COURSE CONTENTS

Category	Title	Code	Credits-6C			Theory Papers
			L	T	P	
Departmental Core - 8	Transducers & Measurements	BM 501	3	1	2	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Unit I Measurements & Errors: Significance of measurements, methods of measurements: Direct & indirect methods, Mechanical, Electrical, Electronic Instruments, Classification of instruments, Deflection & null type, Characteristics of instruments: Accuracy, precision, Drift, Span & Range, Significant Figures, Static Sensitivity, Linearity, hysterisis, Threshold, Dead zone, Resolution, Loading effect etc.
Error & it s types: Gross, systematic Error: Instrumental Error, Environmental error, observational error. Random error: Arithmetic mean, Range, deviation, Average deviation, Standard deviation, variance etc.

Unit II CRO & Measurements: Basic CRO Circuit, Dual trace Oscilloscope, Dual beam Oscilloscope, Sampling Oscilloscope, fast storage Oscilloscope, Analog Storage Oscilloscope, Digital Storage Oscilloscope. Measurement With CRO: Frequency, Voltage, Current, Phase, Dielectric, Frequency ratio etc.
A.C Bridges: General equation for bridge balance, Measurement of inductance, Capacitance and Q of the coil, Anderson, Hay, owen, Capacitance Maxwell's , Wiens , Schering bridge, Wagner Earth Tester, vector impedance meter.

Unit III Digital instruments: Advantages of digital instruments, Over analog instruments,
D-A, A-D conversion, Digital voltmeter, Ramp type DVM, Integrating DVM, successive approximation DVM, Displays (LED, LCD and seven segment etc.), (Instruments used in computer controlled instrumentation, RS232C and IEEE 488, GPIB electrical interface, Interfacing transducers to electronic control).

Unit IV Signal generator, Function generator, sweep frequency generator, Pulse and square wave generator, Wave Analyzers, Harmonic Distortion Analyzer, Spectrum Analyzer, Heterodyne frequency meter, frequency counter, measurement errors, automatic and computing counter.

Unit V Transducer: Electrical transducers, classification of transducers, resistive transducer, resistance thermometers, thermistors, thermocouples, Inductive transducer, LVDT, Capacitive, piezoelectric, Hall Effect transducers. Measurement of non Electrical quantity: Displacement, strain, flow, temperature, level, humidity, pH.

Reference Books:

1. Electrical Electronics Measurement & Measuring Instrumentation "A.K. Shawney ".
2. Electronics & Instrumentation Measurement "J.B. Gupta"
3. Instrumentation & Measurement "Helfrick Cooper"
4. Electronics Instrumentation "H.S. Kalsi"

List of Experiment:
1. Displacement measurement by inductive pickup.
2. To measure the temperature using RTD.
3. To measure the speed of motor by using photoelectric pickup.
4. To measure the displacement using LDR.
5. To measure the displacement using Photo Transducer.
6. To measure the pressure by LVDT type pressure Transducer.
7. To measure the flux density by Gauss meter.
8. To measure the Angular displacement using gang capacitive transducers.
9. Study of Soil Pressure Transducer.
10. Study of Piezoelectric Transducer.

COURSE CONTENTS

Category	Title	Code	Credits-6C			Theory Papers
			L	T	P	
Departmental Core - 9	Fundamentals of microprocessor	BM 502				Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit I Introduction to microprocessor – Architecture & Pin Diagram of typical 8 bit microprocessor-Intel 8085- study of Functional units. Function &generation of various control signals. Instruction set of 8085 – Addressing modes – Programming – Timing Diagram – Memory Interfacing – peripheral mapped I/O, Memory Mapped I/O. techniques.

Unit II Introduction to the various interfacing chips like 8212, 8155, 8255, 8755, and interfacing keyboards, printers, LEDS, motors, ADC, DAC, and stepper motors and introduction to programmable keyboard / display interface, memory Interfacing.

Unit III General Purpose programmable peripheral devices (8253) 8254 programmable interval timer, 8259A
Programmable interrupt controller & 8257 DMA controller, USART.

Unit IV Serial I/O & Data communication: use of RS 232C, Modern etc. and various bus standards.

Unit V Introduction to 8 bit microcontrollers, (8051), Its architecture pin description, I/o configuration, interrupts, addressing modes, an overview of 8051 instruction set.

Reference Books:

1. R.S Goankar Intel 8085 Microprocessor, “Penram International’.
2. D. Hall (Mc-Graw Hill), "Advanced Microprocessor and Interfacing".
3. Pal (TMH), "Microprocessors Principles & Applications".
4. R.L. Krutz (John Wiley), "Interfacing techniques in Digital Design with emphasis on Microprocessors”
5. A.P. Mathur (TMH), "Introduction to Microprocessors".

