode equation ,

1.2 volt- amper characteristics temperature dependence of V-I characteristic ,

1.3 ideal versus practical –resistance levels(static and dynamic)

1.4 Transition and diffusion capacitances,

1.5 diode equivalent circuits, load line analysis

1.6 breakdown mechanisms in semiconductor diodes , zener diode characteristics.

1.7 **Special purpose electronic devices:** Principal of operation and Characteristics of Tunnel Diode with the help of energy band diagrams

1.8 Varactar Diode

1.9 SCR and photo diode

UNIT-II RECTIFIERS, FILTERS:

1.1 P-N Junction as a rectifier ,

1.2 Half wave rectifier

1.3 full wave rectifier,

1.4 Bridge rectifier Harmonic components in a rectifier circuit 2.5Inductor filter,

1.6 Capacitor filter

1.7 L- section filter, section filter and comparison of various filter circuits

1.8 Voltage regulation using zener diode.

UNIT-III BIPOLAR JUNCTION TRANSISTOR:

1.1 The Junction transistor, Transistor current components

1.2 Transistor as an amplifier

1.3 Transistor construction, Input and Output characteristics of transistor in Common Base

1.4 Common Emitter, and Common collector configurations.

1.5 α and β Parameters and the relation between them,

1.6 BJT Specifications. BJT Hybrid Model, 3.7h-parameter representation of a transistor,

1.8 Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance.

1.9 Comparison of transistor configurations in terms of Ai, Ri ,Av,and Ro,

UNIT-IV TRANSISTOR BIASING AND STABILIZATION:

1.1 Operating point , the D.C and A.C Load lines,

1.2 Need for biasing , criteria for fixing,

1.3 operating point, B.J.T biasing, Fixed bias, Collector to base bias

1.4 Self bias techniques for stabilization, Stabilization factors, (s, $s^{I, sII)}$,

1.5 Bias Compensation using diode and transistor , (Compensation against variation in VBE, ICO,)

1.6 Thermal run away, Condition for Thermal stability.

UNIT-V FIELD EFFECT TRANSISTOR AND FET AMPLIFIER

1.1 JFET (Construction, principal of Operation and Volt –Ampere characteristics).

1.2 Pinch- off voltage-Small signal model of JFET. FET as Voltage variable resistor, 5.3Comparison of BJT and FET. MOSFET (Construction, principal of Operation and symbol),

1.4 MOSFET characteristics in Enhancement and Depletion modes.

1.5 **FET Amplifiers**: FET Common source Amplifier, Common Drain Amplifier,

1.6 Generalized FET Amplifier, FET biasing.

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PROJECT-II

BASIC ELECTRONICS CONCEPT

List of Experiments:

1) Test the Performance of PN junction.
2) Test the performance of zener diode.
3) Test the performance of Photodiode.
4) Test Half wave rectifier on Breadboard.
5) Test Full wave Rectifier using Two diodes. (On Breadboard).
6) Test Full wave Rectifier using Four diodes. (On Breadboard).
7) Use LC filter for getting minimum ripple using Two diodes.
8) Use filter for getting minimum ripple using four diodes.
9) Identity terminals of PNP and NPN transistor.
10) Test Various blocks in regulated power supply.
11) Troubleshoot given DC regulated power supply.
12) Test performance of IC's.
13) Test the performance of Logic gate IC.
14) Test the performance of flip flop IC'

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3RD SEMESTER

BVE301

DC MACHINE & TRANSFORMER

Unit-1 Polyphase Transformers

1.1 Single unit or bank of single-phase units,Polyphase connections.

1.2 Star/delta connections

1.3 open – delta connections

1.4 Phase-conversion: 3 to 6 phase and 3 to 2 phase conversions.

1.5 Effect of 3-phase winding connections on harmonics.

1.6 3-phase winding-transformers cooling,

1.7instrument Transformer C T / P T Application.

1.8 Trouble shooting of transformer Defects, causes and remedies cooling,

Unit-2 Induction Motor

1.1 Construction, basic principles,

1.2 Revolving field theory flux and mmf waves, 2.3induction motor as a transformer. Equivalent circuits..

1.4 Starting methods Circle diagram. Calculation of performance.

1.5 Torque-slip curves. Effect of rotor resistance. Cogging crawling..

1.5 speed control Starting, speed control and braking of induction motors

1.6 Testing Losses and efficiency. Induction Generator. Induction regulator.

Unit-3 Control of AC Drive

1.1 Control of AC drives: Induction motor drives Induction motor drives

1.2 Basic principle of operation, stator voltage control

1.3 Rotor voltage control, frequency control, voltage and frequency control

1.4 current control, voltage, current and frequency control

1.5 Close-loop control, Synchronous motor drive

1.6 Synchronous motor drive: Cylindrical rotor, salient pole, reluctance,

1.7 permanent magnet and switch reluctance motors

1.8 Close loop control of synchronous motors.

1.9 Brushless DC and AC drives.

Unit-4 Synchronous

1.1 Machines principle of operation Synchronous motor,

1.2 principle of operation, Basic principles Construction Flux and EMF waves.

