

KURUKSHETRA UNIVERSITY, KURUKSHETRA

SCHEME OF EXMINATION FOR B.TECH DEGREE COURSE INSTRUMENTATION & CONTROL ENGINEERING FOURTH SEMESTER EXAMINATION

COURSE CODE	SUBJECT	TEACHING SCHEDULE				EXAMINATION SCHEDULE			TOTAL	DURATION OF EXAM.
		L	T	P/D	TOTAL	THEORY	SESSIONAL	PRACTICAL VIVA		
MATH-201-E/HUM-201 E	MATHEMATICS III/ BASICS OF INDUSTRIAL SOCIOLOGY, ECONOMICS AND MANAGEMENT	3	1		4	100	50		150	3
IC-202-E	TRANSDUCERS AND SIGNAL CONDITIONING	3	1		4	100	50		150	3
IC-204-E	LINEAR INTEGRATED CIRCUIT	3	1		4	100	50		150	3
IC-206-E	LINEAR CONTROL SYSTEM -1	3	2		5	100	50		150	3
EE-204-E	DIGITAL ELECTRONICS	3	1		4	100	50		150	3
EE-208-E	SIGNALS AND SYSTEMS	3	1		4	100	50		150	3
IC-212-E	TRANSDUCER AND MEASUREMENT LAB.			3	3		25	25	50	3
IC-214-E	LINEAR INTEGRATED CIRCUITS LAB			2	2		25	25	50	3
IC-208-E	DIGITAL ELECTRONIC LAB LAB			3	3		50	50	100	3
IC-210-E	SIGNAL AND SYSTEM LAB LAB			2	2		25	25	50	3
TOTAL		18	7	10	35	600	425	125	1150	

E: Practical Training of 6 weeks duration during summer vacation, Evaluation in V Sem.

**BASICS OF INDUSTRIAL SOCIOLOGY, ECONOMICS
AND MANAGEMENT**

HUM – 201 E
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Sessional	:	50	Marks
Theory	:	100	Marks
Total	:	150	Marks
Duration of Exam	:	3 Hrs.	

UNIT-I

Meaning of social change, nature of social change, theories of social change. The direction of social change, the causes of social change, the process of social change. Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social need of status system, social relations in industry.

UNIT-II

Meaning of Industrial Economic, Production Function, its types, Least Cost Combination, Law of Variable Proportion, Laws of Return – Increasing, Constant & Diminishing.

Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC Curve.

Price & Output Determination under Monopoly in short run & long run. Price Discrimination, Price Determination under Discriminating Monopoly. Comparison between Monopoly & Perfect Competition.

UNIT – III

Meaning of Management, Characteristics of Management, Management Vs. Administration, Management – Art, Science & Profession, Fayol's Principles of Management.

Personnel Management – Meaning & Functions, Manpower – Process of Manpower Planning, Recruitment & Selection – Selection Procedure.

Training – Objectives & Types of Training, Various Methods of Training. Labour Legislation in India – Main provisions of Industrial disputes Act 1947;

UNIT – IV

Marketing Management – Definition & Meaning, Scope of Marketing Management, Marketing Research – Meaning, Objectives.

Purchasing Management – Meaning & Objectives, Purchase Procedure, Inventory Control Techniques.

Financial Management – Introduction, Objectives of Financial decisions, Sources of Finance.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

TEXT BOOKS :

1. “Modern Economic Theory” Dewett, K.K., S. Chand & Co.
2. “Economic Analysis” K.P. Sundharam & E.N. Sundharam (Sultan Chand & Sons).
3. “Micro Economic Theory” M.L. Jhingan (Konark Publishers Pvt. Ltd.).
4. “Principles of Economics” M.L. Seth (Lakshmi Narain Aggarwal Educational Publishers – Agra).
5. “An Introduction to Sociology”, D.R. Sachdeva & Vidya Bhusan.
6. “Society – An Introductory Analysis”, R.M. Maclver Charles H. Page.
7. “Principles and Practices of Management : R.S. Gupta; B.D. Sharma; N.S. Bhalla; Kalyani.

REFERENCE BOOKS

1. “Organization and Management : R.D. Aggarwal, Tata McGraw Hill.
2. Business Organization and Management : M.C. Shukla

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MATH-201 E**MATHEMATICS - III**

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Theory	:	100	Marks
Sessional	:	50	Marks
Total	:	150	Marks
Duration of Exam	:	3 Hrs.	

UNIT - I

Fourier Series : Euler's Formulae, Conditions for Fourier expansions, Fourier expansion of functions having points of discontinuity, change of interval, Odd & even functions, Half-range series.

