Price:- 7 Rs.

॥ अंतरी पेटवू ज्ञानज्योत ॥

North Maharashtra University, Jalgaon

Syllabus for Fourth Year Engineering Degree Course

Industrial Electronics

w.e.f. July,2001

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (INDUSTRIAL ELECTRONICS)
(1998 Course)
With Effect from Academic Year 2000-2001
TERM - I

Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper duration Hours	Maximum Marks			
					Paper	Term work	Practical	Oral
	Elective - I	4	2	3	100	25	25	-
	Power Electronics I *	4	2	3	100	25	25	-
	Electronics Instruments and Measurements	4	2	3	100	25	-	-
	Electronic Communication II *	4	2	3	100	25	25	-
	Seminar	-	2	-	-	-	-	50
	Project Work	-	4	-	-	50	-	-
	Total	16	14	-	400	150	75	50
	Grand Total	30		-	675			

NORTH MAHARASHTRA UNIVERSITY, JALGAON
B.E. (INDUSTRIAL ELECTRONICS)
(1998 Course)
With Effect From Academic Year 2000-2001
TERM - II

Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
		Lectures	Practical	Paper duration Hours	Maximum Marks			
					Paper	Term work	Practical	Oral
	Elective - II	4	2	3	100	25	25	-
	Power Electronics-II *	4	2	3	100	25	25	-
	Electronics Systems Design	4	2	3	100	25	25	-
	Industrial Instrumentation	4	2	3	100	25	-	-
	Technical Visit	-	-	-	-	50	-	-
	Project Work	-	4	-	-	50	-	50
	Total	16	12	-	400	200	75	50
	Grand Total	28		-	725			

Total Marks of Term I + II = 1400)

* Paper common with B.E. (Electronics)

In Continuations of B.E.(Industrial Electronics) Syllabus

Elective - I

1. Advanced Digital Techniques
2. Modern Control Theory
3. Optoelectronics

Elective - II

1. Medical Electronics
2. Robotics
3. Computer Techniques

BE(INDUSTRIAL ELECTRONICS)
TERM-I
ADVANCED DIGITAL TECHNIQUES

Teaching Scheme:
Lectures:4Hrs/week
Practicals:2Hrs/week

Examination scheme:
Paper:100 marks
(3 Hours duration)
Termwork:25 marks
Practical:25 marks

UNIT I
Fourier Transform & Z Transform
Fourier Transform,Energy spectrum for non-periodic function,properties of Fourier transform,Fourier transform of some important signals,Fourier transform of power & energy signals.
Z-transform,Inverse Z-transform,Regien of convergence,z-transform pairs,properties of z-transform,evaluation of inverse z-transform by different methods

(10Hrs;20marks)

Unit II
Discrete & fast fourier transform:
Discrete time fourier transform,Discrete fourier transform,properties of DFT,Fast fourier transform,Decimation in time Algorithm ,Decimation in frequency Algorithm,computing an inverse DFT by doing direct DFT

(10Hrs;20marks)

Unit III
FIR filters & IIR filters
Magnitude response & phase response of digital filters,frequency response of linear phase FIR filters,Design technique for FIR filters,fourier series methods,frequency sampling method,Different window techniques
IIR filter desien by approximation of derivatives,IIR filter design by impulse invarients' methods,Bilinear transformation,butterworth filter,chebysher filter,Inverse chebsev filter elliptic filters,frequency transformation,analog frequency trasformation,digital frequency trasformation

(10Hrs;20marks)

Unit IV
Sampling and Quantization
Sampling,sampling theorm,sampling rate conversion,sampling of sinusoidal and periodic signals,sampling interpolation and recovery
Quantisation rounding and errors,quantisation effects in analog to digital conversion of signals,output noise power from a digital processing of analog signals,practical ADC consideration, C.D audio recording and playback

(10Hrs;20marks)

Unit V

Application of advanced digital techniques :
Voice processing,speech signals,analysis of speech signals, short time spectrum analysis,speech analysis,synthesis system,compression and coding,channel vocoders,sub-band coding,voice privacy
Application of RADAR,Application to image processing,Introduction to wavelets,Application of wavelet transform
(10Hrs;20marks)

References:

1.Analog and digital signal processing -second edition
Ashok Ambardar,Brooks/cole publishing company
2.Digital signal processing
S.Salivahanan,A.Vallavaraj,C.Ghana priya. Tata McGraw hill.
3.Advanced digital signal processing.
Parkais John G.Macmillan Publishing Company
4.Application of digital signal processing
Rabinar and Gold

The termwork should include a minimum of six experiments covering the above syllabus.The termwork works will be based on performance in theory & practicals having a weightage of 40% & 60% respectively.

B.E(INDUSTRIAL ELECTRONICS) TERM:-1 ELECTIVE-1

MODERN CONTROL THEORY

Examination Scheme

Teaching Scheme:-4 Hours/Week.
Pract:-2 Hours/Week.

Pract:-25 Marks.
Paper:-100 Marks.
(3 Hours duration)
Term Work:-25 Marks.