1.3 Theory of cylindrical rotor and salient pole machines.

1.4 Two reactance theory. O.C. and S.C and Zero power factor characteristics.

1.5 Starting of synchronous motors.

1.6 Starting of synchronous motors.

1.7 Single phase synchronous motor.

1.8 Single phase series and repulsion motor.

1.9 Parallel operation Parallel operation.

1.10 Synchronizing. Hunting and its prevention

1.11 Trouble shooting Testing, Defects, causes and remedies

Unit-5 Single Phase Induction Motor

1.1 Single phase induction motor

1.2 Double revolving field theory equivalent circuit

1.3 performance analysis – load characteristics starting methods

1.4 Types starting methods used shaded

1.5 pole induction motor – variable reluctance motor

1.6 Hysteresis motor – AC series motor –repulsion motor

1.7 linear motor – permanent magnet

1.8 Stepper motor DC and AC motors.

1.9 Trouble shootingTesting, Defects, causes and remedies

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BVE302

INDUSTRIAL MANAGEMENT & SAFETY

Unit-1 Industrial Safety

1.1 To understand safety precautions necessary in Industry.

1.2 Industrial Safety Principles.

1.3 Accidents in Industry

1.4 Emergency Response - System Emergency Planning and Preparedness

Unit-2 Hazards

1.1 Introduction Chemical Hazards, Hazards Classification

1.2 Objective of MSDS/CSDS Various Explosions Fire Hazards Potential Hazard

1.3 Job Safety Analysis Materials Of Construction Safe Handseling and Operation

Unit-3 Hazard Analysis

1.1 Introduction, Types of Hazard Analysis, Hazard Identification

1.2 Material Safety Data Sheet, Safety Audits

1.3 Event Tree Analysis

1.4 Fault Tree Analysis

1.5 Failure Modes and Effects Analysis

Unit-4 Safety Appraisal

1.1 Safety Audit Effective Steps

1.2 Safety Education Personal Protective Equipment's Fire Fighting Equipment'

Unit-5 Health Hazards and Legal Aspects

1.1 Occupational Health Hazards, OSHA

1.2 Safe Working Environment, Factories Act

1.3 Employee State Insurance Act Workmen Compensation Act

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BVE303

ELECTRICAL TRANSMISSION & DISTRIBUTION

1. Structure Of Electric Power System

1.1 Single Line Diagram - Distributors with Concentrated and Uniform Loading

1.2 DC Two Wire and Three

1.3 Wire Systems - AC Distributors - Radial and Ring Distributors

1.4 Interconnectors - Electrical Layout & Bus Bar Arrangement in Generating Sub Stations and Bulk Power Substation - Kelvin's Law for the

1.5 Design of Feeders and its Limitations.

2. Transmission Line Parameters

2.1 Resistance, Inductance and Capacitance of Single Phase and Three Phase (Including Double Circuits) Transmission Lines

2.2 Stranded and Bundled Conductors - Symmetrical and Unsymmetrical Spacing - Transposition

2.3 Application of Self and Mutual GMD - Skin and Proximity Effect - Inductive Interference with Neighboring Circuits - Corona -

2.4 Factors Affecting Corona - Advantages and Disadvantages of Corona

2.5 Methods of Reducing Corona Effect.

3. Performance Of Transmission Lines

3.1 Equivalent Circuits for Short, Medium (p and T circuits) and Long Lines

3.2 Efficiency and Regulation - Attenuation Constant, Phase Constant, Surge Impedance and Surge Impedance

3.3 Loading - Real and Reactive Power Flows in Lines - Power Circle Diagrams for Receiving and Sending Ends - Ferranti Effect.

4. Insulators, Cables And Mechanical Design Of Oh Lines

4.1 Insulators - Types and Construction - Voltage Distribution in String Insulator

4.2 string Efficiency - Methods of Improving String Efficiency

4.3 Cables - types - Capacitance of Cables - Insulation Resistance

4.4 Dielectric Stress and Grading - Dielectric Loss

4.5 Thermal Characteristics - capacitance of Three Core

4.6 Cables - Stress and Sag Calculations

4.7 Effect of Wind and Ice - Supports at Different Levels - stinging

5. Recent Trends In Transmission

5.1 Extra High Voltage AC (EHVAC) Transmission - Need, Advantages

5.2 Limitations High Voltage Direct current Transmission (HVDC)

5.3 Terminal Equipment for HVDC Systems -

5.4 Classifications, Advantages, Limitations

5.5 Economic Distance for HVDC - Comparison of EHVAC and HVDC

5.6 Transmission -Interconnection of HVDC & AC Systems

5.7 Voltage Control of Lines -Introduction to

5.8 FACTS Technology -SVC,TCSC,STATCOM, UPFC.

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BVE304

BASIC PROTECTIVE DEVICES

Unit-1 Protective Devices:

1.1 Protective Devices: Philosophy of protection, Nature, Causes and consequences of faults

1.2 Causes and consequences of faults, Zone of protection, Requirements of a protective scheme

1.3 Basic terminology components of protection scheme.

1.4 Relay classification, Principle of different types of electromagnetic relay.

1.5 General equation of phase and magnitude comparators, Duality of comparators

1.6 Electromagnetic relays, over current relays Directional relays

1.7 Distance relay- impedance, Reactance and Mho type, Differential relays.

Unit-2 Feeder: Protection:

1.1 Feeder: Protection: Over current and earth fault protection, Distance protection, Pilot wire protection, Carrier current protection.

