VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-II (Electronics & Communication Engg.)

Semester - VII

Electrical Instrumentation

Microprocessors & Applications to Electrical Engineering

Electrical Power Systems III

Elements of Electrical Design

Industrial Power Electronics

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-IV (Electrical Engg.)

Semester - VII

E LE 701 ELE Electrical Instrumentation

	Lecture	Tutorial	Practical
Teaching Hours	2	1	0
Examination Scheme Marks	100	25	Continuous Evaluation 0 Examination 0

Measurement of voltage, current & other related parameters :-Review of static characteristics of instruments, dynamic characteristics of instruments, digital voltage measurement techniques, electronic methods of current, power and energy measurement, digital ohmmeter, digital capacitance meter, digital quality factor meter, digital loss angle meter, tri vector meter.

Ultrasonic and Optical Instrumentation :- Photoelectric Devices and applications, piezoelectric transducers and applications, principles of optical fibers and applications in instrumentation,

Frequency and time measuring instruments (Digital) :- Frequency counter, period duration meter, pulse width meter, frequency ratio measuring instrument, electronic phase-meter, errors in digital instruments.

Signal conditioning, data acquisition and conversion :- Instrumentation amplifiers, isolation amplifiers, sample and hold circuits, multiplexers and de-multiplexers, data converters, v/f; f/v; A/D; D/A conversion, data acquisition systems, encoders, guarding and shielding techniques in electronic measuring systems.

Waveform generators :- Oscillators, pulse and square wave generators, signal generators, function generators, signal analysis, switched capacitor filters.
Digital signal transmission and processing :- Data transmission systems, pulse code formats, modulation techniques for digital data transmission, serial data communication, telemetry systems, digital signal processing: sampling theorem, discrete Fourier transform, fast Fourier transform algorithms, circular convolution, digital filters and design.

Reference:-

1) Helfrick–cooper, Modern Electronic Instrumentation and Measurement Techniques, PHI, 1994.
2) T. S. Rathore, Digital Measurement Techniques, Narosa publishing house, 1996.
3) Reissland M. U., Electrical Measurements, Wiley Eastern Limited, 1992.
4) Oliver-cage, Electronic Measurement and Instrumentation, McGraw hill int. Edition, 1975.
5) Ranga, sarma, Mani, Instrumentation Devices and Systems, TMH, second edition 1997.
6) Doebellin E.O. , Measurement systems, McGraw Hill International Edition, IV Ed 1990.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-IV (Electrical Engg.)

Semester - VII

E LE 702 ELE Microprocessors & Applications to Electrical Engineering

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation 20 Examination 3

Number Systems :- System of representing numbers- Binary, Octal, Hexadecimal, BCD, Gray code, ASCII Code, Conversion from one system to another.

Microprocessor Architecture (8085A) :- Introduction, Registers, concept of data, address and data buses, memory (RAM, ROM, and EPROM), input output devices, Microcomputer systems.

Instructions, Timing and Programming Methods :- Instruction set and classifications, timing diagrams, fetch and execute cycles, addressing modes, assembly language programs, single stepping and single cycle utility routines in microprocessors kits, simple programming techniques like looping, counting, indexing, sub-routines, parameter passing and software time delays.

Data Transfer Techniques: Synchronous and asynchronous data transfer, polling, interrupt driven data transfer, masking of interrupts, serial data transfer, direct memory access data transfer, timing cycles, op-code fetch cycle, memory and I/O read and write cycles.

Parallal Input/Output and Interfacing Applications :- Basic Interfacing concepts, Interfacing of memory chips, Interfacing with seven segment display and key-board.
General purpose Peripheral Devices :- Block diagram, pin configuration and operating modes of 8251, 8254, 8255, 8259 , 8279 (or their currently available functionally equivalent / upgrade)and DMA controller, asynchronous receiver / transmitter (UART) etc. interfacing these chips to 8085A.

DAC & ADC:- DAC & ADC chips and their interfacing.

Higher bit Chips :- Brief description of 6800/ 68000 series, 8086, 8088, 80286, 80386, 80486, Pentium and other higher bit chips.
Microprocessor applications in some area like :- (a) Electric drives (b) Power Systems : protection e.g. over current relay, under and over frequency relay, impedance and mho relay, differential relay

Text /References:

1) Gaonkar: Microprocessor Architecture, Programming and Applications, Wiley Eastern.
2) Mathur: Introduction to Microprocessors. TMH.
3) Badri Ram: Fundamentals of microprocessors and microcomputers, Dhanpat Rai

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-IV (Electrical Engg.)

Semester - VII

ELE 703 ELE Electrical Power Systems III

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	00	Continuous Evaluation 20 Examination 30

System economics, cost of generation and tariff :- choice of plant and site, estimation of capital and running charges, energy cost, distribution of costs, fixed charges, running charges, formation of tariffs, flat rate, block rate, two part and special types of tariffs, their analysis and application, penalty clause for power factor, fuel and such variable factors, reduction of energy cost, factors governing the reduction of energy cost, low power factor loads, causes and effects, methods of improving power factor at load and supply points, calculations of leading KVA on economical basis, improvement of load factor, use of peak energy.

Load studies :- load forecasting, anticipated load growth, load growth rate of the country and the world, load characteristics, industrial, commercial, residential etc.

Load analysis :- load curves, maximum and average demands on a system, load factor, diversity factor, plant capacity factor, utilization factor, influence of these factors on power station economy, cost of generation and cost of supply.