UNIT I:- STATE SPACE RERRESENTATION OF DYNAMIC SYSTEMS:-
Mathematical,Physical notation of system state, Block-Diagram Representation,Lagrange's Equations,Mathematical models and a few physical processes.

DYNAMIC OF LINEAR SYSTEMS
Solution of Linear Differential Equations in state space form, Properties of the state variables state Transition Matrix, Transformation & state variables state space representation of Transfer function.

UNIT II:- FREQUENCY DOMAIN ANALYS
Frequency Domain characterisation of Dynamic Behaviour concept of Stability & Routh Hurwitz Test, Graphical Methods, Steady-State Response,Dynamic Responce,Robustness, Multivariable systems.

CONTROLLABILITY & OBSERVABILITY
Origin of uncontrollable or unobservable systems,Definations, Algebraic conditions for controllability & Observability, Exogenous Variables.

UNIT III:-POLE PLACEMENT:-
Desirable Regions for close loop poles, Design of Regulators for SISO Systems, Multiple Input Systems,Exogenous Variables.

LINEAR OBRSERVERS:-
The need for observers, structure and properties of observers, pole placement for single output system, Reduced-order observers, Compensator Design by the separation Principle.

UNIT IV:-INTRODUCTION TO RANDOM PROCESSES & KALMAN FILTER:-
Conceptual models of Random processes,Statistical Characteristics of Randon processes white Noise & liner system Responce KALMAN FILTER.

UNIT V :-NONLINEAR CONTROL SYSTEM:-
Introduction to Nonlinear systems. Different types of linearities commonly occurring in electrical systems, Phase planar Method, Method of isoclines, limit lines & dividing lines on phase plane limit cycles, Describing function Method,Defination of describing function,Derivation of Describing function for different types of Nonlinearties, limit cycles.

COMPENSATION
Design Considerations lag,lead,lag-lead compensation.

REFERENCE BOOKS

Control System Design:- An Introduction to state-space Method by ;B.Friedland, Mc.Graw Hill International Edition MC Graw Hill Book Co.Sungapore 1987.

Modern Control System Theory By M.Gopal, Wiley Easterm Ltd. New Delhi 1984.
Linear System By T.Kr0lrth Prentice-Hall Inc. Eaglewood,Clif/s N.J (U.S.A).

Modern Control Engineering- K.Ogata.
Automatic control Sysytems-B.C.Kuo.

The termwork should include a minimum of six experiments covering the above syllabus.The termwork works will be based on perform ice in theory & practicals having a weightage of 40% & 60% respectively.

BE(INDUSTRIAL ELECTRONICS)
TERM-I ELECTIVE-I
OPTOELECTRONICS

Teaching Scheme:
Lectures:4Hrs/week
Practical:2Hrs/week

Examination scheme:
Paper:100 marks
(3 Hours duration)
Termwork:25 marks
Practical:25 marks

UNIT I
Light:Nature of light;wave nature of light-polarisation,principle of superposition,interference,diffraction;light sources-blackbody radiation;units of light
Modulation of light;elliptical polarisation;birefingence;electro-optic effect;Kerr modulators;magneto optic devices;acousto-optic devices;nonlinear optics-parametric oscillation
(10Hrs;20marks)

Unit II
Laser I: emission & absorption of radiation;Einstein relation;absorption of radiation;population inversion;laser modes-axial,transverse;classes of laser-doped insulator, semiconductor,gas,liquid dye
(10Hrs;20marks)

Unit III
Laser II: single mode operation;frequency of stabilisation;mode locking,Q-swithing;Laser applications-properties of laser light;measurement of distance-interferrometric methods,beam modulation telemetry,pulse echo technique;holography;laser induced nuclear fusion
(10Hrs;20marks)

Unit IV
Photodetectors: Thermal detectors -thermoelectric, balometer, pneumatic,pyroelectric; photon devices -photoemissive ,vacuum photodiodes,photomultipliers,junction detectors,detector arrays
Display
devices: Luminescence; photoluminescence; chathodoluminescence electroluminescence,LEDS-materials,construction,response times, drive circuitry;plasma displays liquidcrystal displays

(10Hrs;20marks)

Unit V

Optical communication systems: modulation schemes-analog,digital;free space communications;fibre optical communication - systems operating wavelength, emitter design, detector design,fibre choice,system design,local area networks; integrated optics-slab & stripe waveguides, devices, emitters & detectors.

(10Hrs;20marks)

References:

1.Optoelectronics:an introduction,second edition,J.Wilson,J.F.B. Hawkes,Prentice -Hall of India
2.Photonics:elements & devices,V.V.Rampal,wheeler

The termwork should include a minimum of six experiments covering the above syllabus.The termwork works will be based on performance in theory & practicals having a weightage of 40% & 60% respectively.