1.2 Generator Protection: Biased differential protection, restricted earth fault protection, Field suppression, Negative sequence protection, Earth fault detection in rotor circuit

1.3 Power transformer Protection: Biased differential protections, restricted earth fault protection

1.4 Buchholz relay Protection of combined transformer and alternator.

1.5 Bus Zone Protection: frame leakage and circulating current scheme-use of Translay relay.

Unit-3 Circuit Breakers

1.1 Current chopping. Principle of A.C. and D.C. circuit breaking requirements of good circuit breaker circuit breaker rating.

1.2 Different types of circuit breakers. Air break and Air blast circuit breaker.

1.3 Minimum oil circuit breakers. Vacuum circuit breaker, SF6 circuit breaker. D.C. Circuit breaker. H.R.C. Fuse: Construction and characteristics.

Unit-4 . Static Relays

1.1 Development and classification of static relays, Different types of phase and amplitude capacitors, Basic static relays used in protective scheme.

1.2 Protection against surge-surge absorber, Surge- diverter.

1.3 Current limiting reactors in power system and their arrangement calculation of fault MVA for symmetrical short circuits.

1.4 Circuit breaker capacity.

KALINGA UNIVERSITY
RAIPUR | INDIA

BVE305P
PROJECT-III
PRACTICAL

DC MACHINE & TRANSFORMER

1) Speed control of D.C. shunt motor by (a) Field current control method & plot the curve for speed verses field current. (b) Armature voltage control method & plot the curve for speed verses armature voltage.

2) To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency.

3) To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.

4) To determine the efficiency and voltage regulation of a single-phase transformer by direct loading.

5) To plot the O.C.C. & S.C.C. of an alternator and to determine its Zs , Xd andregulation by synchronous impedance method.

6) To plot the V-curve for a synchronous motor for different values of loads.

7) To perform the heat run test on a delta/delta connected 3-phase transformer and determine the parameters for its equivalent circuit.

8) To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits. Draw the circle diagram and compute the following (i) Max. Torque

9) (ii) Current (iii) slips (iv) p.f. (v) Efficiency.

10) To Plot V-Curve and inverted V-Curve of synchronous motor.

11) To synchronize an alternator across the infinite bus (RSEB) and control load sharing.

BASIC PROTECTIVE DEVICES

1) State the reasons circuit protection is needed and three conditions requiring circuit protection.
2) Define a direct short, an excessive current condition, and an excessive heat condition.
3) State the way in which circuit protection devices are connected in a circuit.
4) Identify two types of circuit protection devices and label the schematic symbols for each type.
5) Identify a plug-type and a cartridge-type fuse (open and not open) from illustrations.
6) List the three characteristics by which fuses are rated and state the meaning of each rating. Identify a plug-type and a cartridge-type fuse (open and not open) from illustrations.
7) List the three categories of time delay rating for fuses and state a use for each type of time-delay rated fuse.
8) List the three categories of time delay rating for fuses and state a use for each type of time-delay rated fuse. Identify fuses as to voltage, current, and time delay ratings using fuses marked with the old military, new military, old commercial, and new commercial systems. List the three categories of time delay rating for fuses and state a use for each type of time-delay rated fuse.
9) Identify a clip-type and a post-type fuse holder from illustrations and identify the connections used on a post-type fuse holder for power source and load connections.
10) List the methods of checking for an open fuse, the items to check when replacing a fuse, the safety precautions to be observed when checking and replacing fuses, and the conditions to be checked for when conducting preventive maintenance on fuses.
11) Select a proper replacement and substitute fuse from a listing of fuses.
12) List the five main components of a circuit breaker and the three types of circuit breaker trip elements.
13) Describe the way in which each type of trip element reacts to excessive current.
14) Define the circuit breaker terms trip-free and nontrip-free and state one example for the use of each of these types of circuit breakers.
15) List the three time delay ratings of circuit breakers.
16) Define selective tripping, state why it is used, and state the way in which the time delay ratings of circuit breakers are used to design a selective tripping system.
17) Identify the factors used in selecting circuit breakers.

