

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

## Scheme For Teaching and Examination B.E.-II (Instrumentation & Control Eng.) 4<sup>th</sup> Semester

Course	Course No	Teaching Scheme			Examination Scheme					
		L	T	P	Theory Exam University Exam		Pract/Quiz/Viva/T.W. ect.			
		(Hrs)	(Hrs)	(Hrs)	Dura tion (Hrs)	Marks	Tuto- rial Marks	Cont Int.Evaluation (P)	Examination (P) Marks	Total Marks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Computational methods Using C	CO 401 IC	3	0	2	3	100	-	20	30	50
Pulse & switching Ckt.	EC 402 IC	3	1	2	3	100	25	20	30	75
Properties of Eng. material	IC 403 IC	3	0	0	3	100	-	-	-	-
Electronic Circuits	EC 404 EC/IC	3	1	2	3	100	25	20	30	75
Control theory	IC 405 IC	3	1	0	3	100	25	-	-	25
Digital Integrated Ckt.	EC 406 IC	3	1	2	3	100	25	20	30	75
	(Total)	18	4	8		600	100	80	120	300
Total contact Hours=				30				Grand	Total	900

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B.E.II (Instrumentation & Control Engg.)

Semester - IV

COMPUTATIONAL METHODS USING C CO 401 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme	100	0	Cont. Evaluation 20
Marks			Examination 30

1	ERROR ANALYSIS AND SOLUTIONS OF NON LINEAR EQUATIONS : Error, their types, estimation, Accuracy And Stability, Bisection Method, Method Of False Position., Newton Raphson Method, Secant Method.
2	INTERPOLATION : Finite Difference Operators and Difference Tables , Newton-Gregory Formulas ( Forward, Backward & Divided ), Langrange's Interpolation Formula.
3	NUMERICAL INTEGRATION AND DIFFERENTIATION : Trapezoidal Formula For A Single Interval , Simpson's 1/3 and 3/8 formulas, Numerical Derivatives using Newton forward difference formula.
4	MATRICES : Matrix Inversion, Determinant Of A Matrix, Gauss Elimination, Gauss-Jordan Method, LU Decomposition, Eigen Value And Eigen Vectors, Power Method, Iterative methods - Jacobi and Gauss-Seidel methods.
5	NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS : Taylor's Series, Euler's Method, Runge Kutta 2 and 4 order Methods For Ordinary Differential Equations, Initial Value And Boundary Value Problems, Gauss-Seidel And Jacobi Methods For Partial Differential Equations

## REFERENCES :

- 1 SASTRY S. S : Introductory Methods Of Numerical Analysis PHI 1994
- 2 SALARIA R S : Numerical Methods - A Computer Oriented Approach BPB 1996

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B.E.II (Instrumentation & Control Engg.)

Semester - IV

## PULSE AND SWITCHING CIRCUITS:EC 402 IC

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

1.	<p><b>LINEAR WAVE SHAPING:</b> .High pass RC Circuit and its response to sinusoidal step, Pulse , Square wave , Exponential and ramp inputs, High pass RC circuit as differentiator , Double Differentiation , Low Pass RC circuit and its response to sinusoidal , Step Pulse , Square wave , Exponential and ramp inputs, Low Pass RC circuit as integrator, Attenuators. Introduction-pulse nomenclature-effect of capacitance on pulse shape-introduction to pulse transformers-delay lines.</p>
2.	<p><b>CLAMPING AND COMPARATOR CIRCUIT:</b> Diode clippers- Transistor clipper- Clipping at two independent level- Emitter-Coupled clipper- Compensation for temperature changes in diode-Comparators-Applications of voltage comparators.</p>
3.	<p><b>CLAMPING AND SWITCHING CIRCUIT :</b> clipping, clamping operation - Clamping circuit- Clamping circuit theorem-Practical Clamping circuits-Effect of diode characteristics-Clamping in base - Synchronous clamping circuit- Transistor as a switch - Two stage overdriven amplifier- Damper diodes- Switch with inductive and capacitive load - Collector catching diode- Nonsaturating switches-Emitter follower with capacitive load..</p>
4.	<p><b>BISTABLE MULTIVIBRATORS:</b> Fixed biased transistor binary- Self biased transistor binary-Commutating capacitors-Methods of improving resolution- Methods of triggering-Schmitt trigger.</p>
5.	<p><b>MONOSTABLE AND ASTABLE MULTIVIBRATORS:-</b> Collector-Coupled monostable multivibrator-Emitter- Coupled monostable multivibrator- Gate width calculation and waveforms in Emitter- Coupled monostable- Triggering of monoshot- Astable collector coupled and emitter coupled multivibrator.</p>
6.	<p><b>SYNCHRONIZATION AND FREQUENCY DIVISION:</b> General features of a time-Base signal- Exponential sweep circuit-Pulse Synchronization of relaxation devices- Frequency division in sweep circuit-Astable and Monostable multivibrators as Frequency dividers.</p>

7.	<b>SWEEP CIRCUITS :</b> Time base generators-sweep generators-Miller integrator-Bootstrap sweep generator-current time base generator
8.	<b>SYNCHRONIZATION AND FREQUENCY DIVISION :</b> Fundamental ideas about synchronization and frequency division.