B.E(ELECTRONICS) AND B.E.(INDUSTRIAL ELECTRONICS)

Term I
Power Electronics I

Teaching Scheme:
Lectures: 4 hrs/week
Practical: 2 hrs/week

Examination scheme:
Paper : 100 marks
(3 hrs duration)
Termwork : 25 marks
Practical: 25 marks

Unit I:

Line-frequency phase controlled rectifiers and inverters : single phase coverters - idealised circuits,dc-side voltage,line current,power,power factor and reactive volt-amperes;effect of Ls,input line current;practical thyristor converter,discontinuous current conduction;inverter mode of operation,inverter start-up,ac voltage waveform(line notching and distortion). three phase converters - idealised circuit,dc-side voltage,input line currents,power,power factor and reactive volt-amperes;effect of Ls,input line current;practical converter,discontinuous-current conduction,inverter mode of operation,inverter start-up;ac voltage waveform(line notching and distortion).

(10 hrs;20marks)

Unit II:

dc-dc switch-mode converters:dc-dc converter system,block diagram description;control of dc-dc converters;step-down (buck) converter,continious conduction mode,boundry between continuous and discontinuous conduction,discontiniuous-conduction mode,output voltage ripple;step-up (boost) coverter,continuous-conduction mode,boundry between continuous and discontinuous conduction,discontinuous conduction mode,effect of parasitic elements,output voltage ripple;buck-boost converter,continuous-conduction mode,boundry between continuous and discontinuous conduction,discontinuous conduction mode,effect of parasitic elements,output voltage ripple;Cuk dc-dc converter,full bridge dc-dc converter, PWM with bipolar voltage switching,PWM with unipolar voltage switching;dc-dc converter comparison.

(10 hrs;20 marks)

Unit III:

Switch-mode dc-ac inverters: application and types;basic concepts of switch-mode inverters,PWM switching scheme,square-wave switching scheme;single-phase inverters - half-bridge inverters,full-bridge inverters - PWM with bipolar voltage switching,dc-side current,PWM with unipolar voltage switching,square wave operation,output control by voltage cancellation,switch utilisation in full-bridge inverters,ripple in output,push-pull inverters,switch utilisation,three-phase inverters,PWM in three-phase voltage source inverters,square-wave operation in three-phase inverters,switch utilisation,ripple in inverter output,dc-side current,conduction of switches,effect of blanking time on voltage in PWM inverters;other inverter swiching

schemes,square-wave pulse switching,programmed harmonic elimination switching,current-regulated (current-mode) modulation,switching scheme incorporating harmonic neutralization by modulation and transformer connections;rectifier mode of operation.

(10 hrs;20marks)

Unit IV:
Resonant converters: zero-voltage and/or zero-current switching application,switch mode inductive current switching,zero-voltage and zero current switching;classification of resonant converters,load-resonant converters,resonant-switch converter, resonant-dc-link converters,high frequency-link-integral-half-cycle converters;basic resonant circuit concepts,series-resonant circuits - undamped series-resonant circuits,series-resonant circuits with a capacitor-parallel load,frequency characteristics of a series-resonant circuit;load-resonant converters,series-loaded resonant dc-dc converters,discontinuous-conduction mode,continuous-conduction mode,steady-state operating characteristics,control of SLR dc-dc converters,parallel-loaded resonant dc-dc converters - discontinuous mode of operation,continuous mode of operation, steady-state operating characteristics,hybrid resonant dc-dc converter,parallel resonant dc-to-dc inverters for induction heating - start-up,class E converters;resonant-switch converters;zero-voltage switching, clamped voltage topologies;resonant-dc-link inverters with zero-voltage switching,high-frequency-link-integral-half-cycle converters.

(10 hrs;20marks)

Unit V:
Switching dc power supplies: overview of switching power supplies;dc-dc coverters with isolation,unidirectional core excitation,bidirectional core excitation,control of dc-dc converters with isolation,flyback converters(derived from back-booshed converters),other flyback converter topologies-two-transistor flyback converter,paralleling flyback converters,forword converters(derived from step-down converters),other forword converter topologies- two-switch forword converter,paralleling forword converters,push-pull converters(derived from step-down converters),half-bridge converter(derived from step-dowm converter),full bridge converter(derived from step-down converter),current source dc-dc converter,transformer core selection in dc-dc converters with electrical isolation,control of switch mode dc power supplies - block diagram description,voltage feed forword PWM control,current mode control,digital pulse width modulation control,power supply protection,soft start,voltge protection,current limiting,electrical isolation in feedback loop,desiging to meet power supply specification,input filter,input rectifier bridge,bulk capacitor and the holduptime,limiting in rush(surge) current at initial turn-on,equivalent series resistance of output filter capacitor, synchronous rectifier to improve energy efficiency,multiple outputs,EMI consideration,power coditionres and uninterruptable power supplies: power line disturbances - types and sources,effect on sensitive equipment,power conditioners;uniterrutable power supplies(UPSs),block diagram description,rectifier,batteries,inverters,static transfer switch.

(10 hrs; 20 marks)

Referances:

1. Power electronics: conveters,applications and design,second edition.
   by Ned Mohan, T.M.Udeland, W.P. Robbins, John Wiley and Sons.
2. An introduction to Thyristors and their application,second edition.
   by M.Ramamoorty, East-West Press.
3. Power electronics.
   by Vedam Subrahmanyam, NewAge International.
4. Power electronics.
   by P.C.Sen,Tata McGrawHill.

