ELECTROMAGNETIC FIELD & WAVES
V Sem. EEcT-301-E

L	T	P/D	Total
4	1	-	5

Theory : 100 Marks
Sessional : 50 Marks
Duration : 3Hrs

UNIT II
Review of vector analysis in all the three coordinate system line, surface & volume integrals, gradient, divergence & curl of a vector & their physical significance, Gauss Divergence theorem, Stokes theorem.
Gauss law in electrostatics & its applications, uniform line, surface & volume charge distributions, concepts of electric field & electric potentials, electric field & potential due to a linear dipole,method of images.

UNIT II
Biot Savart's law, Amperes circuital law & its applications. Boundary conditions for both the electric & magnetic fields at the interface of various types of media. Laplace, Poisson's equation & continuity equation. Faraday's & Lenz's laws, Maxwell's equations in differential & integral forms & their physical significance,retarded potentials.

UNIT III
Plane & uniform plane waves and their properties, waves equations in various media. . Polarisation & its types. Intrinsic impedance, propagation constant. Reflection & refraction of uniform plane waves at the interface of conductor- dielectric & dielectric - dielectric (both normal and oblique incidence). Relaxation time,skin effect, skin depth & surface impedance,Poynting vector theorem & its physical significance.

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UNIT IV
Distributed parameters, circuit parameters, concepts of voltage & current flow on a transmission line,characteristic impedance. Reflection of transmission line, maxima & minima, standing wave ratio of a transmission line. Impedance matching, , Smith's chart & its applications, strip lines & microstrip lines,co-axial type transmission line. Concept of Wave Guide and TE, TM and TEM modes in rectangular and circular wave guide. Cut off and guide wave length, characteristic impedance, dielectric wave guide.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References:

1. Electromagnetics by D.K. Cheng. (Pearson Education)
2. Electromagnetic Fields & Waves by Sadiku (Oxford Univ. Press)
3. Basic Electromagnetics with Application by N.N. Rao.
4. Electromagnetic waves and Radiating Systems by E.C. Jordan and K.G. Balman.
5. Electromagnetics by J.D. Kraus.

ELECTRONIC INSTRUMENT & MEASUREMENTS
V Sem. EEcT-303-E

L	T	P	Total
3	1	-	4

Theory   : 100 Marks
Sessional: 50 Marks
Duration : 3Hrs

UNIT I
C.R.O.: Introduction**,** Cathode Ray Tube (CRT), Electron Gun, Electrostatic Focusing, Electrostatic Deflection, Post Deflection Acceleration of Electron Beam, Effect of Beam Transit Time, Frequency limitation. Deflection plates, Screens of CRT's Graticule Aquadog, Applications, Storage C.R.O. Digital CRO. Design of delay lines for CRO.
Amplifier Measurement: Amplifier Measurements, Transient response of Amplifiers, Measurements of Noise figure of Amplifier, Harmonic Distortions analyzer, Distortion Meter, Measurement of op-amp parameters.

UNIT II
Digital Instruments: Digital Indicating instruments, comparison with analog type digital display methods, theory and applications of digital voltmeters., Transistor, FET and other type of voltmeters. Electronic Galvanometers, Q-meter.
Frequency Measurements: - Measurements of frequency using cavity wave-meter. Heterodyne frequency meter, comparison of frequency using interpolation method. Digital frequency meter. Frequency   measurements using digital means.

UNIT III
Signal Conditioning & Acquisition System: - Signal conditioning, A/D converter, D/A Converter, Use of op-amp in signal conditioning, Components of analog data acquisition System. Components of digital data acquisition system, signal conditioning, Multiplex special Encoders, Principles of Telemetry, Wire link channels, Ratio channels, and Microwaves Channels.

UNIT IV
Instruments For Signals Generation: - Pulse and square wave circuits, Laboratory square wave and pulse generators, Function generators, Random noise generators, Frequency Synthesizer.
Bio-Medical Instruments:- ECG, EEG, EMG & Measurement of BP.

