UNIVERISITY OF MUMBAI
SCHEME OF INSTRUCTIONS & EXAMINATION
BE (ELECTRONICS ENGINEERING)

Semester V

Sr. No.	Subjects	No. of Periods per Week			Duration of Theory Paper(Hrs)	Marks				
		Lectures	Practicals	Tutorials		Theory Paper	Term Work	Practical	Oral	Total
1.	Applied Mathematics –V	4	-	-	3	100	-	-	-	100
2.	# Engineering Electromagnetics	3	-	1	3	100	25	-	-	125
3.	Electro Measuring Instruments	3	2	-	3	100	25	-	-	125
4.	Continous Time Signals and Systems	4	-	2	3	100	25	-	-	125
5.	Microprocessors and Microcontrollers	3	3	-	3	100	25	-	-	125
6.	Presentation and Communication Techniques	2	2	-	-	-	25	-	25	50
7.	Electronic Workshop	-	3	-	-	-	-	-	25	25
Total		19	10	3	-	500	125	-	50	675

TE(ELECTRICAL/ELECTRONICS/INSTRUMENTATION/BIOMEDICAL/ELECTRONICS & TELECOMMUNICATION)

SEMESTER V

APPLIED MATHEMATICS –V

Lecture : 4 hrs per week 100Marks(3hrs)

1.Random Variables

Discrete and continuous Random Variables. Probability mass function and density function probability for random variables. Expected value,variance Momenis and Moments generating functions Relation between Raw moments central moments.

2.Probability Distributions

Binomial, Poisson and Normal Distribution for Detailed study. Introduction to the distributions such as 't' and chi-square. Central limit theorem and problems based on this theorem.

3.Sampling Theory

Sampling distribution test of Hypthesis level of significance critical region. One Tailed and Two tailed tests. Internal estimation of population parameters.

Large and small samples

Test of significance for large samples

i. Test for significance of the difference between sample mean and population means.
ii. Test of significance of the difference between the means of two samples.

Test of significance for small samples

i. Test of significance of the difference between sample means and population mean.
ii.Test of significance of the difference between the means of two samples.
iiiPaired "t" test.

Application of X^2 distribution

Test of the goodness of fit and idependence of attributes.

4.Fitting of curves

Least square method. Fitting of the straight line and parabolic tread bivariate frequency distribution Covariance and correlation Karl Pearsons coefficient and spearman's Rank correlation co-efficient (non repeated and repeated ranks) lines of regression.

5.Introduction to discrete structure.

(A) Relations and functions Matrix of relation Partial order and equivalence relation injective, surjective and bijective functions pigeonhole principle and its application.
(B)Posets and Hasse Diagram Lattice, Bounded lattice, bounded lattice, complemented Lattice and distributive lattice.
©Algebric structure: Groups, rings, Integral domains, Fields, Boolean Algebra, Homomorphisam and isomorphisms of algebraic structures.

BOOKS

1."Fundamentals of Mathematicals Statics"
S.C.Gupta & V.K.Kapoor sultan chand & Co. N.Delhi
2."Probability Statistics and Random Processes"
T.V.Veerajan, Tata McGraw Hill Publications
3."Probability & Statics" Schaum Series
4.Discrete Mathematics-Second Edition
N.Biggs – Oxford University Press
5.Schaums Outlines-Discrete Mathematics-Tata McGraw Hill Publications
6.Discrete Mathematical structures- Bernard Kolman, Robert C. Bushy, Sharon Rus,
Prentice Hall of India Pvt.Ltd.
7.Function fo Discrete Mathematics – K.D.Joshi.

TE(ELECTRONICS) SEMESTER V

Engineering Electromagnetics

Lectures: 3 hours/we — Theory Paper: 3 hours and 100 marks

Tutorial : 1 hours/week — Termwork: 25 marks

Rationale

After having studied circuit theory, this subject exposes the student to the more exact field the Electromagnetic field theory deals directly with electric and magnetic field vectors, where as theory deals with voltages and currents that are the integrated effects of electric and magnetic. An understanding of Electromagnetics is a must to appreciate wave propagation, Antenna the Microwave and Optical fiber systems.