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RAIPUR INDIA

4TH SEMESTER

BVE401

SWITCHGEAR & PROTECTION

Unit-1 Introduction to switchgear

1.1 Essential Features of switchgear, Switchgear Equipment.

1.2 Bus-Bar Arrangement, Switchgear Accommodation.

1.3 Short Circuit, Faults in a power system

Unit-2 Fault calculation

1.1 Symmetrical faults on 3-phase system. Limitation of fault current.

1.2 Percentage Reactance.Percentage Reactance and Base KVA.

1.3 Short – circuit KVA. Reactor control of short circuit currents.

1.4 Location of reactors, Steps for symmetrical Fault calculations.

1.5 Solve numerical problems on symmetrical fault.

Unit-3 Fuses

1.1 Desirable characteristics of fuse element. Fuse Element materials.

1.2 Types of Fuses and important terms used for fuses.Low and High voltage fuses.

1.3 Current carrying capacity of fuse element.

1.4 Difference Between a Fuse and Circuit Breaker

Unit-4 Circuit breakers

1.1 Definition and principle of Circuit Breaker, Arc phenomenon and principle of Arc Extinction.

1.2 Methods of Arc Extinction, Definitions of Arc voltage, Re-striking voltage and Recovery voltage.

1.3 Classification of circuit Breakers. Oil circuit Breaker and its classification.

1.4 Plain brake oil circuit breaker. Arc control oil circuit breaker. Low oil circuit breaker.

1.5 Maintenance of oil circuit breaker, Air-Blast circuit breaker and its classification

1.6 Sulphur Hexa-fluoride (SF6) circuit breaker.

1.7 Vacuum circuit breakers.

Unit-5. Protective relays

1.1 Definition of Protective Relay. Fundamental requirement of protective relay.

1.2 Basic Relay operation, Electromagnetic Attraction type

1.3 Induction type, Definition of following important terms

1.4 Classification of functional relays, Induction type over current relay (Non-directional)

1.5 Induction type directional power relay, Induction type directional over current relay.

KALINGA UNIVERSITY
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BVE402
NETWORK ANALYSIS