NOTE:
The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.
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References:

1. A course in Electrical & Electronics Measurement & Instrumentation: By A.K. Sawhney.
2. Electronics Instruments & Measurements techniques: By Helffrick & Cooper (PHI)
3. Instrumentation devices & Systems: By C.S. Rangan, G.R. Sharma & V.S. Mani.
4. Bio- medical Instrumentation & measurements: By Leslie Cromwell, Fred. J. Weibell, Erich A. Pfeitter (PHI).

TRANSMISSION & DISTRIBUTION OF POWER
V Sem. EEcT – 305-E

L   T   P/D Total   Theory   : 100 Marks
3   1   -   4   Sessional : 50 Marks
                                                                    Duration   : 3 Hours

UNIT I
Transmission of Power: Growth of Power System in India, Transmission of Power by A.C. & D.C. system. Effects of increase in Voltage on transmission line efficiency. Underground or overhead system, Typical power system, Modern trends in power system transmission.
Distribution of Power: General consideration, Radial and ring main system D.C. Three wire system. Different types of distributors A.C. distribution; Relative copper consumption in various systems. Conductor size and Kelvin's Law, Tariffs and power factor improvement.

UNIT II
Resistance of transmission lines, skin effects, Proximity effect, Inductance of a single phase & two phase line, Composite conductor lines, Three phase lines with symmetrical and unsymmetrical spacing, Transposition of a line, Three phase double circuit line with symmetrical and unsymmetrical spacing, Bundled conductors.

UNIT III
Capacitance of two-wire line, three phase line with symmetrical and unsymmetrical spacing, Effect of earth capacitance of three-phase double circuit line with symmetrical and unsymmetrical spacing.
Short, medium and long lines – their representation, Performance, determination, Ferranti effect, Surge impedance, Loading of transmission lines, power circle diagram, Calculation of synchronous phase modifier capacity.

UNIT IV
Types of underground cables, Cables for A.C & D.C systems, Insulation, resistance and capacitance. Use of inter sheaths, Capacitance grading, Power factor in cable, Thermal characteristics.
Types of Insulators, Methods of equalizing voltage distribution, Corona loss and radio interference,
Line supports, various types of conductor material, Sag calculations, Effect of wind, Ice and temperature on sag, Condition at erection.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References :
1. Elements of Power System Analysis by W.D. Stevenson
2. Electric Power System by B.M. Weddy
3. The transmission and Distribution of Electric energy by H. Cotton
4. Modern Power System Analysis by I.J. Nagrath and D.P. Kothari
5. A Course in Electrical Power by Soni, Gupta and Bhatnagar
6. Power System analysis and Stability by S.S. Vadhera
7. Electric Power System by C.L. Wadhwa
8. Electrical Power System by Ashfaq Hussain
9. Electrical Power System Vol. I and II by A.E. Guile and Peterson
10. Electrical Power by S.L. Uppal
11. Power System Analysis and Design by B.R. Gupta

CONTROL SYSTEM ENGINEERING
V Sem. EEcT-307-E

L   T   P/ D   Total   Theory   : 100 Marks
4   1 -   5   Sessional : 50 Marks
                                                          Duration : 3 Hrs

UNIT I
Concept of control, Control system terminology, Classification of control systems, system representation-Analogies, mathematical modeling of physical system, Block diagram, signal flow graphs and reduction techniques. Transfer function, State space characteristics of control systems.
Error detectors, Signal conditioners, Modulators, Demodulators, Servo amplifiers voltage and power, Actuators including servometers, Techogenerators, Stepper motor.

UNIT II
Time domain and frequency domain analysis, steady state error, peak response and resonant frequency, system specification in time and frequency domain and their relationship.
Concept of stability, analytic, graphic and numeric techniques of stability analysis, Routh Hurwitz, Nyquist, Bode, Root locii and Liapunov's criteria/methods. D-partition method, Nicols chart.