Maxwell Equations:

Derivation of various basic electro magnetic laws using Maxwell's Equations, conditions at a Boundary surface, basic idea of inductance & capacitance.

Electromagnetic waves

Solution of free space conditions, uniform plae-propagation, Uniform palane waves, The wave equation for conducting medium, Sinusoidal Time variations, Conductors & dielectrics, Polarization, Direction cosines. Reflection by a perfect conductor-Normal Incidence, reflection perfect conductor-oblique incidence, reflection by a perfect dielectric-Normal incidence, reflect by a perfect insulator-oblique incidence, Relfection at surface of a Conductive Medium,surface impedance, the transmission-line analogy.

Poynting vector & flow power

Poynting's theorem, Note on interpretation of ExH, Instantaneous, Average & complex poyntin vector, power loss in a plane conductor.

Guided Waves

Waves between parallel planes, tranverse electric waves (E_2=0), Transverse Magnetic waves (H2) Characteristics of TE & TM waves, transverse electromagnetic waves, velocities of power attenuation in parallel-plane guides, wave impedances, Electric field & current flow within the conductor, transmission line, circuit representation of the parallel-plane cylindrical conductors of arbitrary cross section, transmission-line theory, low loss radio frequency & UHF transmission lines, UHF lines as circuit elements, transmission-line charts, impedance matching by means of lines.

Radiation

Potential Functions & the electromagnetic field, potential functions for sinusoidal oscillations, The alternating current element (or Oscillating Electric Dipole), power radiated by a current element, Application to short antennas, assumed current distribution, Radiation from a quarter- wave monopoze or half –wave dipole, sine

integral & cosine integral, Electromagnetic field close to antenna, solutions of the potential equations, far-field approximation.

Transmission Lines
Transmissin Line equations, Transmission line parameters, Transmission examples, use of smith chart, impedance matching.

Text Book
1. E.C.Jordan & K.G.Balmain-Electromagnetic Waves & Radiating Systems, PHI Second Edition, 1988.

Additional Reading
1. John D.Krauss-Engineering electromagnetics, McGraw-Hill, sixth edition 2001-05.
2. Edminister-Engineering Electromagnetics, Schaum series, Tata McGraw-Hill, second edition, 1992.

Term work
Term work shall consist of at least eight tutorials based on the above syllabus out of which one tutorial should cover transmission line problems using Smith Chart. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

Electronic Measuring Instruments (Electronics- Sem V)

Syllabus :-

1. **Introduction :** Fundamentals of operational amplifier circuits, principles of working of electronic meter.

2. **Electronic Voltmeters :** Principle of operation, advantages over conventional type analog voltmeters, factors involved in selection of voltmeters, basic voltmeter, peak reading, average reading, true RMS reading, sampling type, FET voltmeters, sensitivity considerations & calculations.

3. **Digital Voltmeters :** Methods of analog-to-digital and digital-to-analog conversion, principles of operation and typical specifications of a digital voltmeter, description of various types of DVMs with block diagrams, resolution and sensitivity of a digital meter, digital displays for meters.

4. **Frequency Meters :** Analog-schematic & operational details, limitations. Digital frequency meters, time interval measurements, frequency ratio measurements.

5. **Phase Meters :** Phase measurement by voltage addition method, balanced modulation type, phase meters using flip-flops, advantages & limitations of each type, Digital phase meters for entire A.F range & their limitations.

6. **Oscilloscopes :** Block diagram study of C.R.O, description of panel layout & implementation of controls. Requirement of time base, triggered time base, delayed time base, external triggering etc. Lissagios patterns, circular time base, intensity modulation, velocity modulation, use of these in phase & frequency measurements. Frequency time base, Wobbler scope & its applications, dual trace, multi trace, double beam, sampling; Storage, Digital read-out oscilloscopes. Use of CRO in square wave testing of amplifiers, tracing of diode & transistor characteristics.