Unit 1 Network Theorems

1.1 Superposition Theorem

1.2 Thevenin's Theorem

1.3 Norton's Theorem

1.4 Reciprocity Theorem

1.5 Maximum Power Transfer Theorem

Unit 2 Network Functions And Its Parameters

2.1 Terminals And Ports Z-Parameters

2.2 T-Equivalent Of Reciprocal Networks

2.3 Y-Parameters Pi-Equivalent Of Reciprocal Networks

2.4 Application Of Terminal Characteristics

2.5 Conversion Between Z- And Y-Parameters

2.6 H-Parameters

2.7 G-Parameters

2.8 Transmission Parameters

2.9 Interconnecting Two-Port Networks

2.10 Choice Of Parameter Type

Unit 3 Two-Port Networks

3.1 Asymmetrical Networks

3.2 Image Impedance

3.3 Characteristic Impedance

3.4 Iterative Impedance

3.5 Image Transfer Coefficient

3.6 Lattice And Bridged Network

3.7 Lattice Networks

3.8 Π And T Networks

3.9 The Twin-T Bridge

3.10 Bartlett's Bisection Theorem Interconnections Of Two-Port Networks

Unit 4 Synthesis Of Lc, Rl & Rc Network

1.1 Hurwitz Polynomial

1.2 Routh Hurwitz Array Method

1.3 Positive Real Function

1.4 Elementary Synthesis Procedure

Unit 5 Network Topology

1.1 BasicComplete Incidence Matrix

1.2 Reduced Incidence Matrix

1.3 Tie-Set ScheduleCutset

1.4 Duality And Dual Network

KALINGA UNIVERSITY
RAIPUR INDIA

BVE403
AC MACHINE

Unit – 1 Fundamentals Of AC Machine Windings

1.1 Physical arrangement of windings in stator and cylindrical rotor; slots for windings

1.2 single turn coil - active portion and overhang; full-pitch coils

1.3 concentrated winding, distributed winding, winding axis,

1.4 Air-gap MMF distribution with fixed current through winding - concentrated and distributed

1.5 Sinusoidally distributed winding, winding distribution factors.

Unit –2 Induction Machines

1.1 Operating principle, Construction, Types (squirrel cage and slip-ring),

1.2 Starting and Maximum Torque

1.3 Equivalent circuit, Phasor Diagram 2.4Torque-Slip Characteristics,

1.5 power flow in induction machines,

1.6 Losses and Efficiency, No load and blocked rotor test,

1.7 Circle diagram, performance characteristics, Numerical problems.

1.8 Methods of starting, braking and speed control for induction motors,

1.9 Doubly-Fed Induction Machines

1.10 Crawling and cogging.

1.11 Analysis of 3 phase induction motors with single phasing operation.

Unit –3 Synchronous Generators

1.1 Constructional features, cylindrical rotor synchronous machine

1.2 Generated EMF, equivalent circuit and phasor diagram,

1.3 Armature reaction, synchronous impedance, voltage regulation,

1.4 EMF, MMF, ZPF and ASA methods. 3.5Operating characteristics of synchronous machines,

1.6 Salient pole machine - two reaction theory, analysis of phasor diagram,

1.7 Power angle characteristics. Parallel operation of alternators -

1.8 Synchronization and load division.

Unit-4 Single-phase induction motors

1.1 Constructional features, double revolving field theory,

1.2 Equivalent circuit, determination of parameters.

1.3 Split-phase starting methods and its applications

1.4 Capacitor start and run single phase.

KALINGA UNIVERSITY
RAIPUR INDIA

BVE404

ANALOG DIGITAL INTEGRATED CIRCUIT

UNIT - 1 IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICS

1.1 Advantages of ICs over discrete components –

1.2 Manufacturing process of monolithic Ics – Construction of monolithic bipolar transistor –

1.3 Monolithic diodes – Integrated Resistors – Monolithic Capacitors –

1.4 Inductors. Current mirror and current sources, Current sources as active loads,

1.5 Voltage sources, Voltage References, BJT Differential amplifier with active loads,

1.6 General operational amplifier stages -and internal circuit diagrams of IC 741,

1.7 DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT - 2 APPLICATIONS OF OPERATIONAL AMPLIFIERS

1.1 Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower,

1.2 V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier,

1.3 Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier,

1.4 Comparators, Schmitt trigger, Precision rectifier, peak detector,

1.5 clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters

UNIT -3 ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

1.1 Analog and Digital Data Conversions, D/A converter – specifications -

1.2 weighted resistor type, R-2R Ladder type, Voltage Mode and Current-

1.3 Mode R – 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits,

1.4 A/D Converters – specifications - Flash type - Successive Approximation type -

1.5 Single Slope type - Dual Slope type - A/D Converter using

1.6 Voltage-to-Time Conversion - Oversampling A/D Converters.

UNIT-4 :NUMBER SYSTEM AND BOOLEAN ALGEBRA

1.1 Number Systems, Base Conversion Methods, Complements of Numbers,

1.2 Codes- Binary Codes, Binary Coded Decimal, Unit Distance Code,

1.3 Digital Logic Gates (AND, NAND, OR, NOR, EX-OR, EX-NOR),

1.4 Properties of XOR Gates, Universal Gates, Basic Theorems and Properties,

1.5 Switching Functions, Canonical and Standard Form.

UNIT-5 MINIMIZATION TECHNIQUES

1.1 The Karnaugh Map Method, Three, Four and Five Variable Maps,

1.2 Prime and Essential Implications, Don't Care Map Entries,

1.3 Using the Maps for Simplifying,

1.4 Multilevel NAND/NOR realizations.

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RAIPUR INDIA

BVE405P
PROJECT-IV

PRACTICAL

NETWORK ANALYSIS

1. Charging and discharging characteristics of RC series circuit
2. Verification of Thevenin's and Norton's theorems.
3. Verification of Superposition theorem
4. Verification of Maximum power transfer theorem.
5. Characteristics of Linear, Non-Linear and Bilateral Elements
6. Frequency Response of a R-L-C Series Circuit
7. Frequency Response of a R-L-C Parallel Circuit
8. Impedance and Admittance Parameters of Two Port Network
9. ABCD and Hybrid Parameters of Two Port Network
10. Measurement of power by Two Wattmeter Method.

AC MACHINE

1. Speed control of D.C. shunt motor by (a) Field current control method & plot the curve for speed verses field current. (b) Armature voltage control method & plot the curve for speed verses armature voltage.
2. To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency.
3. To perform back-to-back test on two identical 1-phase transformers and find their efficiency & parameters of the equivalent circuit.
4. To determine the efficiency and voltage regulation of a single-phase transformer by direct loading.
5. To plot the O.C.C. & S.C.C. of an alternator and to determine its Zs , Xd andregulation by synchronous impedance method.

6. To plot the V-curve for a synchronous motor for different values of loads.
7. To perform the heat run test on a delta/delta connected 3-phase transformer and determine the parameters for its equivalent circuit.
8. To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of its equivalent circuits. Draw the circle diagram and compute the following (i) Max. Torque
9. (ii) Current (iii) slips (iv) p.f. (v) Efficiency.
10. To Plot V-Curve and inverted V-Curve of synchronous motor.
11. To synchronize an alternator across the infinite bus (RSEB) and control load sharing.
12. Design of transformers: output of transformer, output equation- volt per turn, core area and weight of iron & copper, optimum design–(i) minimum cost and (ii) minimum losses. Design of core and windings. Design a 3-phase transformer.
13. Design of rotating machines: General concepts. specific loading, output equations –dc machines and ac machines, factor affecting size of rotating machines, choice of specific magnetic and electric loadings.
14. Design of 3-phase induction motors: output equation, choice of air gap flux density and ampere conductors' parameter, main dimensions. Design of a 3-phase squirrel cage induction motor.
15. Design of single phase induction motors: output equation, main dimensions, relative size of single phase and 3-phase induction motors. Design of a single phase capacitor start induction motor.
16. Design of synchronous machines: output equation, choice of specific magnetic and electric loadings, main dimensions, short circuit ratio. Design a 3-phase, 2-pole turbo alternator.

