

## gkfnl ; bf

### kf=p=; } 0h]S^sn P)\* 0h]S^f]gS; 0lGhlgo/sf] kf&bqmd

o; kf&bqmddf gkfnl ; b]fdf blf k]lj lws pk=; b]fgl -0h]S^sn P)\* 0h]S^f]gS; 0lGhlgo/\_ kbsf] k/Llff ; fng ug{ Pj d\ kl/Lffyl{x?nf0{ kl/Lffdf cfj Zos kg] k]lj lws blftf ! fg Pj d\ kl/Lff of]hgfsf] lj :t{t lj j /)f ; dfj z ul/Psf] % . kf&bqmdsf] ?k/}f 0h]S^sn P)\* 0h]S^f]gS; 0lGhlgo/ u/}sfx?nf0{ d}wo gh/ /fv/ tof/ ul/Psf] % . o; kf&bqmdaf^ %gf^ k/Llffdf ; fd]h xg cfPsf k/Llffyl{x?nf0{ kf&bqmddf cfwf/t /x/ ; DalGwt ^}sf] blftf dfkg ug{ ; lhnf] Pj d\ sfo{ lgbf^ ub% .

#### p@Zox?

- 1\_ 0h]S^sn P)\* 0h]S^f]gS; 0lGhlgo/ kbsf ; Deflj t pDdbj f/x?sf] ; DalGwt laifodf ; }f]Gts / Joj xfl/s !fgsf] blftf dfkg ug{ .
- 2\_ ; Deflj t pDd}f/x?nf0{ ln0g] kl/Lffsf] of]hgf af/] hfgsf/l lbg] .
- 3\_ ; DalGwt kf&bqmdsf] ?k/}fsf] cfwf/df k/Llff ; fng ug{ Pj d\ k/Llff of]hgf lgd]f ug{ ; lhnf] xg] .

o; kf&bqmdsf] cfwf/df lGDgfg' f/ ln]vt kl/Lff ln0g] % .

k)ff° M 100  
pQL)ff° M 40

Examination System	No. Of Question x Marks	Time
Long Question	5 x 10 = 50	90 Min.
Short Question	5 x 5 = 25	50 Min.
Multiple Choice	25 x 1 = 25	40 Min.

- 1= ln]vt k/Llffsf] d}wod cu]hl efiff dfq xg% .
- 2= dfly pNn]vt kqx?sf] kf&bqmdsf] ?k/}f cg' f/ lj ifoj :t' Pp^} xg%
- 3= k]yd r/)fsf] ln]vt k/Llffaf^ %gf^ ePsf pDdbj f/x?nf0{ dfq csf] r/)fsf] k/Llffdf ; lDdlnt u/f0g% .
- 4= gkfnl ; b]fsf] t]tsfng cfj Zostf tyf lj lj w kl/l:yltdf gkfnl ; b]f cg'sh xg] u/l pNn]vt lj j /)fx?df x/}k]f/ xg ; Sg] % .
- 5= kf&bqmd nfu" ldlit M 2064 ÷ cf]Zj g ÷ ut] b]v

**Detail Syllabus  
for  
ELECTRICAL & ELECTRONICS, T/Lt**

**1. COMPUTER PROGRAMMING**

Introduction to Computers, Problem Solving Using Computer, Introduction to C, Input and Output Statement, Control Statement and Structure of programs, Arrays, Modular Programming and Subprograms, Data file, Data Structures, Structured Programming, Programming Projects and Software Management

**2. ELECTRIC CIRCUITS**

Circuit Elements, Series and Parallel Circuits, Kirchoff's Laws, Network Analysis Theorem, Single phase AC Circuit Analysis, Power and Energy in AC Circuits, Three Phase Circuit Analysis, Matrix Methods in Network Analysis, Solution of differential equations with constant coefficients, Complete Time Domain Response of Second and Higher order Systems, Use of Laplace Transform Techniques for Solution of Ordinary Differential Equations with constant Coefficients, Transfer Functions, poles and Zeros of Networks, Frequency Response of Networks, Fourier Series and Transform, Two-Port Parameters of Networks, State Space Analysis

**3. ELECTRICAL ENGINEERING MATERIALS**

Theory of metals, Free electron Theory of Conduction in Metals, Conduction in Liquids and Gases, Dielectric Materials, Magnetic Materials, Semiconducting Materials, Semiconductor Materials Processing