Optimal system operation:- incremental rate, economic loading by incremental rate, development for loss formula for simple circuits, transmission loss as a function of voltage and phase angle, effects of transmission losses.

Basic principles and ratings of circuit breakers :- principle of arc formation and extinction, arc control devices, circuit breaker operating mechanism and control systems, making current, breaking current symmetrical and unsymmetrical, continuous current rating, MVA capacity.

Types of circuit breakers :- DC and AC circuit breakers, bulk oil, minimum oil, air break, air blast, sulfur hexafluoride and vacuum circuit breakers.

Testing of circuit breaker :- direct and indirect methods of testing.
Indoor and L.V. switchgear including isolators, fuses, HRC and others, co-ordination and grading.

References :-

1) Elements of electrical power station design by M V Deshpande, A H wheeler.
2) Elements of power system analysis by W D Stevension, TMH.
3) Principles of power system engineering by V K Mehta, S Chand and Co. Ltd.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-IV (Electrical Engg.)

Semester - VII

E LE 704 ELE Elements of Electrical Design

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation 20 Examination 30

Electrical Engineering Materials :- High conductivity and high resistivity materials and their uses, Super conductivity, Magnetic material used in electrical machinery, Classification of insulating materials and their uses in electrical machines.

Heating and Cooling of Electrical Machine :- Modes of heat conduction, Temperature gradient in machine, Cooling of rotating electrical machine, Types of enclosures, Transient and steady state temperature rise calculation, Duties and ratings, Determination of motor rating for variable loads.

Magnetic Circuit Calculations :- Magnetic circuit of rotating machine, Gap flux distribution curve, MMF for the gap teeth and core, Real and apparent flux density, Leakage flux in salient pole machine, Magnetisation curve, Iron losses, Eddy current losses in thin sheets, Magnetising current for concentrated and distributed winding, Unbalanced magnetic pull.

Magnetic Leakage Calculation :- Leakage flux and leakage reactance in rotating machine, Permeance coefficient, Slot leakage- open and semi closed slots, Parallel sided and tapered slots, Round and T-bar slots, Tooth head, Overhang zigzag and harmonic leakage, Leakage reactance of distributed windings.

Eletromagnets :- Types of electromagnets, Basic equations used in design of electromagnets, Design of field coils, Design of flat faced horse-shoe type and plunger type electromagnets. Design of Electrical Accessories :- Calculation of resistance steps for D.C. motor and induction motor starters and field regulators, Design of resistance for stators field regulators loading resistors and heating elements.

Design of Transformers :- Core construction, Hot rolled and CRGO cores, Core sections, Types of windings, Insulation, Types of cooling, Output equations, Optimum design, Design of core and winding, Leakage reactance for cylindrical and sandwich coils, Mechanical forces, Magnetising current, Design tank and tubes, Design of welding transformers current transformers and chokes, Computer aided design of transformers.

Texts\References:-

1) A course in Electrical Machine Design, A. K. Sawhney, Dhanpat rai & sons
2) The Performances and Design of Alternating Current Machines, M. G. Say, ELBS.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-IV (Electrical Engg.)

Semester - VII

ELE 705 ELE Industrial Power Electronics

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation 20 Examination 30

Introduction :- Application of Power electronics, Power semiconductor devices, Control characteristic of power devices, Types of power electronics circuits, Thyristor Characteristics, Two transistor analogy, Gate Characteristics, Methods of triggering and commutation, Ratings and protection of devices, Modern power electronic devices (Power BJT, MOSFET, GTO, IGBT)

Phase Controlled Rectifiers :- Principle of phase control, half wave controlled rectifiers, half wave controlled rectifiers with R, R-L, R-L-E load, single phase full wave controlled converters, 2-pulse mid-point converters, 2-pulse half and fully controlled bridge converters with R, R-L, R-L-E load, Three phase converter system with diodes, 3 phase half and fully controlled bridge converters, triggering scheme, Effect of source impedance on the performance or the converters, Dual converters.

Choppers :- Basic principle of chopper operation, Control strategies, Types of idealized chopper circuits, Steady state time domain analysis of choppers, Thyristor commutation in chopper circuits, step up chopper.

Inverters :- Forced commutated inverters, Single phase voltage source inverters, Half bridge full bridge inverters, Single phase voltage source inverters, Half bridge and full bridge inverters, Steady state analysis, Modified Mc Murray inverters, 3-phase bridge inverters, Voltage control in single phase inverters, Pulse width modulated inverters, 1-pulse and multi pulse modulation, Sinusoidal PWM and realization of Sinusoidal PWM in 3 phase circuits, Reduction of harmonics.

AC Voltage Controllers :- Types of ac voltage controllers, 1-phase controllers with R and R-L load, 3-phase voltage controllers, Cycloconverters.
Applications of Power Electronics :-Speed control of dc drives through control rectifiers and choppers, battery chargers, speed control on I/M.

Text/References: -

1) “Power Electronics” by Dr. P.S. Bimbhra, Khanna publishers.
2) “Power Electronics - circuits, devices and applications” by Muhammad h. Rashid, Prentice Hall of India, second edition.
“Power Electronics – Converters, Applications and Design” by Mohan, Undeland and Robbins, John Willey & sons, Inc., Second Edition.
“Power Electronics ” by P. C. Sen.