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5TH SEMESTER

BVE501

CONTROL SYSTEM

UNIT - 1 Introduction to Control Problem:

1.1 Industrial Control examples.

1.2 Mathematical models of physical systems.

1.3 Control hardware and their models.

1.4 Transfer function models of linear time-invariant systems.

1.5 Feedback Control: Open-Loop and Closed-loop systems.

1.6 Benefits of Feedback. Block diagram algebra.

UNIT -2 Time Response Analysis of Standard Test Signals:

1.1 Time response of first and second order systems for standard test inputs.

1.2 Application of initial and final value theorem.

1.3 Design specifications for second order systems based on the time-response.

1.4 Concept of Stability. Routh-Hurwitz Criteria.

1.5 RelativeStability analysis.

1.6 Root-Locus technique. Construction of Root-loci.

UNIT -3 Frequency-Response Analysis:

1.1 Relationship between time and frequency response,

1.2 Polar plots,

1.3 Bode plots.

1.4 Nyquist stability criterion.

1.5 Relative stability using Nyquist criterion – gain and phase margin.

1.6 Closed-loop frequency response.

UNIT -4 Introduction to Controller Design:

1.1 Stability, steady-state accuracy, transient accuracy, disturbance rejection,

1.2 insensitivity and robustness of control systems.

1.3 Root-loci method of feedback controller design. Design specifications in frequency-domain.

1.4 Frequency-domain methods of design. Application of Proportional, Integral and Derivative Controllers

1.5 Lead and Lag compensation in designs.

1.6 Analog and Digital implementation of controllers.

UNIT 5 State Variable Analysis and Concepts of State Variables:

1.1 State space model. Diagonalization of State Matrix. Solution of state equations.

1.2 Eigen values and Stability Analysis.

1.3 Concept of controllability and observability.

1.4 Pole-placement by state feedback.

1.5 Discrete-time systems.

1.6 Difference Equations. State-space models of linear discrete-time systems.

1.7 Stability of linear discrete-time systems.

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BVE502

COMPUTER AIDED POWER SYSTEM STUDIES

Unit 1: Introduction to Power Systems

1.1 Fundamentals of Power Systems

1.2 Power Generation

1.3 Transmission and Distribution

1.4 Key Metrics in Power Systems

1.5 Challenges in Power Systems

1.6 Role of Computer-Aided Design in Power Systems

Unit 2: Basics of Computer-Aided Design

2.1 Introduction to CAD

2.2 Power System calculations and simulations

Unit 3: Load Flow Analysis

1.1 Principles of Load Flow Analysis

1.2 Components and Data Requirements

1.3 Practical Load Flow Studies

1.4 Advanced Load Flow Techniques

1.5 Common Issues and Troubleshooting

Unit 4: Short Circuit Analysis

1.1 Fundamentals of Short Circuit Analysis

1.2 Methods of Short Circuit Calculation

1.3 Practical Short Circuit Studies

1.4 Protective Device Coordination

1.5 Advanced Techniques in Short Circuit Analysis

Unit 5: Power System Stability Analysis

1.1 Introduction to Power System Stability

1.2 Small-Signal Stability Analysis

1.3 Transient Stability Analysis

1.4 Voltage Stability Analysis

1.5 Frequency Stability Analysis

Unit 6: Power System Protection

1.1 Introduction to Power System Protection

1.2 Types of Faults and Protection Requirements

1.3 Principles of Protection Coordination

1.4 Protective Relay Types and Applications

1.5 Practical Considerations in Protection Settings and Testing

1.6 Advanced Protection Techniques and Future Trends

Unit 7: Power System Operation and Control

1.1. Introduction to Power System Operation

1.2. Load Frequency Control (LFC)

1.3. Voltage Regulation and Reactive Power Control

1.4. Economic Dispatch and Unit Commitment

1.5. Advanced Operation and Control Techniques

KALINGA UNIVERSITY
RAIPUR INDIA

BVE503

TESTING & MAINTENANCE

Unit 1 - Safety & Prevention of Accidents

1.1 Definition of Safety

1.2 I.E. Rules & Statutory regulations for safety of persons & equipment in electrical installation

1.3 Precautions to be taken to avoid fire due to electrical faults

1.4 types and operation of fire extinguishers

Unit 2 - Introduction to Testing & Maintenance of Machines

1.1 Objectives of Testing, Concept of tolerance

1.2 Methods of testing: Direct, Indirect and Regenerative

1.3 Concepts of preventive, predictive and breakdown maintenance

1.4 Introduction to Total Productive Maintenance

Unit 3 - Testing & Maintenance of Rotating Electrical Machines

1.1 Type tests, routine tests & special tests of single and three-phase Induction motors

1.2 Routine, Preventive, & breakdown maintenance of Single & 3-phase Induction motors

1.3 Maintenance schedule of alternators & synchronous machines

1.4 Brake test on DC Series motor

Unit 4 - Testing & Maintenance of Transformers

1.1 Measurement of winding resistance, no load losses, & no load current, impedance

1.2 Voltage, load losses, Insulation resistance, Induced over voltage withstand test, separate source voltage withstand test

1.3 Impulse voltage withstand test, Temperature rise test of oil & winding.

1.4 back to back test, short circuit test, open delta (delta –delta) test.