**4. SEMICONDUCTOR DEVICES**

Linear device models, Two Terminal Nonlinear Devices, The Junction Field Effect Transistor, a Three Terminal Nonlinear Device, The Bipolar Transistor, a Three Terminal Nonlinear Device, The Metal oxide semi conductor Transistor, a Three Terminal Nonlinear Device, Switching Circuits, The Operational Amplifier

**5. LOGIC CIRCUITS**

Number System, Digital Design Fundamentals, Digital System Building Blocks, Combinational Digital System, Sequential Digital System, Sequential Machines: Synchronous and Asynchronous Machines, Digital Design Examples

## **6. ELECTRONIC CIRCUITS**

Integrated Circuit Technology and Device Models, Operational Amplifier Circuits, Operational Amplifier Characteristics, Power Supplies and Voltage Regulators, Untuned and Tuned Power Amplifiers, Oscillator Circuits

## **7. MICROPROCESSORS**

Introduction to Computer Architecture, Computer Instructions, Assembly Language Programming, Microcomputer Systems, Interrupt Operations, Stacks, Push and Pull Instruction, Static and Dynamic Variable Allocation, RISC and CISC Architectures, DSP Processors

## **8. ELECTROMAGNETICS**

Electrostatic Fields in Free Space, Gauss's law in Integral Form and Applications, Concept of Divergence, Electric Energy and Potential, Electrostatic Fields in Material Media, Boundary Value Problems in Electrostatics, Current and Current Density, Time-Invariant Magnetic Fields, Concept of Curl, Magnetic Forces and Torque, Quasi-Static Fields, Electrodynamics Fields, Wave Equations  
Retarded Potentials, Transmission Lines

## **9. INSTRUMENTATION**

Instrumentation System, Theory of Measurements, Transducers Electrical Signal Processing and transmission, Non-Electrical Signal Transmission, Analog-Digital and Digital-Analog Conversion, Digital Instrumentation, Output devices: Plotters, recorders, meters, Analytical and Testing Instrumentation, Microprocessor Based Instrumentation Systems, Data Acquisition Systems, Transmission and Telemetry of Data

## **10. ELECTRIC MACHINES**

Magnetic Circuit Concepts, Transformer, Principles of Electromechanical Energy Conversion, General Aspects of Modeling and Steady State performance of DC machines, DC Motors

DC Generators, Control of DC Machines in the steady state, Induction Machines, Synchronous Machines, Materials Used in Electrical Equipment, Review of Heat Transfer, Heating and Cooling of Electrical Machines, Design Process, Transformer Design, DC Machine Design, Three Phase Induction Motor Design

## **11. POWER SYSTEM ANALYSIS**

Three Phase Power System, Generating Plants, Transmission System, Distribution System, Power System Load Flow Study, Power System Stability, Introduction to Power System Protection

## **12. CONTROL SYSTEMS**

Component Modeling, Linearization, System Transfer Functions and Responses, Stability, Root Locus Method, Frequency Response Methods, Performance Specifications for Control System, Compensation and Design

## **13. HYDRO POWER**

Kinematics and Dynamics of Fluid flow, Hydraulic Structures for Power Plants, Turbines for Electric Power Generations, Hydraulic pump, Basic Layout of hydro power plants, Elements of Hydrology in Nepal

## **14. POWER SYSTEM CONTROL AND PROTECTION**

Fault Calculation, Principles of Power System Protection, Fuses, Isolators and Contactors, Circuit Breakers, Current and potential Transformers, Earthing and Protection Against Over Voltages Relay and Protection Schemes, Power / Frequency Control, Voltage and Var Control

## **15. POWER PLANT DESIGN**

Energy Sources, Electric Power Generation, Integrated System Planning, Power Plant Design

## **16. INDUSTRIAL ELECTRIFICATION**

Writing layouts for industrial building, Design of electrical heating systems, Design of lighting systems, Sound and communication system for industrial plants, Electrical requirements for drives for traction systems, lifts, conveyor belt and other material and personnel moving system within buildings and plants, Total energy concept and energy conservation in industrial and commercial plants, Emergency and back up electrical supplier for industrial plants

## **17. DIGITAL CONTROL SYSTEMS**

Introduction to Discrete-Time Control Systems, The Z-Transform, Z-Transform Methods for Analysis of Control Systems, Design and Compensation of Discrete-Time Control Systems, Discrete-Time State Equation

## **18. POWER ELECTRONICS**

Power Electronic Devices, Single phase ac to dc conversion, Three phase ac to dc conversion, Single phase and three phase dc to ac conversion, Power electronic applications in motor control, HVDC power transmission

