

MASTER OF SCIENCE in ELECTRONICS 2006-2008

1. **Course:** The Master of Science course in Electronics with emphasis in Communication electronics leading to M.Sc Degree of Mohanlal Sukhadia University is designed to be a professional course to train students in different areas of electronics. The course is of four semester's duration, which will be conducted in two years. Each semester will be approximately of 4 months (minimum 80 working days in a semester) duration.
2. **Eligibility:** Candidates seeking admission to the first semester of M.Sc in Electronics must have passed B.Sc. degree with Physics or Electronics or Computer Science as one of the optional subject, or B.E Degree in any branch of Engineering with at least second division marks in their graduation.

Note: Candidates who have passed graduation (except Engineering Graduates) with 10+2+3 scheme only will be considered for admission.

3. Admission procedure

Admission will be made on the basis of the (50% weightage) to the marks obtained in the Entrance examination conducted by the University and 50% weightage to the total theory marks obtained in the qualifying subject. The entrance examination shall consist of tests on mathematical ability (25%), mental ability (25%) and Electronics (50%). The Entrance test will be of 2-hrs duration and will carry 300 marks. There will be a total 100 objective type questions. (Each correct answer carries 3 marks). Outline for the admission test is given in Appendix -A. The standard of the syllabus of the Entrance test is that required by the candidate to pursue the M.Sc in Electronics.

Entrance Examination Fee: Rs 500/- including cost of Application form

Since course requires high logical thinking, hard work and mental makeup to work about 6-8 hrs daily in the laboratory without routine breaks & holidays, candidates are advised to make a self-assessment of their capabilities before applying for the course.

Seats: The total number of seats in Master of Science in Electronics will be 20. SC/ST/OBC Reservation will be made as per university rules. Since M.Sc. Electronics is a professional self sufficient course, no other reservation applicable to conventional courses will be applicable

Courses of Study and Examination

Semester - I

Semester - I

Paper/Code	Paper Name	Exam (Hrs)	Maximum marks		
			Ext	Int.	Total
Paper-I (MSCE-101)	Analog Electronics	3	75	25	100
Paper-II (MSCE 102)	Communication Electronics	3	75	25	100
Paper-III (MSCE-103)	Digital Electronics	3	75	25	100
Paper-IV (MSCE-104)	Network Theory	3	75	25	100
Paper-V (MSCE-105)	Practical-I: Analog and Communication Electronics Lab (Based on Theory papers I & II)	6	75	25	100
Paper-VI (MSCE-106)	Practical-II: Digital and Network Lab (Based on Theory Papers III & IV)	6	75	25	100
Paper-VII (MSCE-107)	Communication Skill	6	75	25	100

Semester - II

Paper-I (MSCE-201)	Microwave Electronics	3	75	25	100
Paper-II (MSCE-202)	Microprocessors	3	75	25	100
Paper-III (MSCE-203)	C++ Programming	3	75	25	100
Paper-IV (MSCE-204)	Power Electronics	3	75	25	100
Paper- V (MSCE 205)	Practical –I: Microwave and Power Electronics Lab (Based on Theory Papers I & IV)	6	75	25	100
Paper-VI (MSCE-206)	Practical –II: Microprocessors & Programming Lab (Based on Theory papers II &III)	6	75	25	100

Semester - III

Paper-I (MSCE-301)	Digital Signal Processing	3	75	25	100
Paper-II (MSCE-302)	Programmable Logic Controllers	3	75	25	100
Paper-III (MSCE-303)	Radio Wave Propagation and Antenna	3	75	25	100
Paper-IV (MSCE-304)	VLSI Technology	3	75	25	100
Paper-V (MSCE-305)	Practical – I: Digital Signal Processing Lab (Based on Theory Paper I)	6	75	25	100
Paper-VI (MSCE-306)	Practical – II : Microcontroller Lab (Based on Theory Paper II)	6	75	25	100

Semester – IV

Paper-I (MSCE-401)	Optical Fiber Communications	3	75	25	100
Paper-II (MSCE-402)	Embedded System	3	75	25	100
Paper-III (MSCE-403)	Programmable Peripheral Interfaces	3	75	25	100
Paper-IV (MSCE-404)	Digital Communication	3	75	25	100
Paper-V (MSCE-405)	Project	6	75	25	100

Scheme of Instruction:

Medium of instruction and Examination shall be English.

Each semester shall be of four months (80 working days) duration. Details of lecture hours per week shall be as follows

Theory: 4 hrs/week for each paper

Practical: Students are required to work in the laboratory for 24 hrs/ week for completing experiments. Faculty guidance for 12 hrs/ week is available for carrying out lab work. In the first semester, students are required to undergo additional practical training of 10hrs/week in Communication Skill development

Visit to Industry/Institutions: Students are required undertake an educational tour to visit Industries/Institutions and make a report and present the same at the Third semester Practical examination.

Seminar: Students are required to give Seminar on topics assigned to them by teachers. Detailed write up must be prepared and submitted to the department through supervising teacher. Seminar topics for each semester will be suggested by the advisory committee, from the advanced and emerging technology areas, which may not be directly covered in the syllabus, so that students will be exposed to advancements in each area.

Course Management: The course will be managed by the Programme coordinator/Director, and an advisory board consisting of four members. The advisory board will monitor the course and make suggestions regarding improvement /modification of the syllabus etc to the committee of courses.