**TUTORIALS:** Tutorials shall be based upon theory.

**REFERENCES :**

1. MILLMAN & TAUB : Pulse, Digital and Switching waveforms, McGraw Hill, IS Edition,1978.
2. TAUB & SCHILLING : Digital Integrated Electronics, McGraw Hill, IS Edition,1977.
3. DOYLE J. : Pulse Fundamentals,2/e,1973.
4. MITCHELL B.B. : Semiconductor pulse circuits with experiments, Holt-Rhinehart & Winston,1970.
5. BELL DAVID A : Solid State Pulse Circuits, Reston Publishing Company,1976.
6. STRAUSS L. : Waveform generation and shaping,McGraw Hill,2/e.1970.
7. AGGARWAL & SURESH : Waveshaping and Digital Circuits, Khanna Publishers,1978
8. PASCOE.LOBERT D. : Solid State Switching-Discrete and Integrated, John Wiley and Sons,1973.

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Semester - IV

## PROPERTIES OF ENG. MATERIALS: IC 403 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	0	0
Examination Scheme Marks	100	0	Cont. Evaluation 0 Examination 0

1	INTRODUCTIONS TO ATOMIC STRUCTURES. -Nature & Structure of atom,-Interatomic and inter molecular forces,-Different types of crystal structures.
2	FRICITION, LUBRICATION AND WEAR -Basic principles, -Effects, -requirement of lubrication, different type of friction and removing techniques
3	ELECTRONICS AND MECHANICAL PROPERTIES -Elasticity , Plasticity, flow strength and fracture- Viscosity,- Hardness of material, - Strain & Stress of different material, - dielectric properties,-radiation interaction .
4	MAGNETIC AND THERMAL PROPERTIES. -Basic concepts of magnetic properties-magnetization curve-hysteresis and magnetic material- formation of oxide field and mechanism of growth of field-thermal expansion , conductivity, radiation and protection.
5	BASIC MECHANISM OF CORROSION. -Corrosion and it's Protecting coating-Erosion corrosion-Ferrous metal, cast-iron, steel and alloy material and effect of alloying material, Corrosion reactions and control.
6	EFFECT OF DIFFERENT GASES & LIQUID ON MATERIAL -Properties of gas & liquid material, -Effect on different material, -Alloy & Composite material for selection of flow, temp., level, pressure etc. transducers according to fluid characteristic
7	METALS : Forming processes, Ferrous metals, Nonferrous metals and alloys, effect of high temperatures on metals , effects of gases on metals.

### REFERENCES :

- 1 ZBIGNIEW D.JASTRAZEBSKI The nature and Properties of Engg. Material. , 3rd Edition John Wiley & sons,(1987)
- 2 VAN VALCK: Element of Material Science and Engg. Addison Publication (1989)

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.II (Instrumentation & Control Engg.)

Semester - IV

ELECTRONIC CIRCUITS : EC 404 EC/IC

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

1	FET : Introduction to theory and operations of n-channel JFET & MOSFET; Reversibility of drain & source; P-channel FET; FET switch; MOSFET inverter; Bias stability in FET; Different FET configuration; Small signal analysis of FET.
2	FREQUENCY RESPONSE : R-C, Coupled amplifier with BJTs; Effect of emitter bypass capacitor; Coupling capacitor of base and collector; Low frequency analysis of FET amplifier; Source bypass capacitor; Drain coupling capacitor and gate coupling capacitor.
3	HIGH FREQUENCY ANALYSIS OF TRANSISTOR AMPLIFIER : Transistor amplifier at high frequencies; Hybrid $\pi$ equivalent circuit at high frequency; High frequency behavior of CE & CC amplifier; FET at high frequencies; CD and CS amplifier at high frequency; GBW products of above circuits.
4	NEGATIVE FEEDBACK IN AMPLIFIERS : Basic concept of feedback amplifier; Effect on gain due to feedback; Input and output impedance; Feedback amplifiers and sensitivity function; Voltage series, voltage shunt, current series and current shunt configuration circuits; Details analysis and introduction to its design; Frequency response of a feedback amplifier.
5	OSCILLATORS : Barkhausen's criteria for oscillators; Stability concept; Three pole amplifier; Nyquist criteria; Stabilizing networks; Frequency compensation and sinusoidal oscillator; Phase shift, Wein bridge, Colpitts, Hartley, Crystal and Tune circuit type oscillators (AF & RF Range).
6	TUNED AMPLIFIER : Introduction to single tuned amplifier; G.B.W. response calculations & design; Cascade amplifier; Neutralization methods; Synchronously tuned amplifier; Elementary treatment of stagger tuned and doubly tuned amplifiers.