List of Experiments:

1. Dc to dc switch mode converter: 2 expts.
2. Switch mode dc to ac inverters: 2 expts.
3. Resonant converters: 2 expts.
4. Switching dc power supply: 1 expt.
5. Uninterruptable power supply: 1 expt.

The term work should include a minimum of six experiments from the above list. The term work marks will be based on performance in theory and practicals having weight of 40 % and 60 % respectively.

BE(ELECTRONICS & INDUSTRIAL ELECTRONICS)
TERM-I
ELECTRONIC INSTRUMENTS & MEASUREMENT

Teaching Scheme:
Lectures:4Hrs/week
Practical:2Hrs/week

Examination scheme:
Paper:100 marks
(3 Hours duration)
Termwork:25 marks

UNIT I

True rms responding voltmeter,Q-meter,vector impedence meter,vector voltmeter,RF power & voltage measurement,signal generators:frequency synthesized signal generator,signal generator modulation,sweep frequency generator,function generator
(10Hrs;20marks)

Unit II

Signal Analysis: wave analyzers,harmonic distortion analyzers,spectrum analyzer
Frequency counters & time interval measurements:
simple frequency counter measurement errors,extending frequency range of the counter,automatic & computing counters
(10Hrs;20marks)

Unit III

Oscilloscopes: block diagram,CRT circuits,vertical deflection system,oscilloscope probe,delay line multiple trace,horizontal deflection system,digital storage oscilloscope
(10Hrs;20marks)

Unit IV

Analog & digital data acquisition systems: Instrumentation systems;interfacing transducers to electronic control & measuring systems - instrumentation amplifier,shielding,isolation amplifier,effects of load resistance,current loop transmitter,frequency-to-voltage & voltage-to-frequency converters,multiplexing
Computer controlled test systems:testing an audio amplifier,testing a radio receiver,IEEE 488 standard interface
(10Hrs;20marks)

Unit V

Recorders: galvanometric recorders;servorecorders-block diagram description,performance characteristics;magnetic recording-recording process,digital data recording,analog recording,reproduction process,noise in reproduction;line printer;ink-jet printer
Fibre optics measurements:introduction,sources & detectors,fibre optic power measuring,stabilised calibrated light sources,end-to-end measurement of fibre optic system loss,optical time-domain reflectometer
(10Hrs;20marks)

References:

1.Modern Electronic Instrumentation & measurement Techniques,A.D. Helfrick,W. D. Cooper,Prentice-Hall of India.
2.Electronic Measurements & Instrumentation,oliver & cage,Mc-Graw-Hill International edition.
3.Instrumentation:Devices & systems,second edition,C.S.Rangan,

The termwork should include a minimum of six experiments covering the above syllabus.The termwork works will be based on performance in theory & practicals having a weightage of 40% & 60% respectively.

B.E.(ELECTRONICS) AND B.E.(INDUSTRIAL ELECTRONICS)
Term I

Electronic communication II

Teaching scheme:
Lectures: 4 hrs/week
Practical: 2 hrs /week

Examination scheme:
Paper: 100 marks
(3 hours duration)
Termwork : 25 marks
practical :25 marks

UNIT:I
Television fundamentals: television broadcasting;television picture elements; television cameras, vidicon, plumbicon, saticon:colour pictures:scanning and synchronization: video signal, horizontal blanking time, vertical blanking time, video signal amplitudes and frequencies ,colour information in video signals.

(10 hrs;20 Marks)

UNIT:II
Television transmission : vestigial sideband transmission,television broadcast channel, standard television channel FM sound signal, television transmission standards, line of sight transmission, satellite television.
Television Receivers: Functional block diagram description, sync and deflection,automatic gain control,DC power requirements, RF-section,IF section,video detector ,video amplifier section,dc component of the video signal,sound If section,receiving antenna.

(10 Hrs;20 Marks)

UNIT:III
Colour television receiver:producing luminance image,IF Circuits,chroma section ,bandpass amplifier,colour demodulators.
Cable television:cable frequencies,coaxial cable used,cable losses,cable distribution system,cable TV converters.

(10 Hrs;20 Marks)

UNIT:IV
Raster circuits and sync: Amplitude and waveform separation of sync,sync separator,vertical sync integrator,vertical deflection,troubles in vertical scanning,horizontal sync and deflection,vertical rolling of pictures,diagonal black bars in the picture,power supplies,troubles in horizontal scanning and HAFC

(10 Hrs;20 Marks)

UNIT:V
Video tape recorders and disk players:video recording requirements,FM recording,rotating heads ,slant tracks ,servo controls,VCR connections to the TV receivers ; Tape recording and playback,recorded wavelength ,play back frequency response, head gap and recorded wavelength;VCR modulation for luminance signal ; color under system for the chroma signal ,down conversion of the frequency for recording up conversion of playback signal,

cancellation of the time - base error,combined colour and luminance singanls;rotary head -drum assembly,slant tracks; scanner servo system;Video disk systems ,optical disk,capasitance disk,modulation and playback in each type .