Unit 5 - Testing & Maintenance of Insulation

1.1 Classification of insulating materials

1.2 Methods of measuring temperature of internal parts of windings/machines & applying the correction factor when the machine is hot

1.3 Properties of good transformer oil, Causes of contamination of insulating oil, Procedure of acidity test, sludge test, crackle test and flash point test, Need and method of Filtration of Transformer oil

1.4 Methods of internal heating & vacuum impregnation

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RAIPUR INDIA

BVE504

DIGITAL SIGNAL PROCESSING

UNIT 1: Introduction to Digital Signal Processing:

1.1 Introduction to Digital Signal Processing: Discrete Time Signals & Sequences,

1.2 Linear Shift Invariant Systems, Stability, and Causality,

1.3 Realization of Digital Filters: Solution of Difference Equations Using Z-Transform

1.4 Realization of Digital Filters - Direct, Canonic forms.

UNIT 2 : Discrete Fourier Transforms:

1.1 Properties of DFT. Linear Convolution of Sequences using DFT.

1.2 Computation of DFT: Over-lap Add Method, Over-lap Save Method.

1.3 Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2

1.4 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms

1.5 Inverse FFT.

UNIT 3: IIR Digital Filters:

1.1 Analog Filter Approximations - Butterworth and Chebyshev

1.2 Design of IIR Digital filters from Analog Filters

1.3 Bilinear Transformation Method.

UNIT 4: FIR Digital Filters:

1.1 Characteristics of FIR Digital Filters.

1.2 Design of FIR Filters: using Window Techniques

1.3 Comparison of IIR & FIR filters.

UNIT 5 Multirate Digital Signal Processing:

1.1 Introduction, Down sampling, Decimation,

1.2 Up sampling, Interpolation, Sampling Rate Conversion,

1.3 Applications of Multi Rate Signal Processing.

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BVE505P

PROJECT-V

TESTING AND MAINTENANCE

1. Draw circuit diagram, select appropriate meters and connect it to perform routine test on single phase Induction motor.
2. As per the given circuit diagram perform routine test on three phase Induction motor & calculate the different parameters.
3. Select two single phase transformers, perform polarity test, mark its terminals, select appropriate meters & perform back to back test, compare its regulation with direct loading method.
4. Carry out OC & SC test on Induction motor and calculate motor parameters.
5. Perform brake test on DC series motor & plot characteristic of output against torque, speed, and load current.
6. Observe & carry out weekly, monthly & yearly maintenance of motor in your workshop & prepare its report.
7. Prepare trouble-shooting chart for single and three phase transformers.
8. Prepare trouble-shooting chart for single and three phase motors.

OR

1. Single line diagram of 132 or 220 or 400 KV substation (based on actual field Visit) Symbols, Plate or Pipe earthling (Drawing Sheet).
2. Study of troubleshooting of electrical equipment based on actual visit to repair workshop i) Three phase induction motor.
3. Study of troubleshooting of electrical equipment based on actual visit to repair workshop i) Transformer.
4. Construction, working and troubleshooting of any two household Electrical equipments (Fan, Mixer, Electric Iron, Washing machines, Electric Oven, Microwave - Limited to electrical faults)
5. Study the various types of earthing for electrical appliances/systems, Practice of earthing and Measurement of Earth resistance of Campus premises.
6. Wiring of distribution box with MCB, ELCB, RCCB and MCCB

7. Wiring of 40 W tube, T-5, LED, Metal Halide lamps and available latest luminaries.
8. Assembly of various types of contactors with wiring.
9. Assembly of DOL and 3 point starter with NVC connections and overload.
10. Start delta starter wiring for automatic and manual operation.
11. Industrial Visit: Visit to repair workshop (Any One). i) Three phase induction motor ii) Transformer iii) Power Cable.

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6TH SEMESTER

BVE601

ELECTRICAL TRACTION & UTILIZATION

Unit 1 - Introduction to Electrical Traction

1.1 Meaning and advantages of electric traction

1.2 Systems of traction: Steam, Diesel, Electric

1.3 Types of electric traction systems:

- DC traction system
- AC traction system
- Composite system

1.4 Comparison of AC and DC traction

1.5 Applications of electric traction (railways, metros, trams)

Unit 2 - Mechanics of Train Movement

1.1 Types of tractive effort

1.2 Factors affecting tractive effort

1.3 Adhesion and coefficient of adhesion

1.4 Resistance to motion:

- Rolling resistance
- Air resistance
- Gradient resistance

1.5 Speed-time curves:

- Trapezoidal and quadrilateral curves

1.6 Calculations related to speed, acceleration, and distance

Unit 3 - Electric Traction Drives and Equipment

1.1 Types of motors used in traction:

- DC series motor
- Induction motor
- Synchronous motor

1.2 Characteristics of traction motors

1.3 Control of traction motors:

- Rheostatic control
- Series-parallel control

1.4 Electric braking methods:

- Regenerative braking
- Rheostatic braking
- Plugging

1.5 Current collection systems:

- Overhead system
- Third rail system

Unit 4 - Power Supply and Substations

1.1 Traction power supply systems

1.2 Layout of traction substations

1.3 Feeding and distribution systems

1.4 Booster transformers and their role

1.5 Negative booster system

1.6 Protection systems in traction

Unit 5 - Electrical Energy Utilization

1.1 Electric heating:

- Resistance heating
- Induction heating
- Dielectric heating

1.2 Electric welding:

- Arc welding
- Resistance welding

1.3 Illumination:

- Laws of illumination
- Types of lamps (LED, fluorescent, incandescent)