Examination Scheme:

Medium of instruction and Examination shall be English.

1. University shall conduct examinations only after completion of at least 80 working days of instruction in each semester. External examination may be conducted on consecutive working days without any gap.
2. Each theory paper shall be of 100 marks (75 marks for written examination of 3 hrs duration and 25 marks for internal assessment).
3. Each practical paper shall be of 100 marks (75 marks for semester practical examination of six hours duration and 25 marks for internal assessment).
4. Paper on Project work will be of 200 marks. An external examiner and an internal examiner will evaluate it.
5. Students are required to answer total five questions out of eight questions in each theory paper in the external examination
6. A committee consisting of Programme coordinator, Teacher concerned and one advisory committee member will award the internal marks. The

committee will ensure that norms given below are followed in the award of internal marks for each theory & Practical paper

1. Detailed outline of the course and a list of textbooks and reference books followed to teach the course will be intimated to the examiner along with a model paper to provide necessary guide lines to set question paper for the external examination.

 8. In case of questions in the external examination is found outside the prescribed syllabus or not within the scope of the syllabus, the matter will be referred to the advisory board. The advisory committee will examine the matter in detail and will make specific recommendation to the University Grievance committee. If the students walk out or boycott the examination, they will be declared failed in that paper/examination and their grievance will not be examined by the board of examiners.
2. Internal Evaluation Scheme to award internal marks
- (a) **Assignments:** 40% of the internal assessment marks for each theory paper will be awarded on the basis of the performance in the assignments regularly given to the students.
 - (b) **Internal examination:** 40% of the total internal assessment marks for each theory paper will be awarded on the basis of the performance in the written examination conducted by the faculty, one at the end of the two months and another at the end of the semester.
 - (c) **Seminar & Oral examination:** 20% of the total internal assessment marks for each paper will be awarded on the basis of the performance in a seminar and Internal viva examination. At least one Internal Viva Voce examination per paper will be conducted by a committee consisting local examiners preferably during internal examination

Over all performance: Performance report of the student will be prepared by each teacher based on the active role played by the candidate in understanding the subject in the form of asking questions, participating in the discussion, group work, sharing of resources and knowledge with fellow students etc.

Note: Candidate who attends less than seventy percent of the total classes conducted in a paper will be awarded zero marks in the internal marks of that paper. This rule will not be relaxed under any circumstances

Students are required to keep record of the assignments, Seminars and answer books of the internal examinations and present them at the end of the semester to the advisory board of the course. The attendance / Lab log book and performance sheet of each student will be examined by the board .The internal marks awarded by the teacher will be moderated by the advisory board if necessary.

If a student has undertaken project work but failed to submit Project report before the prescribed date for submission, he/she shall be declared failed in IV semester. However he/she will be allowed to submit the same whenever next Semester examination is conducted and internal marks will be carried over.

If the project work of a student is found unsatisfactory or he/she has not carried out the project work, he or she will be declared Failed in the IV Semester examination and shall not be eligible for award of M.Sc degree. Such students will be given one more chance within one year provided they undertake a fresh project work as per rules.

Vacation/holidays: Normal holidays, except national holidays, and vacations declared by the University for Traditional Courses will not be applicable to this course due to professional and semester nature of the course. If required, classes may be conducted even on Sundays. However, limited semester /summer breaks applicable to the course will be declared by the Programme director.

Minimum passing marks and classification of the successful candidates:

1: First semester

- (a) The minimum marks for passing I semester shall be 40% in each paper
And 50% marks in the aggregate.
- (a) A candidate may be promoted to second semester if he or she has secured at least 40% marks in each papers but has failed to secure 50% marks in aggregate. He/she shall be required appear in some of the papers when these papers are offered again by the university so as to satisfy the passing criteria laid in 1 (a). However, candidate will not be allowed to reappear in the practical papers to improve the percentage.
- (b) A candidate may be promoted to the second semester if he/she has secured at least 40% marks in any four papers prescribed in the first semester, provided that aggregate of marks in all papers together is at least 50%. Such candidate shall be required to appear in papers in which

he/she has secured less than 40% marks when these courses are offered again so as to satisfy the passing criteria laid in 1 (a)

- (c) A candidate fails to satisfy the criteria 1 (a), 1 (b), and 1 (c) for promotion to II semester shall be required to rejoin the course in the first semester, if otherwise eligible in accordance with the university regulations laid in this regard.
- (d) In case result of the first semester is not declared by the university, before the starting of the second semester, all the students who have appeared in all the papers in the first semester will be allowed to attend the class of the second semester at their own risk. Candidates who are not eligible to be promoted to the second semester will have to leave the semester.