(10 Hrs;20 Marks)

References:

1.Basic Telivision and Video Systems,fifth edition.
By-Bernard Grob,Mc-Graw Hill International Edition.
2.Modern Television Practice,principles,technology,and servicing
By-R.R.Gulathi,New Age International.
3.Television Engineering.
By-A.M.Dhake,Tata McGraw hill.

List Of Experiments:

1.Study Of TV receiver(tracing,voltage,measurement etc.)
2.RF and If alignment of TV receiver using wobbuloscope.
3.Fault% finding of TV reciver,use of pattern genarator.
4.Yagiaantenna-Measurement of gain,directivity and impedance.
5.Study of VCR .
6.TV reception through satellite link .
7.Booster gain measurement.
8.Video amplifier.

The termwork should include a minimum of six experiments from the above list.The termwork will be based on performance in theory and practicals having a weightage of 40% and 60% respectively .

B.E. INDUSTRIAL ELECTRONICS ENGINEERING

TERM-I

SEMINAR

TEACHING SCHEME:	EXAM SCHEME:
Practical : 2 Hrs/week	Oral : 50 marks

Student shall select a topic based on latest research and development in the field of electronics, telecommunication, power electronics, computer or allied field. he/she shall undergo detail study of the topic under supervision of guide. he/she shall submit a seminar report consisting of introduction,literature survey concept, analysis, application, future development and other information related topic.

Exam Scheme :
Seminar shall assessed by a panel of two examiners appointed by University Authority. (one of which shall be guide)
Seminar exam shall consist of presentation by student in the presence of examiners & staff members & other students of the duration of about 15 to 20 minutes and minutes followed by oral exam.

Evaluation Scheme :

Quality/Presentation of report	: 10 marks
Presentation	: 20 marks
Subject knowledge	: 20 marks

B.E. INDUSTRIAL ELECTRONICS ENGINEERING

TERM-I

PROJECT PART - I

TEACHING SCHEME:
Practical : 4 Hrs/week

EXAM SCHEME:
Term Work : 50 marks

Project work will be carried out by a batch of at the most 3 students working on a topic related to electronics, power electronics, telecommunication, computer science (Simulation base) and allied field. The topic may be form one of the following :

1. Laboratory work involving theoretical design and implementation of the electronics (allied field) system/project.
2. Design modification with fabrication of an existing electronics system/equipment.
3. System design and fabrication based on practical need of industry,
4. Simulation software.

In the first term batch of students must get approved synopsis of the project and register the name of project to university within 4 weeks from the commencing the term. Theoretical design of project and at least 25 percent of implementation must over during the first term. Candidate shall submit term work in the form of hand-written /typed report which shouid include literature survey, technical details, design and related data and that are required for project - II and a separate progress report consisting of data-wise attendance and work done on the day.

The candidate shall give a talk on topic of the project in the presence of staff members and students. The term work will assessed by two internal examiners (one of the examiner shall be guide and
other examiner shall be teacher of concerned dept.) appointed by principal of institution.

B.E.(Industrial Electronics)
Term II (ELECTIVE II)

Medical Electronics

Teaching scheme:
Lectures:4 Hrs/week
Practical:2 Hrs/week

Examination scheme:
Paper:100 marks
(3Hrs. Duration)
Termwork:25 marks
Practical:25 marks

Unit 1

Bioelectric potentials: physiology of nerves and muscles; resting and action potentials,propogation of action potentials, bioelectric potentials.
electrodes: electrode theory, biopotential electrodes, biochemical electrodes.
cardiovascular system:heart and cardivascular system,blood pressure, characteristics of blood flow;and heart sounds,
(10 Hrs; 20 marks)

Unit 2

Cardiovascular measurement : electrocardiography,measurement of blood pressure-indirect method , measurement of blood flow and cardiac output plethysmography,measurement of heart sounds.
(10 Hrs; 20 marks)

Unit 3

patient care and monitoring: element of intensive care monitoring;digonsis,calibration and repairabilty of patient monitoring equipment: pacemakers and defibrillators. electrical safety of medical equipment: phycological effect of electrical current shock hazard , methods of accident prevention
(10HRS, 20 MARKS)

Unit-4
The nervous system :anatomy of nervous system ,nerval communication , the organisation of brain,neuronal receptors ,measurement from the nervous system. Bioelementry:introduction to bioelementry , physiocological parametrs adoptable to bioelementry,component of bioelementry system
(10Hrs; 20MARKS)

Unit-5
Instrumentation for diagonstic X-ray ,computerised axial tomography(CAT) scanners ,ultrasonics diagonsis.