Fourier Transforms : Fourier integrals, Fourier transforms, Fourier cosine and sine transforms. Properties of Fourier transforms, Convolution theorem, Parseval's identity, Relation between Fourier and Laplace transforms, Fourier transforms of the derivatives of a function, Application to boundary value problems.

UNIT-II

Functions of a Complex Variables : Functions of a complex variable, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, limit and continuity of a function, Differentiability and analyticity.

Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, Polar form of the Cauchy-Riemann equations, Harmonic functions, Application to flow problems, Conformal transformation, Standard transformations (Translation, Magnification & rotation, inversion & reflection, Bilinear).

UNIT-III

Probability Distributions : Probability, Baye's theorem, Discrete and Continuous probability distributions, Moment generating function, Probability generating function, Properties and applications of Binomial, Poisson and normal distributions.

UNIT-IV

Linear Programming : Linear programming problems formulation, Solution of Linear Programming Problem using Graphical method, Simplex Method, Dual-Simplex Method.

Text Book

1. Higher Engg. Mathematics : B.S. Grewal
2. Advanced Engg. Mathematics : E. Kreyzig

Reference Book

1. Complex variables and Applications : R.V. Churchill; Mc. Graw Hill
2. Engg. Mathematics Vol. II: S.S. Sastry; Prentice Hall of India.
3. Operation Research : H.A. Taha
4. Probability and statistics for Engineer : Johnson. PHI.

Note : Examiner will set eight question, taking two from each unit. Students will be required to attempt five questions taking at least one from each unit.

IC-202-E TRANSDUCER AND SIGNAL CONDITIONING

L	T	Total
3	1	4

THEORY:	100 MARKS
SESSIONAL:	50 MARKS
TOTAL :	150 MARKS
DURATION:	3 HOURS

UNIT-1 TRANSDUCERS

Introduction, electric transducers, advantage of electric transducers, classification, characteristics and choice of transducers, input characteristics, transfer characteristics, output characteristics

Resistive traducers

Resistive transducers, loading effect, power and rating potentiometer applications

Strain gauge

Theory of strain gauge, types of strain gauge, applications.

UNIT-2 Linear variable differential transformer (LVDT)

Introduction advantages & disadvantages of LVDT. Uses of LVDT, rotary variable differential transformer (RVDT), applications.

Thermistors

Resistance temperature characteristics of Thermistors, voltage- current & current- time characteristics of Thermistors, application of Thermistors, integrated circuit temperature, transducer applications.

Capacitive transducers

Capacitive transducers, transducers using change change in area of plates and change in distance between plates, advantages and disadvantages, uses.

UNIT-3 Hall effect transducers

Hall effects transducers, applications.

Electric Transducers

Modes of operation of Piezoelectric crystal,, properties of piezo electric crystals, equivalent circuit, uses of piezo electric transducers, applications.

UNIT-4 Signal conditioning

Introduction, dc and ac analysis of signal conditioning, amplification attenuation, multiplexing, demultiplexing, filtering, conversion and manipulation of signal, comparator, sample and hold circuits, clipping and clamping circuits.

Opto- electronic transducers

Photo conductive cells, semi conductor photo diode, photo transistors

TEXT BOOKS:

1. A course in Electrical & Electronic Measurement & Instrumentation: A.K.Sawhney; Dhanpat Rai.
2. J.B. GUPTA "Electronic and electrical measurements and Instrumentation".

REFERENCE BOOKS

1. Measurement Systems : E.O. Doebelin;TMH.
2. Electronic Instrumentation & Measurement Techniques: W.D. Cooper & A.D. Helfrick ; PHI.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

(IC- 204-E)**LINEAR INTEGRATED CIRCUIT**

L	T	Total
3	1	4

Sessional	: 50 Marks
Exam.	: 100 Marks
Total	: 150 Marks
Duration of exam.	: 3 Hours

UNIT-1 DIFFERENTIAL AND CASCADE AMPLIFIER.

Introduction , DC & AC Analysis , Inverting & Non inverting amplifier , Common mode rejection ratio, balanced O/P differential Amplifier, Unbalanced O/P differential Amplifier.

INTRODUCTION OF OPERATIONAL AMPLIFIERS.

Introduction Block Diagram representation , ideal Op-amp , Equivalent circuit and characteristics of ideal Op-amp. Ideal voltage Transfer Curve, open loop Op-amp Configuration: Differential amplifier, Inverting amplifier, Non inverting amplifier, Freq. response of op amp.

UNIT-2 GENERAL LINEAR IC APPLICATIONS.

Concept of feed back , summing , Scaling Averaging, Instrumentation Amplifier, V-I Converter & I- V Converter, Differentiator, Integrator, Log & Anti-log amp ,Precision Rectification.