2: Second Semester

- (a) The minimum marks for passing II semester shall be 40% in each paper and 50% marks in the aggregate.
- (b) A candidate may be promoted to third semester if he or she has secured at least 40% marks in each papers but has failed to secure 50% marks in aggregate. He/she shall be required appear in some of the papers when these papers are offered again by the university so as to satisfy the passing criteria laid in 2 (a). However, candidate will not be allowed to reappear in the practical papers to improve the percentage.
- (c) A candidate may be promoted to the third semester if he/she has secured at least 40% marks in any four papers prescribed in the second semester, provided that aggregate of marks in all papers together is at least 50%. Such candidate shall be required to appear in papers in which he/she has secured less than 40% marks when these courses are offered again so as to satisfy the passing criteria laid in 1 (a)
- (d) A candidate fails to satisfy the criteria 2 (a), 2 (b), and 2 (c) for promotion to III semester shall be required to rejoin the course in the second semester, if otherwise eligible in accordance with the university regulations laid in this regard.
- (e) In case result of the second semester is not declared by the university, before the starting the third semester, all the students who have appeared in all the papers in the second semester will be allowed to attend the class of the third semester at their own risk. Candidates who are not eligible to be promoted to the third semester will have to leave the semester.

3: Third Semester:

- (a) The minimum marks for passing III semester shall be 40% in each paper and 50% marks in the aggregate.
- (b) A candidate who has secured at least 40% marks in each papers but has failed to secure 50% marks in aggregate shall be required appear in some of the papers when these papers are offered again by the university so as to satisfy the passing criteria laid in 3 (a). However, candidate will not be allowed to reappear in the practical paper to improve the percentage.
- (c) A candidate may be promoted to the IV semester if he/she has secured at least 40% marks in any four papers prescribed in the third semester, provided that aggregate of marks in all papers together is at least 50%. Such candidate shall be required to appear in papers in which he/she has secured less than 40% marks when these courses are offered again so as to satisfy the passing criteria laid in 3 (a)
- (d) A candidate fails to satisfy the criteria 3(a), 3(b) and 3(c) shall be required to rejoin the course in the third semester, if otherwise eligible in accordance with the university regulations lay in this regard.
- (e) In case result of the third semester is not declared by the university, before the starting the fourth semester, all the students who have appeared in all the papers in the third semester will be allowed to attend the class of the fourth semester at their own risk. Candidates who are not eligible to be promoted to the fourth semester will have to leave the semester.

(4) Fourth Semester

- (a) The minimum marks for passing 4th semester shall be 40% in each paper and 50% marks in the aggregate.
- (b) A candidate who has secured at least 40% marks in each papers but has failed to secure 50% marks in aggregate shall be required appear in some of the papers when these papers are offered again by the university so as to satisfy the passing criteria laid in 4 (a). However, candidate will not be allowed to reappear in the practical paper to improve the percentage.
- (c) No candidate shall be deemed to have satisfied examination requirement for award of M.Sc degree unless he/she fulfills the criteria for passing first, second third and fourth semester as laid in 1(a), 2(a) and 3 (a) and 4(a).

No candidate will be allowed to reappear in the practical papers of first, second and third and fourth semester in which he/she obtained 50% marks to improve the percentage to satisfy the criteria for passing First, Second, third and fourth semester examination.

Note: In order to avoid loss of working days/classes due to delay in declaration of the results of the each semester examination, classes of next semester will be started after provisional admission immediately after previous semester examination. If any candidate is found not eligible for promotion to the next semester on the basis of results of their previous examinations or any other reason, their admission will be cancelled and fee deposited for that particular semester will be refunded.

RESULT

At the end of final examination the candidates eligible for the award of M.Sc. Degree in Electronics with specialization in the subject he/she chosen from Group I or II or III Degree shall be classified on the basis of the marks obtained in the first, second, third and fourth semester examination taken together, as follows:

(a) First Division with distinction:

75% or more marks in the aggregate and provided the candidate has passed all the papers and examination in the first attempt.

(b) First Division

60% or more marks but fails to satisfy criteria being classified as first division with distinction laid in (a)

(c) Second Division

All other than those included in (a) and (b) above

The Specialization of the Course will be marked in the Degree as well as in the mark sheet to emphasize the area of specialization. A candidate must pass the M Sc examination within three years of the initial admission to the first semester of the course

Note: Since M.Sc (Electronics) is a Professional course; all other examination rules will be that applicable to professional PG courses of the University

Fee structure:

In each semester students are required to deposit following fee in one installment in the form of a crossed DD in the name of Head, Department of Physics

TOTAL SEMESTER FEE: Rs 15,000/- per semester

Semester fees will be collected for all the four semesters. In addition to the above, the following fee may be paid at the time of admission to first and third semester

Local Fund Fee*: Rs 615/- (in semester I and III)

*(Fee on behalf of Dean, College of Science, may vary from year to year)

Admission fee: Rs 50.00

Examination fee, enrollment fee etc to be paid as per university rules and Rs 1000/- (Refundable) as caution money deposit at the time of admission.

SYLLABUS

First Semester

MSCE-101 : ANALOG ELECTRONICS

Note: Detailed Mathematical derivations not required

Review of Basic Electronics

Specifications and characteristics of different types of passive and active components: Resistor, Inductor, Capacitor, Transformers, and switches.
Semiconductor Devices: Diodes, BJT and FET

Amplifiers and Oscillators (Design): Class A, B, C operation, RC and Transformer Coupled Amplifiers, push pull amplifiers, Narrow band and wide band amplifiers. RC, LC and Crystal Oscillators. Multivibrators, 555 and its applications, Phase Locked Loops

Operational Amplifier and Integrated Circuits: Basic Op-amp, Inverting and Non-inverting amplifier, Parameters of Op-amp, Frequency response, Applications. Voltage Regulators, Design of Power Supply Circuits.