UNIT III
Introduction to Feed Forward, P, I, D, P/I, P/D, P/I/D and ON/OFF control actions. Static space approach applied to control system, Concepts of state variable feedback, controllability and observability.

UNIT IV
Compensation (lead, lag, lag-lead compensation) and design of system. Introduction of non-linear and digital control systems.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References :
1. Control system Engg. By Nagrath and Gopal.
2. Control system Engg. By Ogata.
3. Liner Control System by R.S. Chauhan, (Umesh Publications)
4. Feedback control system Analysis and Synthesis by D'Azzo and Houpias.
5. Control system by B.C. Kuo.
6. Liner control System Analysis and Design by D'Azzo and Houpias.

POWER ELECTRONICS
V Sem.EEcT-309-E

L	T	P/D	Total		Theory	:100 Marks
4	1	-	5		Sessional	: 50 Marks
					Duration	: 3Hrs

UNIT I
Introduction: Characteristics of different solid state devices namely power diodes, SCR, Diac, Triac UJT, FET, Power transistor, SCS. Firing circuits using-operations amplifiers, UJT and logic gates protection of SCR against-over voltage, over current, dv/dt, di/dt, Temperature calculation, Heat sink design, Methods of commutation of SCR's, Series and Parallel operation of Thyristors.

UNIT II
AC to DC Converters: Classification of rectifiers, principle of working of each along with control circuits, Analysis of output voltage and current waveforms. Ripple factors, utility factor and efficiency. Effect of source inductance and type of load. Reactive power requirements of converter, some important factor in design of converters, dual converter.

UNIT III
AC to AC Converters: Classification of cyclo converters, principle of working along with control circuits, Analysis of output voltage and current waveforms, effect of type of load, presence of subharmonic in cyclo converter output.

UNIT IV
DC to AC Converters: Classification of inverters, operation of each type, design of commutating circuits, Analysis of voltage and current waveforms, voltage and frequency control, current source inverter and pulse width modulated inverter.
DC to DC Converters: Classification of choppers, operating principle and control circuits for each type. Analysis of voltage and current waveforms.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References:
1. Thyrister Engineering by M.S. Brede.
2. Thyrister and their Application by M. Ramamurthy.
3. Thyrister Theory and Applications by Sugandhi and Sugandhi.
4. Principles of Inverter Circuits by B.D. Bedfred and R.G. Hoft.
5. Line Commutated Thyristor Converter by Gotifriend, Moltgen.

VLSI & IC TECHNOLOGY
V Sem. EEcT-311-E

L   T   P/D   Total   Theory : 100 Marks
3   1   -   4   Sessional: 50 Marks
                                                    Duration : 3Hrs

UNIT I
Introduction monolithic Silicon Fabrication Technology: Crystal Growth, Vapour phase (CVDT Technique) and molecular beam epitaxy. Dry and wet Etching.

UNIT II
Diffusion & Oxidation: Oxide properties, oxidation kinetics, Oxidation process, diffusion Fick's law, dopant sources, Diffusion mechanism, Constant source & limited source diffusion, Characterization of diffused layers, Introduction to ion implantation.

UNIT III
Lithography & Metalization: Choice of metals, Vaccum evaporation, Sputtering Metalization problems, Lithography: Introduction to Photo, X-ray, electron beam lithography process, various printing techniques.
MOS Circuits Design Process: MOS layer, Stick diagram, Design rules & layout diagrams-a brief introduction .

UNIT IV
Planer Technology: Fabrication process, Sequence for a BJT, Capacitor, resistor, IC, Environment for IC fabrication,. Assembly & packaging techniques.
Introduction to MOS Technology: Basic MOS transistors, NMOS & CMOS fabrication.
MOS Inverters: Pass Transistor, NMOS Inverter, CMOS Inverter, Latch up in CMOS circuits.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:
1   K.R. BOTKAR: Integrated Circuits.
2   S.M. SZE: Micro Electronics.
3   Milliam Grabel : Mico Electronics
4   Pucknell : VLSI Design.