References;
1. Biomedical instrumentaton & measurement ,second edition,CROMWELL,WIEBELL,PFEFFIER Prentic-Hall of India
2.Handbook of Biomedical instrumentation ,R.S.Khandpur,Tata MC-Graw Hill

The term work should include minimum of six expt. covering of above syllabus.The termwork marks will be based on performance in theory & practicaal having weitage of 60%&40% resply

B.E.(INDUSTRIAL ELECTRONICS)

Term II
Elective II

Robotics

Teaching scheme:
Lectures : 4 Hrs/week
Practical : 2 Hrs/week

Examination scheme:
Paper : 100 marks
(3 Hrs duration)
Term work : 25 marks
Practical : 25 marks

Unit 1:
Introduction to Robots: historical developement,robot arm Kinematics and dynamics,manipulator tragectory plamnning and control,robot sensing,robot programming languages,machine intelligence.
Robort arm Kinematics: direct kinematics problem,inverse kinematic solution.
(10 Hrs ; 20 marks)

Unit 2:
Robot arm dynamics: Lagrange-Euler formulation,Newton-Euler formulation,generalised D'Alembert equation of motion.
Planning of manipulator trajectories,cartesian path trajectories.
(10 Hrs ; 20 marks)

Unit 3:
Control of Robot manipulator: Control of PUMA robot arm,computed torque technique;near-minimum-time control;variable structure control; adaptive control.
Sensing: range sensing, proximity sensing,touch sensors, force and torque sensing.
(10 Hrs ; 20 marks)

Unit 4:
Low-level vision : image acqulisition, illumination technique, imaging geometry,basic relationship between pixels,preprcessing.
High-level vision: segmentation,description,recognition, interpretation
(10 Hrs ; 20 marks)

Unit 5:
Robot programmimg languages: characteristics of Robot level languages,task level languages.
Robot intelligence and task planning: robot learning and task planning,expert systems and knowledge engineering.
(10 Hrs ; 20 marks)

References:
1. Robotics: control,sensing,vision,and intelligence. by K.S.Fu,R.C Gonzalez,C.S.G.Lee,McGraw_Hill International edition.
2. Analytical Robotics and Mechatronics,Wolfram stadler,McGraw_Hill International edition.

The term work should include a minimum of six experiments covering the above syllabus. The term work marks will be based on the performance in the theory and practicals having a weightage of 40 % and 60 % respectively.

B.E. (INDUSTRIAL ELECTRONICS)

COMPUTER TECHNIQUES

TERM-II
ELECTIVE -II

Teaching Scheme :
Lectures : 4Hrs/Week
Practacal : 2Hrs/Week

Examination Scheme:
Paper : 100 Marks
(3 Hours Duration)
Term Work : 25 Marks
Practical : 25 Marks

UNIT 1
Register oraganisation of 8086,architechure, signal description, physical memory organisation, I/O addressing capability,minimum and maximam mode system timings instruction set and assembly directives programming with an assembler, stack and interrupts structure. 8088, processor.
(10 Hrs; 20 Marks)

UNIT 2
Semiconductor memory interfacing, interfacing I/O ports, ADC,DAC interfacing, interfacing with I/O devices 8253, 8255, 8257,8259,8251, CRT controller 8275, FDC 8271.
(10 Hrs; 20 Marks)

UNIT 3
System software and opertaing system Assembler, loader, linkers, compliers, disk opertaing system, Unix opertaing system, introduction to 32 bit microprocessors(68000,80386) Architecture and salient features.
(10 Hrs; 20 Marks)

UNIT 4
Computre networks:LAN,MAN,WAN, networks topologies,bus,star,ring, network software, reference model (OSI,TCP/IP) Transmission media. wireless transmission,data link layer,medium acces sublayer. network application
(10 Hrs; 20 Marks)

UNIT 5
Parallel processing : evolution of computer system, trends towards parallel processing, parallelision in uniprocessor systems, Introduction of pipeline compuers, array computers and multiprocessors systems..Architectural classification schemes. parallel processing application. indroduction of vector processors.
(10 Hrs; 20 Marks)

REFERENCES:

1. Micro processor & Micro computers based system design - M.Raffiaquezman.

2. Communication Networking - Leon Garcia (TMH)

3. Advanced microprocessor & peripherals - A.K. Ray & K.M. Burchandi Tata Mc Graw Hill.

4. Computer Architechure & Parallel Processing By Kaihwng & Briggs (MCH)

The termwork should include a minimum of six experiments from the above list . The term works will be based on performance of theory and practicals having a weightage of 40% and 60% respectively.

B.E. (Industrial Electronics)

TERM 2

Power Electronics II

Teaching scheme
Lecturer :4Hrs /week

practic$: 2 hrs /week

Examination scheme
Paper : 100 marks
3 hrs duration
Termwork : 25 marks
Practic$: 25 marks

UNIT 1
Introduction to motor drive : control of motor drives,servo drives ,block diagram description; criteria for selecting drive components-- match between the motor and the load, match between the motor and the power electronic converter-- current rating, voltage rating, switching frequency and the motor inductance ,selection of speed and position sensors, servo drive control and current limiting, current limiting in adjustable speed drives
DC motor drives : block diagram description of DC motor drive, power electronic converter , ripple in armature current, selection of servo drive parameters ; line frequency controlled converters ,effect of discontinous armature current , power factor of the line current in adjustable speed drive

(10Hrs ; 20 marks)