Power Electronic Components: Specifications and Characteristics of SCR, UJT. Linear Wave shaping circuits: RC circuits, Integrating and Differentiating circuits, pulse response, frequency response, rise time and band width, tilt, attenuators, compensated attenuators, RLC second order systems, damping, pulse transformer, application, ferrite transformer

Design of Filter Circuits:

Approximation theory, Network transformations, Active RC filter design: use of finite and infinite gain amplifiers. Two integrator loop and high order filter design.

Reference Books:

Malvino : Basic Electronics

Kennedy :Electronic Communication System-McGraw Hill

Reference: Millman & Halkias: Integrated Electronics

S.K.Mitra, Active Inductorless Filters, IEEE Press 1971

MSCE- 102: Communication Electronics

Introduction to communication Systems: Analog and Digital base band signals, Description and need for Modulation, Bandwidth requirements

Noise: Sources and Types of Noise, Signal to noise ratio, Noise factor

Noise Figures and its calculations

Modulation- A.M; Definition-Mathematical representation –Frequency spectrum, Power relations, AM generation, Modulated transistor amplifiers, balanced modulator

SSB modulation : Suppression of carrier and unwanted sideband, extensions of SSB

Frequency and Phase modulation-Definition-Mathematical representations of FM and PM wave, frequency spectrum, Comparison of AM, FM and PM, FM and PM generation- FET FM modulator, Varactor diode modulation, Armstrong modulator-Comparison of wide band and narrow band FM

Pulse Modulation: Pulse amplitude modulation, Pulse code modulation: Quantization, PCM receiver, Differential PCM, Delta modulation, General ideas of Pulse frequency modulation, Pulse time modulation, Pulse position modulation and Pulse width modulation

Telephony: Principles, various tones, electronic telephone exchanges, DTMF pulsing techniques

Reference Books:

Kennedy: Electronic Communication System

Roddy and Coolen: Electronic Communications

MSCE-103: Digital Electronics

Basic of Digital Electronics: Number systems and Codes, Basic Logic gates, Gate propagation delay time, power dissipation, Noise immunity, loading considerations, IC logic families and comparison. Boolean algebra: Axiomatic Definition, Basic theorems and properties, Boolean functions, Canonical and standard forms, Simplifications of Boolean Expressions, K-Map, NAND and NOR implementation of Boolean functions

Combinational Logic: Adders, Comparators, Decoders, Encoders, Multiplexers, Parity Generators /Checkers

Sequential Logic: Latches, Edge and Pulse triggered Flip-Flops, Data Lock Out Flip-Flops, Operating Characteristics, Counters: Asynchronous and Synchronous, UP/Down Synchronous counters, Procedure for Design of Sequential circuits

Shift Registers: Serial in- Serial Out, Serial in Parallel out, Parallel-in Serial Out, Parallel in Parallel Out, Bidirectional. Applications of shift Registers

Reference Books:

Floyd: Digital Fundamentals: Third Edition, UBS 2001

M. Morris Mano: Digital Logic and Computer Design :

MSCE-104 : Network Theory

Network Parameters : Active and Passive ,linear and non-linear Unilateral and bi-lateral, lumped and distributed, time varying and time invariant, voltage and current source, dependent and independent sources, Definition of Branch, node, Mesh. Problems on source conversion

Mesh and Nodal analysis: Kirchoff's laws, mesh, nodal equation for a network by inspection, solutions of network equations by using Cramers rule, Simple problems upto three variables

Network Theorems: Superposition, Reciprocity, Thevenins and Nortons theorem, Maximum Power Transfer theorem, Millmans theorem, Star-Delta Conversion

Two Port Network: Introduction, Definitions of Z, Y & ABCD parameters, Equivalent model and Inter relationship between Z and Y parameters, Determination of Z, Y parameters for T, Pie, lattice, bridge T, parallel bridge T

Laplace Transformation: Introduction to Laplace transformation, Transformation of important signal waveform-like unit, step, exponential, ramp, sinusoidal, parabolic functions. Laplace transform of derivatives, Integral function shifting, initial and final value theorem, inverse Laplace transformation for simple, multiple and conjugate complex roots, Application of Laplace Transformation for simple electrical circuits consisting of RC,RL & RLC series

Circuit Transients : Introduction, DC Transients in RL,RC & RLC series circuits, Determination of initial and Final conditions, Simple problems

Reference Books:

Umesh Sinha: A Course in circuit Analysis

Schaum series: Electric circuits, McGraw Hill

Hayt: Circuit Analysis

MSCE-105 : Practical – I Analog and Communication Electronics Lab

Basic Training: Soldering Techniques, PCB fabrication, Component testing and Mounting etc and Experiments based on the course MSCE-101 and 102: Analog Electronics Experiments comprising diode, transistor, FET and UJT characteristics, Transistor Amplifiers and Oscillators, OPAMP based Experiments, AM & FM Generation and Detection

MSCE-106 : Practical – II Digital and Network Lab Analog and Communication Electronics Lab

Experiment based on the course MSCE-103 & 104 : Verification of Network Theorems, Transient response of R-C and R-L-C Circuits, Digital Circuits : Combinational and Sequential Circuits, Design and Implementation.