7. **Signal Generators :** Requirement of a good laboratory type signal generator, A.F. signal generator, Beat frequency oscillator & its advantages.

8. **Q meter :** Principle of operation, sources of error, measurement of a) stray capacitance, b) impedance, c) characteristic impedance of transmission line using Q meter.

Continuous Time Signal and Systems

Lectures : 4 hours/ week **Theory Paper: 3 hours and 100marks**

Tutorials: 2 hours/ week **Termwork :25 marks**

Rationale :

1. **Signals**

- Elementary Continuous Time signals like unit step,Impulse,ramp,exponential,sinusoidal etc.

- Operations on signals like shifting,scaling,flipping,addition,multiplication.
- Breaking of C T signals in different basic components

2. **Systems**

- Concept of system modeling
- Classification of system on the basis of linearity, time variance,causality,memory etc
- System representation by a differential equation .
- System response in terms of linear convulation integral

3. **The Fourier series**

- Orthogonal basis functions
- representation of signals in terms of weighted orthogonal basis function
- Calculation of weights (coefficients) in MSE sense
- Extension to periodic signal in terms of fourier series representation
- Complex and Trigonometric Fourier series.
- Properties of fourier series.
- Power spectral density.

4. **The Fourier transform(FT).**

- Definition and properties.
- FT of basic signals.
- FT of periodic signals
- Energy spectral density.

5. **Laplace transform**

- Review of single sided Laplace transform,its properties and its inverse laplace transform.
- Two sided laplace transform
- Concept of region of convergence.
- Relationship between laplace transform and fourier transform.

Time domain behaviour of systems

6. **Time Domain Behavior of a System**

- Application of Laplace Transform to a system differiantial equation.
- Transfer function & its properties for a linear ,lumped & stable systems.
- Impulse response of a system
- Zero input & Zero state response of a system.

- Time domain analysis of first & second order systems.
- Condotion of BIBO stability in time domain.
- System response to complex exponential inputs

7. **Frequency domain behaviour of a system**

- pole zero diagram
- Frequency response of a system by analytical& Graphical technique
  Stability and routh array
- Bode plot

8. Analog to digital conversion & Reconstruction

- Sampling theorem and aliasing
- Anti aliasing filter
- Reconstruction

9. State Variable Technique

- State Variable concepts
- State equations & their time domain & frequency domain solutions
- State transition matrix
- System state equation
- Stability and routh array
- Bode plot

8 Analog to digital conversion & Reconstruction

- Sampling theorem and aliasing
- Anti aliasing filter
- Reconstruction

9 State Variable Technique

- State Variable concepts
- State equations & their time domain & frequency domain solutions
- State transition matrix
- System state equation

T.E.(ELECTRONICS) SEMESTER V

Microprocessors & Microcontrollers

Lectures:3 hours/week	Theory Paper: 3 hours and 100 marks
Practicals: 3 hours/week	Termwork: 25 marks

Rationale:

This second course on Microprocessors discusses the organization,architecture and operation of the popular Intel MCS 8051 family of eight bit microcontrollers.It lays an indepth foundation sixteen bit microcontrollers using the Intel 8086 family.The subject introduces the concept of multiprocessors.

Overview

Introduction to Single chip microcontrollers of Intl MCS 51 family.Architectural and operational features,its instruction set ,CPU timing and machine cycles.Interrupt structure and priority Internal Timer/counters,serial interface.Connection of external memory.Power saving mode .Interfacing of 8051 with EPROM programming for EPROM versions.8051 variations.

Intel 8086/8088 microprocessor family

Architecture and organisaton of 8086/8088 microprocessor family.Study of its Instruction set Assembly language programming, introduction to mixed language programming using C assembly language.8086 family minimum and maximum mode operation.Timing diagram for 8086 family,detailed syudy of maximum mode connection,study of 8288 bus controller.8086 interface structure.