Electronic Instrument & Measurements Lab
V Sem. EEcT-313-E

L T P Total   Sessional : 25 Marks
- - 2   2   Practical : 25 Marks
                                                   Total   : 50 Marks
                                                   Duration : 3 hrs

1. To measure voltage using digital voltmeter.

2. To measure the frequency using Lissajous pattern on CRO.

3. To measure the distortion in amplifiers using distortion meter.

4. To study Op-Amp. as half wave & full wave precision rectifier.

5. To study the op-amp as :

   Adder

   Subtractor

   Integrater

   Differentiator

6. To study the wave form on ECG recorder.

7. To study the sphygmomanometer for blood pressure measurement.

NOTE : At least 9 experiments are to be performed with 7 from above list, remaining 2 may either be performed or designed & set by concerned institution as per the scope.

Power Electronics Lab
V Sem. EEcT-315-E

L   T   P   Total
-   -   2   2

Sessional : 25 Marks
Practical : 25 Marks
Total   : 50 Marks
Duration : 3 Hrs.

1. To Plot the firing characteristics of given silicon control rectifier.

   a. By varying the gate current I_g keeping forward voltage V_{ak} fixed.

   b. By varying forward voltage V_{ak} keeping gate current fixed.

2. To study the V-I characteristics of given UJT. To plot graph between V_e and I_e. To find negative resistance from the graph.

3. To plot V-I characteristics of given Triac in I and III quadrant.

4. To plot the drain characteristics of given F.E.T & to evaluate the parameter rd, Idss.

5. To study the UJT based relaxation oscillator & to evaluate the dynamic resistance.

6. To study & draw the characteristics of DC-DC chopper power circuit

7. To study the characteristics of single phase fully controlled converter circuit.

8. To study the characteristics of 3-phase fully controlled converter power circuit.

9. To study single phase Mc Murray Inverter power circuit.

10. To study single phase cyclo-converter circuit.

Control System Lab.
V Sem. EEcT-317-E

L T P Total   Sessional : 25 Marks
- - 2 2   Practical : 25 Marks
              Total   : 50 Marks
              Duration : 3Hr.

1. To study D.C. Position control system.

2. To study linear system simulator.

3. To study light intensity control using P & PI controller with provision for

   disturbance and transient speed control.

4. To study D.C motor speed control.

5. To study the stepper motor characteristics and its control through microprocessor kit.

6. To study Temperature control system.

7. To study Compensation design

8. To study Digital control system.

NOTE : At least 9 experiments are to be performed with 8 from above list, the remaining may either be performed or designed & set by concerned institution as per the scope.

VLSI & IC TECHLONOGY LAB
V Sem. EEcT-319-E

L T P Total   Sessional : 25 Marks
- - 2 2   Practical : 25 Marks
                                                            Total   : 50 Marks
                                                            Duration : 3 Hrs.

1. Study of VHDL.

2. To design the two input NAND gate , NOR gate , EX-OR gate in VHDL .

3. To design a full adder & full substractor using the same hardware & with the help of control signal .

4. To design a 4:1 multiplexer and 1:4 demultiplexer in VHDL.

5. To design a priority encoder in VHDL.

6. To design a carry look ahead adder in VHDL.

7. To design a BCD adder & BCD subtractor in VHDL.

8. Write a program in VHDL to compute 2's complement of a four bit binary numbers.

9. Write a program in VHDL to implement the Boolean expression .

     F= (A+ B) (C+D) using CMOS circuitry .

10 Implement a F= (A+ B) using only PMOS circuitry.

     (i) Design a MOD-6 synchronous & asynchronous (ripple) counter in VHDL.

     (ii) Design a MOD-8 ring & Johnson counter in VHDL.