List of Experiment:
1. Detailed study of Student -85 Trainer Kit.
2. Write a program to addition of two 8 bit numbers.
3. Write a program to subtraction of two 8 bit numbers.
4. Write a program to multiplication of two 8 bit numbers.
5. Write a program to find complement of 8 bit number.
6. Write a program to find complement of 16 bit number.
7. Write a program to find out largest number between two numbers.
8. Write a program to find out largest number between three numbers.
9. Write a program to find out smallest number between two numbers.
10. Write a program to find out smallest number between three numbers.
11. Write a program to find out largest number between two numbers.
12. Write a program to arrange a given series in ascending order.
13. Write a program to arrange a given series in descending order.
14. Write a program to store two 8 bit numbers in memory location 2001 &2002.and store the result of addition /substation of these two numbers in memory location 2003.
15. Study of interfacing of RAM/ROM with 8085.

COURSE CONTENTS

Category	Title	Code	Credits-6C			Theory Papers
			L	T	P	
Departmental Core - 10	Control Engineering	BM 503				Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit I Basic idea of control systems and their classification - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason's gain formula - return difference and return ratio. Control system components :- Error detectors , servomotor, tachogenerator, servo amplifier, magnetic amplifier, rotating amplifier.

Unit II. Time domain analysis - Representation of deterministic signals - First order system response - S-plane root location and transient response - impulse and step response of second order systems - performance - characteristics in the time domain - effects of derivative and integral control - steady state response - error constant - generalized definition of error coefficients - concepts of stability - Routh - Hurtwitz criterion.

Unit III. Frequency domain analysis - frequency response - Bode plot, Polar plot, Nicol's chart - closed loop frequency response and frequency domain performance characteristics. Stability in the frequency domain. Nyquist criterion.

Unit IV. Root locus method - basic theory and properties of root loci - procedure for the construction of root loci - complete root locus diagram. Design and compensation of feed back control system. Approaches to compensation - cascade compensation networks and their design in the frequency domain - simple design in S-plane.

Unit-V. State variable methods :- introduction to state variable concepts - state variable description of linear dynamic systems - representation in matrix forms - block diagram and signal flow graph representation of state equations - Transfer matrix from state equations - transition matrix - general solution for linear time invariant state equations. Basic principles of adaptive control systems.

Reference books:

1. Ogata K, “Modern Control Engineering", Prentice Hall
2. Kuo B. C, "Automatic Control System", Prentice Hall
3. Nagarath & Gopal, “Control System Engineering", Wiley Eastern
4. Bakshi & Goyal. Feedback control system, Technical publication.

List of Experiment:

1. To determine speed torque characteristics of armature controlled D.C servomotor.
2. To determine the speed torque characteristics and relationship between torque speed and control windings voltage by AC servomotor.
3. a) To plot bode’s diagram and evaluate function of the given network.
   b) To measure its magnitude and phase angle G (jw) of the given phase lead network.
4. To obtain the step response transient characteristics of First order electric system and to measure system parameters.
5. a) To obtain step response transient characteristics of second order electric system and to measure all system parameters.
   b) Repeat with the ramp input signals .
6. To obtain the following synchronous characteristics of
   a) Starter voltage of synchronous transmission for various positions of its excited rates.
   b) To study angular relationship between synchronous transmitter and receiver.
   c) To study the characteristics of synchronous transmitter and synchronous control transformer.
7. To study of stepper motor.
8. To plot the nyquist plot of a given transformer function using matlab.
9. To plot the bode plot of a given transformer function using matlab.
10. To plot the root locus plot of a given transformer function using matlab.

COURSE CONTENTS

Category	Title	Code	Credits-4C			Theory Papers
			L	T	P	
Departmental Core – 11	Biomaterials	BM 504	3	1	0	Max.Marks-100 Min.Marks-35 Duration-3hrs.

Unit I Definition and classification of biomaterials: Application of polymers, metals, ceramics and composite as biomaterials for implantation. Surface properties of materials physical properties of materials- mechanical properties- viscoelasticity.

Unit II Structure of Solids: Crystal structure of solid – crystal imperfections – no crystalline solid. Strength of biomaterials: Strength and strengthening mechanism of metals, ceramic, glasses and polymers. Structural properties of tissues-Bone, Teeth, Elastic tissue.