MSCE-107 : Practical – I: COMMUNICATION SKILL

Practical to be conducted for

Section A: Oral Communication Competence

Section B: Group Discussion and Personality Development:

SECOND SEMESTER

MSCE-201 : Microwave Electronics

Microwaves: Introduction to Microwaves and its applications

Transmission Lines: Propagation of Voltage and Current on line, characteristics of open and short circuited and infinite line, Reflection coefficient, standing wave ratio, Non-resonant (infinite) and resonant short-circuited transmission line, resonant section

Impedance and Q of resonant section, stub matching (single and double), use of Smith chart, Coaxial, Twin, strip and microstrip lines and balunes

Wave Guides: Rectangular guides, TM waves in rectangular guides, TE waves in rectangular guide, TEM waves in wave guides, TM and TE waves in circular wave guides (general concept), wave impedances and characteristic impedance, transmission line analogy, attenuation factor

Microwave Passive Components: S-parameter, Representation and analysis of microwave components such as tees, directional couplers, attenuator, isolators and circulators, Mixed phase shifter and cavity resonator, Microwave propagation in ferrites and its components

Microwave Devices: Introduction to Klystron, Magnetron and Traveling Wave Tubes

Microwave Circuits: Transistor and Integrated circuits, Varactors and step recovery diodes, Parametric amplifier, tunnel diode, Gun diode, Avalanche effects & diodes, PIN diode, Schotky barrier diode, Microwave Integrated circuits

Reference books:

Jordon: Electromagnetic waves and Radiating system

Kennedy: Electronic Communication System

T.K.Ishii: Handbook of Microwave Technology Vol. I, Academic Press 1995

H.A. Watson: Microwave Semiconductor Devices & their circuit applications

MSCE-202 : Microprocessors

Microprocessor Architecture and Microcomputer systems: Microprocessor Architecture and its operation, Memory, I/O, Example of a Microcomputer system.

8085 Microprocessor Architecture, Memory Interfacing, I/O Interfacing

Programming the 8085 : Introduction to Assembly Language Programming

8085 instructions : Data Transfer, Arithmetic, Logic and Branch Operations
Programming 8085 : Looping Counting and Indexing, 16-bit Arithmetic Instructions, Counters and Time Delays, Stack and Subroutines, Software development system and Assemblers

Introduction to 8086,8088 and other Intel processors used in Computers. 8086 Internal architecture, Introduction to programming of 8086

Reference Book :

Ramesh S. Gaonkar: Microprocessor Architecture, Programming and applications with the 8085, Penram –International

MSCE-203 : Computer Programming using C++ & JAVA

Computer Software: Algorithm, Flow charting, Writing algorithm for: Factorial, generation of Fibanocci nos., Max & Minima, finding roots, solution of simultaneous equations, Sorting: quick, bubble and heap, Matrix inversion, addition and multiplication. Compilers and Interpreters, Linking and Loading, Library, Procedural languages. Structured and modular programming. Introduction to Object Oriented Programming

C++ : Elements of C++ programs: Syntax and Semantics, Data and Data types, Declarations. Arithmetic expressions, Function call and Library functions, Formatting output, interactive input/output, File input and output.

Conditions and logical expressions, Looping, Functions, Simple Data types- built in and User defined. One-dimensional arrays, lists and strings, multidimensional arrays, Records, Abstract Data Types. C++ classes, OOP in C++, Recursion

Java : Programming structures in Java: Data types, variables, assignments and initialization, operators, strings, control flow, class methods, arrays

Objects and Classes: Using classes, packages, inheritance, interfaces and inner classes

Graphics programming, Event handling

User interface components with Swing: Text input, making choices, scroll bars, layout management, menus, dialog boxes

Applets, stream and Files

Reference Books:

Nell Dale, Chip Weems and Mark Headington: Programming in C++, Narosa Publishing House, 1998

Cay S. Horshmann & Gary Cornell: Core Java 1.2 Vol-I, Sun Microsystems Java Series

MSCE-204 : Power Electronics

Power Devices: SCR, Triac, BJT, MOSFET, IGBT & GTOs – Operating characteristics and gate drive requirements and circuits. Review of line commutated converters, Principle of Phase Control, Half Wave converters with R and RL loads, Full wave converters, Single phase half controlled and fully controlled bridge converters, overlap angle, Three phase half controlled and fully controlled bridge converters, Dual converters, Cycloconverter, Inverters: Voltage source inverters: - Single phase & six step inverters, voltage control & PWM strategies and implementation aspects, Linear mode and Switched Mode Power Conversion, Control Strategies, Hard switched and Soft switched Converter, Types of Chopper, Applications – Static circuit breakers, UPS, Static frequency converter, Power factor control

References:

M.H. Rashid: Power Electronics

G.K.Dubey, S.R. Doradla, A.Joshi & V.P. Sinha: Thyristorised Power Controllers

P.C. Sen: Power Electronics

P.S. Bimbhra: Power Electronics

Cyrill W. Lander: Power Electronics

Ned Mohan, T.M. Undeland & W. P. Robbin: Power Electronics(Converter, Application & Design)

R.S. Ramstrand: Power Electronics
M. Ramamoorthy: Thyristor and their Application

MSCE-205 : Practical –I: Microwave and Power Electronics Lab

The practical will be based on the theory papers 201 and 204. These would include characteristics of diacs and triacs, SCRs, Power supplies, Tunnel diode characteristics, Transmission Lines and Smith Charts.