UNIT-3 ACTIVE FILTER.

Introduction , Active Filter, Butter worth filter, first & second order low pass high pass and band pass, band elimination & notch type filter and chebyshev filter.

UNIT-4 VOLTAGE REGULATORS.

Introduction , series operation amplifier regulator , IC voltage regulators, Fixed & variable voltage regulator , (78XX, 79XX Series), 723 General Purpose Regulator .

555 TIMER

Introduction , functional Diagram, monostable, astable operation , Schmitt trigger, Phase locked Loop using 565, Voltage Controlled Oscillators(VCO)

Text Books:

- 1 Gayakwad, R.A., "Op-amplifier & Linear Integrated Circuit Tech." Prentice –Hall India Ltd.
- 2 D.Roy Choudhry "Linear integrated circuit "New age International (P) Ltd.

Reference Books:

- 1 Coughline R.F.& F.F.Dirscall "Operational amp & "Linear Integrated Circuit Tech." Prentice – Hall India Ltd.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

(IC-206-E) LINEAR CONTROL SYSTEM-I

L	T	Total
3	2	5

Sessional	: 50 Marks
Exam.	: 100 Marks
Total	: 150 Marks
Duration of exam.	: 3 Hours

UNIT-1 Introduction:

Concepts of control, Control Terminology, control system terminology, Classification of control system, Concept of Multivariable systems, Illustrative examples.

UNIT-2 Mathematical Modeling:

Differential equations and transfer functions, Basic components and their models, Mechanical Systems, Electrical systems and their analogies, Block diagrams and their reduction, Signal Flow graphs, Characteristics of feedback control system.

UNIT-3 Transient and Steady State Response:

Test Signals, First and second order systems, Static and dynamic error coefficients, Types of system, Effect of Poles and Zeros, Transient response and performance specifications.

UNIT-4 Control system Components:

Error Detectors, Synchros, Servo-amplifiers, Servomotors, Stepper motors, Tachogenerator.

Concept of stability:

Analytic graphic and Numeric techniques of stability analysis, Routh-Hurwitz, Nyquist, Bode Plot, Root locus, Polar Plots, System with Transportation Lag.

Text Books:

Nagrath & Gopal, "Modern Control Engineering", New Ages International (P) Ltd.
R.S.Chauhan, "Linear control system", Umesh Publications.

Reference Book:

Gopal, M., "Control System : Principles and Design ", Tata McGraw- Hill,
Kuo, B.C., " Automatic Control System ", Prentice Hall India Ltd.
Ogata, K., "Modern Control Engineering", Prentice Hall India Ltd.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

EE-204-E DIGITAL ELECTRONICS

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SESSIONAL	:	50	Marks
EXAM	:	100	Marks
TOTAL	:	150	Marks
DURATION OF EXAM	:	3 HRS	

UNIT 1**FUNDAMENTALS OF DIGITAL TECHNIQUES :**

Digital signal, logic gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, Boolean algebra. Review of Number systems. Binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII, Error detection and correction codes.

UNIT 2**COMBINATIONAL DESIGN USING GATES:**

Design using gates, Karnaugh map and Quine Mcluskey methods of simplification.

COMBINATIONAL DESIGN USING MSI DEVICES

Multiplexers and Demultiplexers and their use as logic elements, Decoders, Adders / Subtractors, BCD arithmetic circuits, Encoders, Decoders / Drivers for display devices.

UNIT 3**SEQUENTIAL CIRCUITS:**

Flip Flops : S-R, J-K, T, D, master-slave, edge triggered, shift registers, sequence generators, Counters, Asynchronous and Synchronous Ring counters and Johnson Counter, Design of Synchronous and Asynchronous sequential circuits.

A/D AND D/A CONVERTERS:

Sample and hold circuit, weighted resistor and R -2 R ladder D/A Converters, specifications for D/A converters. A/D converters : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

UNIT 4**DIGITAL LOGIC FAMILIES:**

Switching mode operation of p-n junction, bipolar and MOS. devices. Bipolar logic families:RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families.

PROGRAMMABLE LOGIC DEVICES:

ROM, PLA, PAL, FPGA and CPLDs.

TEXT BOOK :

1. Modern Digital Electronics(Edition III) : R. P. Jain; TMH

REFERENCE BOOKS :

1. Digital Integrated Electronics : Taub & Schilling; MGH
2. Digital Principles and Applications : Malvino & Leach; McGraw Hill.
3. Digital Design : Morris Mano; PHI.

NOTE: Eight questions are to be set in total covering entire course selecting two questions from each unit. Each question will be of equal marks. Students will be required to attempt five questions in all, selecting at least one question from each unit.

EE-208-E SIGNAL AND SYSTEMS.