Unit III Biocompatibility: Definition, Wound healing process- bone healing, tendon healing. Material response: Functions and Degradation of materials in vivo. Host response: Tissue response to biomaterial, effect of wear particles. Testing of implants: Methods of test for biological performance-Invitro implant test, Invivo implant test methods. Qualification implant materials.

Unit IV Metallic implant materials: Stainless steel, Co- based alloys, Ti and Ti- based alloys. Ceramic implant materials: Aluminum oxides, Glass ceramic, Carbons. Hard tissue replacement implant: Orthopedic implants, Dental implants. Soft tissue replacement implants: per-cutaneous and skin implants, vascular implants, heart valve implants.

Unit V Polymeric implant materials: Polyolefin's, polyamides, acrylic polymers, fluorocarbon polymers. Rubbers, Thermoplastics. Physiochemical characteristics of biopolymers. Biodegradable polymers for medical purposes. Synthetic polymeric membrane and their biological applications. Biopolymers in controlled release systems. Artificial skin. Dialysis membrane.

Reference Books:

1) J B Park, "Biomaterials – Science and Engineering", Plenum Press.
2) Jonathan Black, " Biological Performance of materials", Marcel Decker
3) Eugene D. Goldbera, "Biomedical Polymers", Akio Nakajima
4) A. Rembaum & M. Shen "Biomedical Polymers", Mercer Dekkar Inc.
5) Lawrence Stark & Gyan Agrawal, "Biomaterials"
6) L. Hence & E.C Ethridge, "Biomaterials – An interfacial approach.
7) Bhatt, "Biomaterials, Narosa Publication.
8) J B Park, & J D Branzino "Biomaterials Principle & Application, CRC Press.
9) Sujata N Bhatt, Biomatrials, Narosa Press Delhi

COURSE CONTENTS

Category	Title	Code	Credits-4C			Theory Papers
			L	T	P	Max.Marks-100
Humanities & Social Sciences -3	Principles of Management & Managerial Economics	BM505	3	1	0	Min.Marks-35 Duration-3hrs.

Unit I Management Concept: Management, Administration, Organization Management Administration and, Difference and Relationship between Organization, importance of Management, Characteristics of Management

Unit II Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management

Unit III Decision Making: Introduction and Definition, Types of Decision, Techniques of Decision Making, Decision making under uncertainty, Decision Making under reek

Unit IV Managerial Economics: Introduction, Managerial Economics, Factors Influencing Manger, Micro - and Macroeconomics, Theory of the Cost, Theory of the Firm, Theory of Production Function, Production System

Unit V Input-Output Analysis, Microeconomics Applied to plants and industrial Undertakings, Productivity, Factors affecting Productivity, increasing Productivity of Resources

Unit VI Productivity, Production and Productivity, Factors affecting Productivity, Increasing Productivity of Resources

Reference Books:

1. The Practice of Management: Peter Drucker, Harper and Row
2. Essentials of Management : Koontz Prentice Hall of India
3. Management: Staner Prentice Hall of India
4. Principle and Practice of Management : T.N. Chhabra : Dhanpat Rai New Delhi
5. Industrial Organisation and Engineering Economics: T.R. Banga & S.C. Sharma, Khanna Publishers
6. Industrial Engineering and Management : O.P. Khanna, Dhanpat Rai
7. Managerial Economics : Joel Dean : Prentice Hall of India
8. Managerial Economics Concepts & Cases : V.L. Mote, Samuel Paul, G.S. Gupta, Tata McGraw Hill New Delhi
9. Managerial Economics by V.L.Mote: Tata McGraw Hill
10. Analytical Models for Managerial & Engineering Economics by Schweyer: Reinhold

COURSE CONTENTS

Category	Title	Code	Credits-4C		
			L	T	P
IT-5	MATLAB Programming	BM506	-	-	4

MATLAB Windows

MATLAB Basics – Variables and Arrays, Initializing Variables in MATLAB, Multidimensional Arrays, Sub arrays, Displaying Output data, Data files, Scalar and Array Operations, Introduction to Plotting

Branching Statements and Program Design Loops

User Defined Functions

Input / Output Functions

Handling Graphics

Toolboxes and simulation using Simulink environment

Reference Books:

1. Basic of MATLAB by Rudhra Pratap
2. A Guide to MATLAB for Beginners and Experienced Users - Hunt Lipsman & Rosenberg
3. An Introduction to Programming and Numerical Methods in MATLAB - S.R. Otto & J.P. Denier
4. Essential MATLAB for Engineers and Scientists - Brian D. Hahn & Daniel T. Valentine
5. Introduction to MATLAB - Sikander M. Mirza
6. Introduction to Simulink with Engineering Applications - Steven T. Karris