MSCE-206 : Practical –II: Microprocessors & Programming Lab

The practical will be based on the theory papers 202 and 203. These would include 8085 Assembly language programming related to Looping, Counting and Indexing, Block data Transfers, Multiplication of binaries, Counters and Time Delays, Use of Subroutines.

The programming in C++ would include Factorial, generation of Fibanocii nos., Max & Minima, finding roots, solution of simultaneous equations, Sorting, Matrix addition and multiplication.

THIRD SEMESTER

MSCE-301 : Digital Signal Processing

Information theory-Review of probability theory and random variables, Shannon's theorem.

Review of Frequency-Domain Analysis, Sampling and Reconstruction, The discrete Fourier transforms. The Fast Fourier Transform, Practical Spectral Analysis

Review of Z-transforms and Difference equations, Introduction to Digital filters, Finite and infinite impulse response filters, Digital filter realization and Implementation. Analysis and modeling of Random signals. Digital Signal processing applications

Reference Books:

Boaz Porat: A course in Digital signal Processing, First Edition, John Wiley & Sons 1996.

Sanjit K Mitra: Digital Signal Processing -A computer Based Approach

MSCE-302 : Programmable Logic Controllers

Micro controllers: Introduction to Micro controllers, 4-bit, 8-bit, 16-bit, 32-bit micro controllers

The 8051 Architecture: Introduction, 8051 micro controller hardware, Input output pins, port and circuits, External Memory, Counters and timers, Serial data input output, Interrupts.

Moving data: Introduction, Addressing modes, External data moves, code memory, read only data moves, push and pop opcodes data exchange, example programs.

Logical operations: Byte-level logical operations, Bit-level logical operations, Rotate and swap operations, Example programs.

Arithmetic Operations: Flags, Incrementing and Decrementing, Addition, Subtraction, multiplication and division, Decimal Arithmetic, Example program, JUMP and CALL subroutines: the jump and call programs, range, jumps, call and subroutines, interrupts and returns, more details on interrupts example problems.

Programmable Logic Controllers: Introduction to PLC's, Arithmetic details-processor, Memory structure, I/O structure, Programming terminal, Power supply.

Working of PLC's: Basic principal, Response time, Effects of response time relay replacing, Basic instructions, PLC registers and program scan

Instruction set: Latching, Counters, Timers one shot, Shift Registers, Math, Boolean instructions.

Elements of Ladder diagram programming.

Reference Books:

Kenneth J. Ayala: The 8051 Microcontroller, Architecture, Programming and Applications, Penram International

Job Dan Otter: Programmable Logic Controller, P. H. International Inc. USA

MSCE-303 : Radio Propagation and Antenna

Free space propagation equation, Modes of propagation in Earth environment: Ground or surface Waves, Structure and Variability of Earth's atmosphere (ionosphere), Sky Waves, effect of Earth's Magnetic field, Small and Large scale Fading, Space wave propagation, Multi path, Combating multi path, Effect of curvature, Duct Propagation, Elements of radio propagation and channel modeling, popular channel models

Review of Antenna Theory, dipoles: Half wave and monopole, loop antennas, linear and planar arrays, phased arrays, helical antennas, radiation from apertures, aperture distribution, horn and parabolic dish antenna, Yagi-Uda and log periodic antennas, microstrip antennas and arrays, Mobile antennas and antennas for handheld devices and WLANs, Introduction to smart antennas and digital beam forming.

Note: Excessive mathematical derivations to be omitted.

Reference Books:

J.D.Karus: Antennas, McGraw Hill, 1988

R.E. Collin: Antennas and Radiowave propagation, McGraw Hill, 1985

R.C.Johnson and H.Jasik: Antenna Engineering Handbook, McGraw Hill, 1984

I.J.Bahl and P.Bhartia: Microstrip Antennas, Artech House Inc., 1980

MSCE-304 :VLSI Technology & Design

An overview of VLSI, Modern CMOS Technology, Silicon Logic, Logic design with MOSFET. Physical structure of CMOS Integrated circuits, Fabrication of CMOS Integrated Circuits, Elements of Physical Design

Electrical characteristics of MOSFETS, Electronic analysis of CMOS Logic gates, Designing high speed CMOS Logic Networks

Design of VLSI Systems, System specifications using HDL, General VLSI system components. Memories and Programmable Logic, VLSI Clocking and System Design, Reliability and Testing of VLSI circuits

Reference Books:

J.P. Ugemura: Introduction to VLSI circuits and Systems, Wiley 2001

MSCE-305 :Practical – I Digital Signal Processing Lab
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The practical will be based on theory paper 301 to include: Solutions of Difference equations, Sampling and Reconstruction, Fourier Transforms, Digital filtering: FIR and IIR filters.

MSCE-306 :Practical – II: Microcontroller Lab
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The practical will be based on theory paper 302 to include: Programming 8051 micro controller, Block Data Transfers, Performing Logical operations using Bit and Byte Level instructions, Arithmetic Operations, Looping and counters, Use of Subroutines.