1.4 Domestic electrical appliances and energy efficiency

1.5 Industrial applications of electrical energy

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BVE602

MATLAB & EMBEDDED SYSTEM

Unit 1 Introduction to Embedded Processors

1.1 Introduction to embedded processors– Compare Von Neumann architecture and Harvard architecture.

1.2 RISC Vs CISC – System on Chip (SoC)-Introduction to SoC Architecture

1.3 An approach for SOC Design, System Architecture and Complexity. Processor Selection for SOC.

1.4 Basic concepts in Processor Architecture, Overview of SOC external memory, Internal Memory

1.5 Scratchpads and Cache memory, SOC Memory System, Models of Simple Processor – memory interaction, SOC Standard Buses.

Unit-2 Embedded Processors On Chip Peripherals

1.1 Memory - Interrupts - I/O Ports-Timers & Real Time Clock (RTC),

1.2 Watch dog timer - CCP modules - Capture Mode - Compare Mode-PWM Mode

1.3 Serial communication module - USART - SPI interface - I2C interface

1.4 Analog Comparator, Analog interfacing and data acquisition.

Unit-3 Arm Processor

1.1 Architecture of ARM Controller – Registers, Pipeline organization 3 stage & 5 stage

1.2 Thumb mode of operation - D/A and A/D converter, sensors, actuators and their interfacing

1.3 Case study- Digital clock, Temperature sensing, Light sensing

1.4 Introduction to Internet of Things, smart home concepts.

Unit-4 Real world interfacing using arm Processor

1.1 Interfacing the peripherals to LPC2148: GSM and GPS using UART

1.2 on-chip ADC using interrupt (VIC), EEPROM using I2C

1.3 SD card interface using SPI, on-chip DAC for waveform generation.

Unit-5 Arm Cortex Processors

1.1 Introduction to ARM CORTEX series, improvement over classical series and advantages for embedded system design.

1.2 CORTEX A, CORTEX M, CORTEX R processors series.

1.3 Versions, features and applications, need of operating system in developing complex applications in embedded system.

1.4 Firmware development for ARM Cortex.

1.4 Survey of CORTEX M3 based controllers, its features and comparison.

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BVE603
ENTREPRENEURSHIP

UNIT 01 BASICS OF ENTREPRENEURSHIP

1.1 Meaning, Definitions & characteristics of Entrepreneurship

1.2 managerial competency attributes

1.3 Entrepreneurial functions

1.4 Need for Entrepreneurship

UNIT 02 ACQUIRING ENTREPRENEURIAL VALUES AND MOTIVATION

1.1 Attitude and Motivation- Meaning and concept.

1.2 Developing Entrepreneurial Motivation and Competency

1.3 Creativity, Risk Taking, Leadership,

1.4 Barriers to Entrepreneurship.

UNIT 03 INTRODUCTION TO MARKET DYNAMICS

1.1 Meaning, characteristics & types of market

1.2 perfect competition & its features

1.3 monopoly market & its features

1.4 monopolistic competition & its features

UNIT 04 ENTREPRENEURIAL OPPORTUNITIES & ENTERPRISE CREATION

1.1 what is a business opportunity

1.2 environmental factors (the Pestel model)

1.3 selection of an enterprise

1.4 steps in setting up of an enterprise

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BVE604

FIRE AND SAFETY TECHNOLOGY

Unit1: Fire & Safety Overview

1.1 Fire & safety legislation

1.3 Safety Personnel Supplier for construction sites/commissioning of plants

1.4 Understanding the physics and chemistry of fire

1.5 Development and spread of fire

1.6 Action in the event of fire

Unit 2: Fire Fighting Techniques

1.1 Means of raising alarm

1.2 means of summoning the fire brigade

1.3 action on hearing the fire alarm Evacuation procedures

1.4 Fire Service Setup, Fire-Fighting Procedures and

1.5 Fire Brigade Features in Buildings

Unit 3: Fundamentals of Fire Engineering Science

1.1 Fire Tech & Design

1.2 Fire Risk Assessment

1.3 Fire Fighting Drills

1.4 Fire & Safety Audit

Unit 4: Industrial Aspects of Fire & Safety

1.1 Industrial Training on Fire & Safety and Disaster Management

1.2 Repair of all kinds of Fire Equipment including Flooding System

1.3 Repair of Fire Tender including Pump and power take-off systems

Unit 5: Maintenance of Fire Safety Equipment

1.1 AMC of Fire System

1.2 Refilling of Fire Extinguishers

1.3 Ultrasonic Thickness Test of Extinguishers Vessels and Pipe lines

1.4 Hydro Testing of Fire Extinguishers, Vessels and Pipe Lines

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PROJECT-VI

MATLAB & EMBEDDED SYSTEM

List of Experiments in Embedded System

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.
6. Interfacing EPROM and interrupt.
7. Mailbox.
8. Interrupt performance characteristics of ARM and FPGA.
9. Flashing of LEDS.
10. Interfacing stepper motor and temperature sensor.
11. Implementing zigbee protocol with ARM.

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