## REFERENCE :

1. SCHILLING & BELOVE : Electronic Circuits - Discrete and Integrated, McGraw Hill Publication, 3rd edition 1989, reprint 1994.
2. MILLMAN & HALKIAS : Integrated Electronics, McGraw Hill Publication, 1992
3. MILLMAN & GRABEL : Micro Electronics, McGraw Hill Publication, 1992.
4. BOYLESTAD & NASHLESKY : Electronic Devices & Circuit Theory, 5th edition PHI, 1992, Ninth reprint 1995.
5. JAEGER RICHARD: Microelectronic Circuit Design, McGraw Hill (International Ed) 1996.
6. HORENSTEIN : Microelectronics Circuits & Devices, Prentice-Hall of India, 1996.

# VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.II (Instrumentation & Control Engg.)

Semester - IV

CONTROL THEORY: IC 405 IC

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme Marks	100	25	Cont. Evaluation 00 Examination 00

1.	<b>BASIC CONCEPTS OF CONTROL LOOPS:</b> -Open loop control system with examples, Close loop control system With examples and it's merits over open loop system Effect of both on stability, gain And Speed response of system,
2.	<b>CONTROL LOOP BLOCK- DIAGRAMS:</b> Block-diagram representation from real system in form of T.F.,Block-diagram reduction techniques, Signal flow diagram tech. and it's advantages, Voltage and current Analogies for mechanical model.
3.	<b>ROOT LOCUS TECHNIQUES:</b> Plot Locies of root from transfer function, Stability criteria and system response study from root locus.
4.	<b>DIFFERENT PLOTS :</b> Bode plots and effect of gain margin, phase margin on system parameters, Polar plot and stability criteria, Nyquist plot and Hurwitz criteria, Nichol chart and it's application.
5.	<b>LAPLACE TRANSFORMATION TECHNIQUES:</b> Laplace transformation of given system, Inverse laplace transform, Brief ideas about Z-transformation and inverse Z-transformation tech., Use of L.T. in different order time response tech.,
6.	Concepts of stability & different stability criteria for system.

**TUTORIALS:** Tutorials shall be based upon theory.

## REFERENCES:

1. NAGRATH & GOPAL : Control system engineering., New age International Publication (1996)
2. B.C. KUO : Automatic control systems, Prentice Hall of India Ltd, 1995
3. OGATA, KATSUHICO : Modern Control Engineering, PHI, 1996

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B.E.II (Instrumentation & Control Engg.)

Semester - IV

DIGITAL INTEGRATED CIRCUIT: EC 406 IC

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

1.	RTL and IIL Circuits: RTL logic gates and DCTL gates, current hogging and Fan, out and Fan, in RTL and DCTL, RTL buffer, Manufacturer's specifications, concept and physical layout of IIL.
2.	DTL and TTL Circuits: DTL and TTL gates, High threshold logic, input, output characteristics of DTL and TTL gates, wired AND connection, active pull, up, Schottky TTL and other logic with TTL gates.
3.	Emitter, coupled logic and MOS gates :Transfer characteristics fan, out, speed of operation, logic versatility of ECL gates, ECL gates interconnection, MOS and CMOS inverters, Rise time and fall time in CMOS gates, Manufacturer's specification, interfacing BJT and CMOS Gates.
4.	BiCMOS Logic Circuits: Introduction, BJT structure and operation, Dynamic behavior of BJT, Basic BiCMOS circuits, Static behavior, Switching delay in BiCMOS switching circuits, BiCMOS applications.
5.	Circuit Design for LSI and VLSI: CMOS and Bipolar Transistor Gate Arrays and their limitations, Standard Cell, Programmable Logic Array, Circuit Design for VLSI
6.	Semiconductor Memories: Types of memories, Implementation of ROM, MOS ROM cells, MOS EPROM and EEPROM, applications, Static and Dynamic Read, Write memories, Organization of RAM, Paralleling of Semiconductor Memory Integrated Circuit chips

TUTORIALS: Tutorials shall be based upon theory.

## REFERENCES:

1. TAUB AND SCHILLING: Digital Integrated Electronic McGraw Hill.(1985)
2. TEXAS INSTRUMENTS: Designing with TTL Integrated circuits McGraw Hill(1984).
3. HODGES & JACKSON: Introduction to Integrated Electronics circuits, McGraw Hill, 1/e, 1992
4. MILLMAN : Microelectronics, McGraw Hill(1988).
5. GRINICH & JACKSON: Introduction to Integrated Electronics circuits, McGraw Hill(1991).
6. JACOB MILLMAN : Integrated Electronic. Mc Graw Hill Pub. (1992).
7. JAEGER RICHARD: Microelectronic Circuit Design, McGraw Hill (Internatinal Ed) 199