FOURTH SEMESTER

MSCE-401 : Optical Fiber Communication

Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, ray model, wave model, different type of Optical fibers, Modal analysis of a step index fiber

Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR

Optical sources-LEDs and Lasers, Photo detectors-Pin detectors, detector responsivity, noise, optical receivers

Optical link design- BER calculation, quantum limit, power penalties

Optical switches- Coupled mode analysis of directional couplers, electro optic switches

Non-linear effects in fiber optic links. Concept of self phase modulation, group velocity dispersion and soliton based communication. Optical amplifiers- EDFA, Raman Amplifier and WDM systems.

Reference

J. Keiser: Fibre Optic communication, McGraw Hill, 2nd Edition 1992

J.E.Midwinter: Optical Fibers for Transmission, John Wiley 1979
H. Dutton: Understanding Optical Communications, Prentice Hall

MSCE-402 : Embedded Systems

Overview of embedded systems, Design challenge, Processor technology, IC technology, Design Technology

Custom-Single purpose processors: Custom single purpose processor design, optimizing custom single processors, Basic architecture, operation, programmers view, development environment, Application specific instruction set processors, selecting a microprocessor

Standard single-purpose processors: peripherals Timers, counters, watchdog timers, UART, Pulse width modulator, LCD controller, Keypad controller, ADC, Real time clocks

Memory: Memory write ability and storage performance, Common memory types, composing memories, memory hierarchy and cache, advanced RAM : DRAM, FPM DRAM, EDO DRAM, SDRAM, RDRAM, Memory management Unit

Interfacing: Arbitration, Multi-level bus architectures, Serial protocols: I2C bus, CAN bus, Fire Wire bus, USB, Parallel protocols: PCI and ARM bus, Wireless Protocols: IrDA, Blue tooth, IEEE802.11

Digital Camera: Case study of embedded system

Brief study State Machine and Concurrent Process Models

Control systems: Open loop and closed loop systems, General control systems and PID controllers, Fuzzy control, Practical issues related to computer based control, Benefits of computer based control implementations

Reference Book:

Frank Vahid and Tony Givargis: Embedded System Design - A Unified Hardware /Software Introduction, Wiley 2001

MSCE-403 : Programmable Peripheral Interfaces

Interfacing Peripherals and Applications: Parallel I/O and Interfacing applications, Interrupts and Interrupt service procedures, 8085 interrupts, 8086 Interrupts and responses, Interfacing Data converters,

Digital Interfacing: Programmable Interfacing devices- 8155/8156,8355/8755, 8279 (Brief idea), General purpose Programmable Peripheral Devices: 8255A, Basic details of 8253, 8259A, DMA and DMA Controller

Serial I/O: Basic concepts, software controlled asynchronous I/O, SOD and SID, serial I/O using programmable chips- 8251: Block diagram, Transmitter section, Receiver Section and Control Section.

Analog Interfacing and Industrial control, sensors and transducers, Industrial process control

Reference Books:

Ramesh S. Gaonkar: Microprocessor Architecture, Programming and Applications with 8085/8080A, Wiley Eastern

Douglas Hall: Microprocessor Interfacing, McGraw Hill

MSCE-404 : Digital Communication

Introduction to Digital communication: Communication links, Data Communication system, character codes, Digital data rates, Asynchronous and Synchronous data, binary data signal, serial Vs parallel communication, communication channeling

Pulse modulation: sampling theory and Practice, PAM, PWM, PPM techniques, Modulators and demodulators, quantizing of analog signals, PCM generation and demodulation, Time division multiplexing, FDM

Signaling schemes: Binary ASK signaling scheme, Binary PSL signaling schemes, Binary FSK signaling schemes, Comparison of Digital modulation schemes, m-ary signaling schemes-synchronization methods

Network hardware and Software-LAN, MAN, WAN, Wireless and Internetworks, protocol hierarchies, design issues for the layers, interfaces and services, connection oriented and connectionless services .OSI reference model, TCP/IP model, comparison

Different Layers and its functions: Physical Layer, Data Link Layer: Services provided to Network layer, Medium Access Sublayer, Elementary ideas of framing, Network and Transport layers

LAN Hardware and components: Bound and Unbound media and its specifications, Switches and Hubs, Bridges and Routers. Structured cabling and Passive components.

Reference Books:

B.P. Lathi: Modern digital and analog communication systems

MSCE-405 :Project Work

Students are required to take up major project work preferably at any industry. Students are required to carry out a project work which requires atleast 300 hrs (At least 8 hrs/day, 40 working days). After selection of the project, candidate are required to submit brief outline of the project to the programme co-ordinator and get his approval before undertaking the project. During project evaluation, at least one external examiner, one advisory committee member, programme co-ordinator are required to assess the project. Students are required to submit the project report in the hard copy form as well as soft copy on a CD ROM. The project supervisor is required to award the internal marks for the candidate based on attendance and performance during the project work.

PROFORMA FOR CERTIFICATE TO BE SUBMITTED WITH PROJECT WORK

This is to certify that this is a bonafide record of the project entitled _____ was done satisfactorily at _____ by Mr/Ms _____ in partial fulfillment of MSC course. All the subjects have been successfully completed by him/her.

The report had not been submitted for any other examination and does not form part of any other course undergone by the candidate.