Memory and I/O design

Memory system design for 8086 family including interface of dynamic read/write memory.considerations for memory interfacing.Connections of I/O Controllers 8255AH programming peripheral interface,programmable interrupt controller 8259A,UART 8250,programmable DMA controller8237.Data communications ,EIA RS-232C serial interface and IEEE 488 general purpose interface.Error detection and correction-parity and cyclic redundancy check.

8087 Math Co-processor

Study of architecture of 8087 floating point co-processor.Data types supported by 8087 Host and processor interface,Assembly language programming for 8086-8087 based systems.

Introduction to multiprocessor systems

Multiprocessor configurations.Study of 8289 bus arbiter.Design of 8086 based multiprocessor based systems(without timing considerations).

Text books:

1. John Uffenback,8086/8088 Design,Programming and Interfacing,second edition Indian reprint,Prentice hall of India,2001
2. Kenneth Ayala,the 8051 Microcontrollers Architecture, Programming & Application Penram International(India)
3. Douglas Hall,Microprocessors interfacing and programming,Tata McGraw Hill,third edition
4. Advanced Microprocessors & Interfacing- Badri Ram

Additional Reading

1. Muhamud A Mazidi,The 8051 Microcontroller and Embeded Systems,Pearson Education Asia,first Indian reprint,2002.
2. John Uffenback, The 8086 family design,programming and interfacing third edition Pearson Education Asia,2002
3. Intel Corporation, Data manuals

Termwork

The termwork shall consist of at least ten programs covering the whole syllabus and at least one comprehensive design assignment duly recorded and graded.This will carry a weightage of fifteen marks.A test will be conducted having a weightage of ten marks.

T.E.(ELECTRONICS) SEMESTER V

Electronics Workshop

Lectures: Nill Hours/week Theory Paper: Nill

Practicals: 3 hours/week Oral : 25 marks

Rarionale:

Any student of Electronics engineering degree course has to understand electronics to techniques and soldering techniques. This subject introduces the student to these technique subject also exposes the student to PC hardware in a practical way.

Soldering techniques, stripping and tinning standed wires, installing and wires, mounting components- plated through hole and surface mount technology, hand wire soldering, de-soldering techniques, electrostatic discharge.

Analog Troubleshooting: Electronics troubleshooting basics, troubleshooting with Oscilloscopes, signal injection and signal tracing, system analysis, diagnostics methods, seving close loop circuits, troubleshooting noise and intermittents.

Digital Troubleshooting : Introduction to troubleshooting digitallogic, use of understanding and use of logic analyzers, working with microprocessor/microcontroller use of logic analysis system for troubleshooting microprocessor/microcontroller system incricuit emulators.

PC Hardware PC hardware basics: How computers work, how software and has together, system board, floppy and hard drives, troubleshooting fundamentals, devices, multimedia technologies, power supplies.

Text boks:

1.H.(Ted.) Smith, Quality hand soldering and circuit board repair, second edition publishers.

2.J.A.Sam Wilson, et.al., Electronic troubleshooting and servicing techniques vol. Howard W.Sams publication.

3.Jean Andrews, Enhanced guide to managing and maintaining your PC, edition, 2001, Course Technology – Thomson learning publishers.

Additional Reading :

Jan Axelson, The Microcontroller Idea Handbook, Penram publishing (India) Pvt. Ltd.

Termwork: The termwork shall consist of atleast two laboratory experiments on designing , fabrications and troubleshooting simple electronic circuits already studies, a visit to an electro manufacturing electronic systems and using wave soldering machine and a report to be mini project to design, fabricate, test and troubleshoot a simple digital electronic system microprocessor microcontroller.

Oral Exam: A written quiz (fully objective) set by both internal and external examiners together weightage of ten marks. Vis Voce based on mini project shall carry a weightage of fifteen .