Gondwana University, Gadchiroli

Scheme of Examination

&

Syllabus

For Semester Pattern with Credit Based System

in

M. Sc. Electronics

(Under the Faculty of Science)

Approved by the Board of Studies in Electronics

Effective from the session 2012-2013 and subsequently

Appendix-1

Scheme of teaching and examination under credit based semester pattern for M.Sc. Electronics

Sr.No.	Semester	Theory Paper/ Practical	Teaching Scheme (Hrs/week)			Credits	Examination Scheme						
			Th.	Pr.	Total		Duration (Hrs)	Max. Marks		Total Marks	Min. Passing Marks		
								External Marks	Internal Marks		Th.	Int.	Pr.
1	I	I	4	--	4	4	3	80	20	100	32	08	--
2	I	II	4	--	4	4	3	80	20	100	32	08	--
3	I	III	4	--	4	4	3	80	20	100	32	08	--
4	I	IV	4	--	4	4	3	80	20	100	32	08	--
5	I	Practical I	--	8	8	4	3-8*	80	20	100	--	--	40
6	I	Practical II	--	8	8	4	3-8*	80	20	100	--	--	40
7	I	Seminar	2	--	2	1	--	--	25	25	10		
		Total	18	16	34	25	--	--	--	625			
8	II	I	4	--	4	4	3	80	20	100	32	08	--
9	II	II	4	--	4	4	3	80	20	100	32	08	--
10	II	III	4	--	4	4	3	80	20	100	32	08	--
11	II	IV	4	--	4	4	3	80	20	100	32	08	--
12	II	Practical I	--	8	8	4	3-8*	80	20	100	--	--	40
13	II	Practical II	--	8	8	4	3-8*	80	20	100	--	--	40
14	II	Seminar	2	--	2	1	--	--	25	25	10		
		Total	18	16	34	25	--	--	--	625			
15	III	I	4	--	4	4	3	80	20	100	32	08	--
16	III	II	4	--	4	4	3	80	20	100	32	08	--
17	III	III	4	--	4	4	3	80	20	100	32	08	--
18	III	IV	4	--	4	4	3	80	20	100	32	08	--
19	III	Practical I	--	8	8	4	3-8*	80	20	100	--	--	40
20	III	Practical II	--	8	8	4	3-8*	80	20	100	--	--	40
21	III	Seminar	2	--	2	1	--	--	25	25	10		
		Total	18	16	34	25	--	--	--	625			
22	IV	I	4	--	4	4	3	80	20	100	32	08	--
23	IV	II	4	--	4	4	3	80	20	100	32	08	--
24	IV	III	4	--	4	4	3	80	20	100	32	08	--
25	IV	IV	4	--	4	4	3	80	20	100	32	08	--
26	IV	Practical I	--	8	8	4	3-8*	80	20	100	--	--	40
27	IV	Project	--	8	8	4	3-8*	80	20	100	--	--	40
28	IV	Seminar	2	--	2	1	--	--	25	25	10		
		Total	18	16	34	25	--	--	--	625			

Total Marks: 2500 Credits: 100

Note:

1. Minimum marks for passing 32 out of 80 in each theory paper
2. Minimum marks for passing 40 out of 100 in each practical
3. Minimum marks for passing 10 out of 25 in seminar
4. Minimum marks for passing 08 out of 20 in each internal(Int.) assessment

M. Sc. (Electronics)

Semester IV

Paper I (ELE 401): Electromagnetic Fields and Antennas

Unit I: Electromagnetic waves

The equation of continuity for time varying fields, Maxwell's equations, EM waves in a homogeneous medium, wave equations for a conducting medium, conductors and dielectrics, Poynting's theorem, interpretation of E x H, complex Poynting vector

Unit II: Antenna Basics

Basic radiation equation, radiation resistance, antenna patterns, half-power bandwidth, radiation intensity, directivity and gain, resolution, apertures, effective heights, Fii's transmission formula, field zones, linear, elliptical and circular polarization

Unit III: Antenna types

The antenna family, short dipole antenna, antenna arrays, broad-side and end-fire arrays, linear arrays, folded dipole, Yagi-Uda array, helical beam antenna, horn antenna, rhombic antenna, parabolic reflectors

Unit IV: Antennas for mobile communications and antenna measurements

Antennas for terrestrial mobile communications, base station antennas, switched beam and beam forming antennas, antennas on cellular handsets, micro-strip lines and antenna

Antenna measurements: The reciprocity theorem, antenna ranges, compact antenna test ranges (CATR), instrumentation for measurement of radiation properties of antenna under test (AUT)

References:

1. Electromagnetic waves and Radiating Systems: E. C. Jordan and R. E. Balmain, PHI, New Delhi
2. Antennas: For All Applications: John D. Kraus and R. J. Marhefka, TMH, New Delhi
3. Antennas and Radiowave Propagation: R. E. Collin (MGH, International Edition)

M. Sc. (Electronics)
Semester IV

Paper II (ELE 402): Digital Communication

Unit I: Signals and spectra

Classification of signals, energy and power signals, energy spectral density, power spectral density, unit impulse function, sifting property of the Dirac delta function, Fourier series, Parseval's theorem, Fourier transforms, properties of Fourier transforms, convolution properties, graphical convolution