PLACE
DATE

SIGNATURE:
NAME:
DESIGNATION:

(Name & Seal of Organization of supervisor)

PROFORMA FOR CERTIFICATE TO BE SUBMITTED WITH PROJECT WORK

This is to certify that this is a bonafide record of the project entitled _____ was done satisfactorily at _____ by Mr/Ms _____

_____ in partial fulfillment of MSC course.
All the subjects have been successfully completed by him/her.

The report had not been submitted for any other examination and does not form part of any other course undergone by the candidate.

PLACE

DATE

SIGNATURE:

NAME:

DESIGNATION:

(Name & Seal of Organisation of supervisor)

PROFORMA FOR THE PROJECT WORK

1. Title of the project
2. Objectives
3. Input to the project
4. Output generated
5. Details of the hardware platform used
6. Details of software tools used
7. Implementation issues (Clearly defining the are of application)
8. Miscellaneous
9. Signature of the candidate

Guidelines for the chapters and sections are as follows:

1. Microscopic summary
2. Details of candidate and supervisor along with certificates of::
Original work
Assistance if any
Credits
3. Aims and objectives
4. Approach to project and time frame
5. Project design description with appendices to cover:
 - Flow charts/Data flow diagram-Macro/Micro level
 - Blue prints (Only for Network design)
 - Circuit Diagram (only if Circuits are designed)
 - Source code
 - Hardware platform
 - Software tools
 - Security measures
 - Quality Assurance
 - Auditability

6. Test Data and Results

OUTLINE OF THE SYLLABUS FOR ADMISSION TEST

(Total 100 questions of multiple choice type will be set with 50 questions from Section -A, 25 questions from Section-B and 25 questions from Section-C. Each question will carry 1 mark for correct answer. The syllabus given is only a broad outline)

Time: 2 Hrs

Max. Marks: 100

SECTION - A: Basic Electronics (50 Questions)

Network theorem: Ohms Law, Kirchhoff's law, superposition theorem, Thevenin's theorem, Norton's Theorem, Reciprocity Theorem, Transient response, resonance, passive Integrator and Differentiator, Passive filters, attenuator.

Fundamentals of Semiconductor Devices: Electronic energies in conductors, Intrinsic and extrinsic semiconductors, the PN junction, diffusion current density, the drift current, volt-ampere relation for PN junction, capacitance effects in PN junction, Zener diode, tunnel diode, thermistors, junction transistor, transistor current and voltages, Field effect transistors

Amplifier: Transistor as a four terminal network, Transistor amplifiers: low frequency equivalent circuits and low frequency performance. Emitter follower, comparison of transistor amplifiers, Matching of transistor impedances, variation of transistor parameters, transistor bias, stability of Q point, transistor internal capacitance, coupling and cascading amplifiers, Factors influencing amplifier band width, Gain frequency plots, Noise in amplifiers, Class-A, B, C operation, Power amplifiers, Class AB operation. Push pull amplifiers Basic principles of Feedback, Negative feedback and its effect in gain stability, linearity, impedance. Stability of feedback amplifiers

Oscillators: Positive feedback, condition for oscillation, RC, LC and Crystal oscillators and conditions for oscillation, pulse generation by relaxation circuits, Multivibrators, The Schmitt trigger.

Operational Amplifiers: Ideal Operational Amplifier, concept of virtual ground, inverting and non-inverting amplifiers, working of a difference amplifier, different stages of an Operational amplifier, Parameters of Operational amplifier, high frequency response. Different applications of OPAMP.

Power supply and regulator circuits, Instruments for voltage, current, power and wave form measurements.

Electromagnetic waves, lumped constants, propagation of radio waves and factors influencing it, Modulation: amplitude, frequency modulation, phase modulation. Detection of modulated wave, superhetrodyne receiver, basic principles of Television receiver and camera

Digital Electronics: Logic circuit, Boolean algebra, Number system-Binary, octal and Hexadecimal, Basic logic gates, Universal gates, X_OR circuits, Demorgans theorem, Simplification of Boolean expressions

SECTION- B: MATHEMATICAL ABILITY (25 Questions)

Algebra: sets, groups, fields, vector spaces, complex numbers, matrices, determinants relation between roots and coefficients of an equation, scalar and vector products, triple products

Calculus: Real number system, continuity and limits, differentiation, integration, definite integral, evaluation of lengths and area of curves, curvature, tracing of curves, partial differentiation, differential equations of the first order and their solutions, linear differential equations with constant coefficients, Homogenous linear differential equations.

Geometry: 2 dimensions, straight lines, circles, parabola, hyperbola and ellipse. 3 dimensions, spheres, quadric cones and cylinders

Real Analysis: Sequence of real numbers, convergent sequences, Cauchy sequences, bounds, infinite series and their different test of convergences, uniform convergence. Properties of continuous functions, Rols theorem, mean value theorem, Taylor's and Maclaurine series, maxima and minima.

Statistics: Frequency distributions and measures of dispersion, permutation and combinations, probability, random variables and distribution functions, mathematical expectation and generating functions, Binomial, Poisson, Normal distribution, curve fitting and principles of least squares, correlation and regression, sampling and large sample tests, tests of significance based on t and F distributions.

SECTION-C: Mental Ability (25 Questions)

Mental ability: Standard will be that expected from Engineering/Physical Science Degree holders. Candidate's capability for deductive and logical thinking will be tested in this section.