UNIT2
Introduction motor drives : constant-speed drive, adjustable speed drive, block diagram description ;speed control for varying stator frequency and voltage torque speed characteristics ,start up considerations ,voltage boost required at low frequency ,induction motor capability,below and above rated speed , braking in induction motors; harmonic motor currents, harmonic losses, torque pulsations;variable frequency converter classifications; variable frequency PWM-VSI drives,adjustable speed control of PWM- VSI drives,speed control circuit and current limiting circuit,induction motor servo drives,variable frequency squre wave VSI drives,variable frequency CSI drives , comparison of variable frequency drives;line frequency variable voltage drives ,reduced voltage starting (" soft start") of indution motor, speed control by static slip power recovery

10 Hrs ; 20 marks

UNIT 3
Power devices gate turn off thyristor (GTOs) - basic structure and i-v Characteristics,turn off operation, GTO switching characteristics-inclusion of snubber and drive circuits,GTO turn on transient, GTO turn off transient, minimumon on off state times , maximum controllable anode current ,overcurrent protection of GTOs;Insulated gate

bipolar transistor(IGBT) - Basic structure,I-V Characteristic device operation , blocking state operation ,on state operation, latchup in IGBTs - causes of latcthup,avoidance of latchup,switching characteristics - turn on transient,turn off transsient ,NPT versus PT structures, device limits and SOAs ;Field controlled thyristor,(FCT) - basic structure and I-V characteristics, device operation - blocking state operation,on-state operation, switching characteristics, JFET devices verssus other power devices ;MOS -controlled thyristor - basic structure, MOSFET-controlled turn on and turn off ,rationale of off FET placement in MCT structure , MCT switching behaviour, device limits and safe operating area; power integrated circuits - types of power integrated circuits, challenges facing PIC commercialisation

10 Hrs ; 20 marks

UNIT4

Gate and base circuit, preliminary design considerations; dc – coupled drive circuits – with unipolar output, with bipolar output, optocoupler isolated drive circuits, transformer – isolated drive circuits providing both signal & power,cacode connected drive circuits – open emitter BJT drive circuit ,cacode drive cirucit for normally on power .devices, thyristor drive circuits –gate current pulse requirements ,gate pulse amplifiers, commutation circuit ; power device protection in drive circuit –overcurrent protection , blanking times for bridge circuit , " smart" drive circuits for snubblerless switching; circuit layout consideration – minimising stray inductance in drive circuit ,shielding and partitioning of drive circuit , reduction of stray inductance in bus bars, current measurement capacitor selection – aluminium electolytic capacitors, metallised polypropylene capacitors and ceramic capacitor

10 Hrs ; 20 marks

UNIT5

Snubber circuit : function and types, diode snubbers , capacitive snubber, effect of adding a snubber resistance , implementation; snubber circuit for thyristors; need for snubber with transistors; turn-off snubber;overvoltage snubber ; turn-on snubber; snubbers for bridge circuit configurations ;GTO snubber considerations

Component temp control and heat sinks: control of semiconductor device temperature, heat transfer by conduction, thermal resistance ; heat sinks; heat transfer by radiation and convection ;heat sink-ambient calculation

10 Hrs ;20 marks

Reference

1 Power electronic : converter application and design second edition Ned Mohan ,T Mudeland W.D.Robbins john wilery and sons
2 Electric Drives : concepts and application: vedam subrahmanyam ,Tata McGraw Hill
3 Power Electronic: P.C. Sen Tata Mc Graw Hill

List of experiements

1 DC drive : 1 expt
2 AC drive : 1 expt
3 power devices : 2 expts
4 Gate and base drive circuits: 2 expts
5 Snubber circuit : 2 expts

The termwork should include a minimum of six experiment based on the above list Thetermwork marker will be based on performance in theory and practical having overweight of 40% and 60 % respectively.

B.E.(Industrial Electronics)
TERM-II

Electronics System Design

Teaching Scheme:
Lectures:4 hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Paper :100 Marks
(3 Hours Duration)
Term-Work: 25 Marks
Practical: 25 Marks

UNIT:1

Introduction to integrated electronics : characteristics of IC's ,IC Technology,levels of Ic complekity,packaging of IC's ,limitations of IC technology.
Digital integrated circuts:IC Characteristics;digital IC families,DTL,HTL,TTL,ECL,MOS,CMOS,Comparison of digital IC families.
(10 Hours,20 marks)

UNIT:2

Linear integrated circuits :opamp applications ,wave generations and shapping circuits using opamps;monolithic RF-IF amplifiers; monolithic voltage regulators -linear and switching mode;PLL applications -frequency multiplier,AM detector,FM detector.
(10 Hours ,20 Marks)

UNIT:3

Building blocks of digital systems: counters,shift registers,arithmetic functions, decoders/demultiplexers,data selectors/multiplexers ,encoders,ROM and RAM.
(10 Hours,20 Marks)

UNIT:4

System design:frequency counter-- measurement of frequency,period and frequency ratio;D/A and A/D converters;digital voltmeters- dual slope A/D converter type,delta - modulation type A/D convertor.
(10 Hours,20 Marks)

UNIT:5

System design:digital programmable frequency generator,frequency synthesizer,function genarator,PRBS genarator ,display systems - 7 segmental LED displays for frequency counter, dot matrix display ,bar-graph display using LED's.
(10 Hours,20 Marks)

Reference:
1.Introduction to System Design using integrated circuits ,Second edition. By-B.S.Sonde,
New Age International.