## **19. POWER PLANT EQUIPMENT**

Hydro Plants, Diesel Power Plants, Combustion turbine Power Plants, Steam power plants, Combined Cycle Plants, General considerations

## **20. SAFETY ENGINEERING**

Effects of non-ionizing electromagnetic fields on humans, Electrical shock hazards, Earthing and shielding techniques for electrical equipment, Electrical induction into communication and other systems near transmission lines, Lightning Protection, Chemical and Radiation hazards, Fire hazards and fire fighting techniques in electrical equipment

## **21. HIGH VOLTAGE ENGINEERING**

High stress electric fields, Introduction to high voltage testing, High voltage aspects of terminal station equipment, High voltage transmission lines, High voltage Power cables

## **22. TRANSMISSION AND DISTRIBUTION DESIGN**

Characteristics of electrical loads, Distribution Systems Design, Essentials of Surveying and Map Reading, Transmission Systems

## **23. COMMUNICATION SYSTEMS**

Analog and Digital Communication Systems, Representation of Communication Signals and system, Continuous Wave Linear Modulators, Demodulators for Linear Modulation, Frequency Modulation and Phase Modulation, Frequency Division Multiplexing systems, Spectral Analysis, Introduction to Digital Modulation Techniques, Digital Communication Systems, Pulse Modulation systems, Digital Data Communication Systems, Representation of Random Signals and Noise in Communication Systems, Noise Performance of Analog and Digital Communication Systems, Introduction to Coding Theory

## >l ljB't tyf oflGqs ; jf lgbz gfn

-k[-p-; f 0h]S^en P)\* 0h]S^lG; sf kpfuTds k/liff -vhf

- 1= ; do M 45 ldg^
- 2= kZg ; Vof M 5 j ^f -; a) clgj foł
- 3= k)ff° M 50
- 4= plQ)ff° M 25
- 5= kZgsf] lgdf)f, kZgef/ -weightage\_ / ; dosf] laa/)rM-

S.N.	Topic	Marks	Time (Minutes)
1.	Paper simulation	15	15
2.	Component Identification and it's application	10	10
3.	Use of Various Measuring Instrument	10	5
4.	Fault finding	10	10
5.	Workshop Administration	5	5
<b>Total</b>		<b>50</b>	<b>45</b>

**1= Paper simulation:**

(k/liffsf] nlfu bz j ^f Circuit diagram lb0g], h; sf] required output n\g' kg] -k]t ; lx answer 1=5 marks sf] b/n] k]pg ul/g] % .

**2= Component Identification and it's application:**

k/liffyl] layout u/l /flvPsf laleGg Electronic/Electrical components sf] Technical gfd n\g' kg] xG% / lb0Psf] component sxf sxf k]f]u xG% eG] ; d]t vnfpg' kg] % . o; df 5 k]sf/sf ; fdfgx? b\vf0g] / k]o]s gfd / k]f]u ; lx ePdf 2 cS k]pg ul/g] % .

**3= Use of Various Measuring Instruments**

k/liffyl]nf0( laleGg k]sf/sf Measuring Instrument lb0g] . pQm measuring Instruments k]f]u u/ s]g} 5 j ^f components sf] voltage, current, continuity, resistance, polarity n\g' kg] . k]t ; lx answer sf] cS 2 k]pg ul/g] % .

**4= Fault finding**

k/liffyl]nf0( s]g} 2 j ^f Faulty circuit lb0g] . pQm faulty circuit df ePsf ; d:of kQf nufpg' kg] . k]o]s ; d:of ; lx klxrfg u/]df 2.5 marks / faulty circuit correction u/]df 2=5 marks u/l hDdf 10 marks lb0g] % .

**5= Workshop Administration**

k/liffyl]nf0( workshop administration ; DaGwdf Viva kZg ln0g], pQm Viva df 5 j ^f kZg ; f]wg] . k]o]s ; lx pQm/sf] cS 1 k]pg ul/g] % .

6 k]f]uTds k/liffdf k/liffyl] sfo( ; Dkfbg u/]sf] ; Dk)f( lj j /)fx?sf ; Dej eP; Dd Hard/Soft Copy k]o]s pDdbj f/x?sf] %Sf%S} vfdff l; nalGb u/l egf( %gf^ lgbz gfnodf k&fpg" kg] % .

7= k]f]uTds k/liffsf] cgludg >l n]s ; jf cfof]u jf >l /lff dGqfnosf k]tlglwaf^ clgj foł ?kdf xG] % .