L	T
3	1

Theory: 100 Marks
 Sessional: 50 Marks
 Total : 150 Marks
 Time: 3 Hrs.

SIGNAL

UNIT-I

Types of signals:- Deterministic and Stochastic, periodic and a periodic, impulse functional sequences, analog and discrete, singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation. Fourier series, Fourier and La-place transforms. Convolution theorem, geometrical interpretation and application.

UNIT-II

Probability concepts, random variable, pdf, cdf, moments, distributions, correlation functions. Characterization of stochastic signals.

Discretisation of analog signals – sampling, sampling theorem and its proof. Effect of under sampling, recovery of analog signals from sampled signal. Characterization of Discrete signals – in terms of impulse sequences, Z-transforms. Properties, inversion and applications of La-place, Fourier and Z-transforms.

SYSTEM

UNIT-III

Classification linear and non-linear, time invariant and time varying, Lumped and distributed. Deterministic and Stochastic. Casual and non causal, Analog and Discrete/Digital memory and memory less, 1 port and N – port, SISO, SIMO, MISO, MIMO.

UNIT-IV

System modeling in terms of differential, equations, state variables, difference equations and transfer functions.

Linear time invariant system properties, elementary idea of response determination to deterministic and stochastic signals. Concept of impulse response.

REF. BOOKS :

1. Fred J Taylor –“Principles of Signals and System”, MGH.
2. Simon Haykins – “Signal & Systems”, Wiley Eastern
3. A Papoulis – “Circuit and System” Modern Approach HRW

NOTE: Eight questions are to be set in total covering entire course selecting two questions each unit. Each question will be of equal marks Students will be required to attempt five questions in all, selecting at least one question from each unit.

B.Tech 4th Sem.
Transducer and Measurement Lab
(IC-212-E)

List of Experiments

1. Study of CRO and different applications of CRO which include measurement of frequency, phase, voltage and current and its applications as component tester.
2. Study of temperature measurement tutor using RTD along with its characteristic.
3. Study of Water Level measurement using capacitive principal
4. Study of characteristic of Stroboscope along with its application in speed measurement.
5. Study of inductive transducer LVDT.
6. Study the working of strain gauge for load measurement.
7. Study of hall effect sensor.
8. Study of Piezo Electric Sensor.
9. Study of LDR applied sensor.
10. Study of pressure measurement tutor.
11. Study of load cell for force measurement.
12. Study of temperature using thermister and thermocouple sensor and study their characteristic.

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B.Tech 4th Sem.
Linear Integrated Circuit Lab
(IC-214-E)

List of Experiments

1. To study the inverting operational amplifier (OP-AMP).
2. To study the non-inverting Op-Amp.
3. To study the characteristic of Op-Amp.
4. To study the Op-Amp as integrator.
5. To study the Op-Amp as differentiator.
6. To study the Op-Amp as Low Pass and High Pass filter
7. To study the Op-Amp as First order and second order filter.
8. To study the Op-Amp as summing, averaging and scaling.
9. To study Op-Amp as oscillator.
10. To study Op-Amp as log-amplifier.
11. To study 555 as monostable multivibrator.
12. To study 555 as free running multivibrator.

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IC-208-E

DIGITAL ELECTRONICS LABL T P
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SESSIONAL	:	50	Marks
EXAM	:	50	Marks
TOTAL	:	100	Marks
DURATION OF EXAM	:	3 HRS	

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
10. To design & realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND & NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation . Verify the operation of a ring counter and a Johnson counter.

NOTE : At least ten experiments are to be performed, atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

IC-210-E**SIGNALS & SYSTEMS LABORATORY**

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0 0 2

SESSIONAL	:	25	Marks
EXAM	:	25	Marks
TOTAL	:	50	Marks
DURATION OF EXAM	:	3 HRS	

- 1 To study of time properties of Signals.
- 2 To verify basis properties of linear system (Superposition Theorem etc).
- 3 To demonstrate how sampling rules affect the outputs.
- 4 To study sampling theorem for low pass signals and band pass signals.
- 5 To study the LPF & HPF using RC Ckt.
- 6 To study band pass and band reject filters using RC ckt.
- 7 To study response of Pulse Amplitude Modulation & Demodulation process.
- 8 To study response of Pulse Width Modulation and Demodulation process.
- 9 To study response of Pulse Position Modulation and Demodulation process.
- 10 To study response of Pulse Code Modulation and Demodulation process.
- 11 To study the spectral response on spectrum analyzer? Having unit impulse, step I/P & sine input (for various ckt.).
- 12 To study signals synthesis via sum of various harmonics.

NOTE: Atleast ten experiments are to be performed , atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.