Termwork should include a minimum of six disign exercises covering the above syllabus .The term work marks will be based on performance in theory and practicals having a weightage of 40% and 60% respectivly.
The practical exam will be based on a paper design.

B.E. (Industrial Electronics)
TERM-II

Industrial Instrumentation

Teaching Scheme:
Lectures : 4 Hrs/Week
Practical :2 Hrs/Week

Examination Snheme:
Theory :100 Marks
(3 Hrs. Duration)
Term-work : 25 Marks

UNIT:1
Pressure Measurement:Bourdon tubes,diaphragm elements,bellows elements,LVDT pressure guage.
Vacuum measurement: Mc lead gauge,pirani guage
Temperature measurement:bimetallic strip type ,fluid expansion type ,pyrometor .
Level Measurement : conductance probe method ,capacitance method.
(10 Hrs,20 Marks)

UNIT:2
Flow Measurement : differential pressure type ,rotameter type ,electromagnetic flowmeter,ultrasonic flowmeter.
Instruments for Analysis : Gas analysers -thermal conductivity type;humidity measurement-electrical type; moisture measurement - conductance type ,measurement of Ph.
(10 Hrs,20 Marks)

UNIT:3
process control operation:signal conversion,actuators and control element;pneumatic signals,current-to-pressure convertors,electric pneumatic and hydraulic acuator;mechnical,electrical,and fluid valves.discrete state process control:characteristic,ladder diagram,programmable controllers.
(10 Hrs,20 Marks)

UNIT:4
controller principles: process charesteristics,control system parameters; discontinous controller modes-two position, multiposition, floating-control modes, neutral zone;continous controller modes-proportional, integral, derivative, composite control-PI,PD,PID.
(10 Hrs,20 Marks)

UNIT:5
Analog controllers: electronic -single mode,two position ,reverse action ,floating ,proportional,integral,derivative,composite PI,PD,PID modes,pnenmatic controlles.
Digital controllers:digital electronis type-simple alarms,two position control,multivariable alarms;computer in process control-programmable controllers,data logging,supervisor/ control.
(10 Hrs,20 Marks)

Refrence:

1.Principles of Industrial Instrumentation,Second edition, By-D. Patranis,Tata-McGraw Hill.

2.Process Control Intrumentation Technology,fourth edition, By-Curtis Johnson,Prentice-Hall Of India.

The termwork should include a minimum of six experiments covering the above syllabus .The termwork marks will be based on performance in theory and practicals having weightage of 40% and 60% respectively.

B.E. INDUSTRIAL ELECTRONICS ENGINEERING

TERM-II

TECHNICAL VISIT

EXAM SCHEME:
Term Work : 50 marks

The technical visit is a part of the learning process that start before the visit and continues after the visit. Institution shall arrange at least two industrial visit to the electronics, power electronics, computer and to the allied field industries/organization about eight hours duration. Institute shall obtain appropriate certificate of visit from the concern industries/organization. Students shall submit written report about the visit individually or in small groups (2-3 students). The report should contain the information about the following.

1. The organization -activity of organization and administrative set up technical personnel and their main duties.
2. The project/industry brief description with sketches and salient technical information.
3. The work/process observed with specification of materials, item of work, equipment etc. and role of engineers.

The evaluation of the report of technical visit may be made by panel of two teachers appointed by the principal, as per following parts.

a] Coverage Aspects : Almost all item shall be covered.
b] Detailed Observation : System/process/product explained with data, diagram specification.
c] Quality of Presentation : Report shall be very objective and consist of clean and systematic organization of topic and information.
d] Critical : Display unusual clarity to observe critically and to give his own idea regarding merits,demerits, improvement needed etc.
e] Viva voca : A viva voca shall be conducted on the technical visit report by the subject teacher to access the specific knowledge gained by the students for technical application.

B.E. INDUSTRIAL ELECTRONICS ENGINEERING

TERM-II

PROJECT PART - II

TEACHING SCHEME:
Practical : 4 Hrs/week

EXAM SCHEME:
Term Work : 50 marks
Oral:50 marks

Project work Part-II will be the continuation of project -I. Undertaken by the candidates in the first term. The term work shall consist of a typed report on the work carried out by the batch of students in respect of the project assigned during the Part-I & Part-II.Report shall consist of introduction, literature survey, concept, design & analysis, application, future development and information related to project topic. Only those data sheets shall be included in the project report which are not studied in the previous years & absolutely required for the project.

ORAL EXAMINATION :

It shall consist of an oral examination based on the report submitted by the candidates and/or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners, consisting of the guide and another external examiner preferably from Industry or other university.

NOTE : The candidate must bring the project Part-I report and the final report completed in all respect while appearing for practical examination of the project.