Unit II: Digital Communication system

Elements of digital communication system, the sampling theorem, aliasing error, PAM, PPM & PWM signals generation and detection

Pulse code modulation, uniform and non-uniform quantization, SNR, companding characteristics, Inter-symbol interference, Nyquist criteria of zero ISI, eye pattern

Unit III: Digital Modulation Techniques

Coherent binary modulation techniques, PSK, FSK, QPSK, MSK differential pulse code modulation, predictor, delta modulation, adaptive delta modulation, slope overload and granular noise, M-ary signaling

Unit IV: Information Coding

Measure of information, entropy, mutual information, Shannon's coding theorem, channel capacity, capacity of Gaussian channel, source coding, Huffman code, channel coding, block codes, syndrome decoding, convolutional coding, code tree, spread spectrum communication: PN sequences, direct sequence and frequency hopping spread spectrum systems

Practicals:

1. Study of PCM circuit and quantization
2. Study of PAM, PWM and PPM circuits and detection of these signals
3. Study of a Delta modulator
4. Study of a DBPSK communication system
5. Study of an adaptive Delta modulator
6. Study of a convolutional encoder
7. study of a PN sequence generator
8. Study of a spread spectrum direct sequence communication system

Books:

1. Digital communications: Bernard Sklar (Pearson Education, Asia Publ)
2. Modern Digital and Analog Communications Systems: B. P. Lathi (Oxford Univ. Press)
3. Analog and Digital Communications: Hwei Hsu (Schaum Outline MGH)

References:

1. Digital communications: Symon Haykin (John Wiley & Sons)
2. Modern Digital communications Systems : Leon W. Couch (PHI, New Delhi)
3. Digital communications: J. G. Proakis (MGH)

M. Sc. (Electronics)
Semester IV

Paper III (ELE 403): Microwave and Optical Communication

Unit I: Microwave Generators and wave guides

Failure of vacuum tubes at high frequency, Two cavity klystron, reflex klystron oscillator, magnetron oscillator, TWT amplifier, backward wave oscillator, GaAs oscillator;

Propagation of EM waves through wave guide, TE, TM and TEM waves

Unit II: Microwave components and Measurements

Microwave components: scattering matrix, attenuators, Tees, directional couplers, circulators, isolators, phase shifters, cavity resonators

Microwave measurements: Measurement of VSWR, phase shift, frequency, power, attenuation, dielectric constants of liquids and solids, Q of cavity

Unit III: Fiber optics

Principles of optical communication, single mode and multi mode fibers, step index, graded index, ray model, multi path dispersion, material dispersion, optical fiber as wave guide, fiber sources and detectors,

Unit IV: Manufacture and Measurements of fibers

Optical fiber cable, fiber joints, splices, couplers and connectors, measurement in optical fibers, attenuation measurement, dispersion measurement, refractive index profile measurement, transmission links, optical transmitters and receivers

Practicals:

Practicals on X-band test bench

1. Characteristics of reflex Klystron
2. Attenuation Measurement
3. Coupling and directivity of a directional coupler
4. Standing wave plotting and measurement of guide wavelength
5. Measurement of low VSWR and high VSWR
6. Measurement of unknown impedance using Smith chart

Practicals on optical fiber

1. Transmission characteristics of optical fiber link
2. Attenuation measurement
3. Dispersion measurement
4. Refractive index profile measurements

Books:

1. Microwave devices and Circuits: Liao
2. Microwave Engineering: David Pozar
3. Electronics and Radio Engineering: Terman
4. Introduction to Microwave Theory and Measurement: A. L .Lance
5. Optical Fiber Communication : B. Keiser (MGH)
6. Optical Communication Systems: J. Gower (Prentice Hall)
7. Optical Fiber Systems: Kao (MGH)
8. Fiber Optic Communication: D. C. Agrawal (A. H. Wheeler Co.)

M. Sc. (Electronics)
Semester IV
Paper IV (ELE 404): Mobile and Satellite Communication

Unit I: Cellular Concepts and Equalization

Cellular telephone system, frequency reuse, channel assignment and land off strategies, elements of cellular radio system design, switching and traffic, data links and microwaves, system evaluation, interference and system capacity, Improving coverage capacity; Fundamentals of equalization, space polarization

Unit II: Diversity, channel coding and GSM system for Mobile

Frequency and time diversity techniques, channel coding; service and features, GSM system architecture, GSM channel types, GSM frame structure, intelligent cell concept and applications; Features of handset, SMS, security; Interfacing of mobile with computer, application of mobile handset as modem, data storage device, multimedia device; Measurement of signal strength; Introduction to CDMA digital cellular standard

Unit III: Satellite Communication

Satellite orbits, frequencies, stabilization, orbital parameters, coverage area, work angle, Attitude and orbit control system, telemetry tracking and command power system; Satellite Link design: system noise temperature and G*/*T ratio, down link design, domestic satellite system; eclipse on satellite

Unit IV: Multiple Access Techniques

FDMA and TDMA, TDMA synchronization and timing, code division multiple access. Applicability of CDMA to commercial system, Earth's path propagation effects; satellite services for communication – Weather forecasting, remote sensing, direct to home (DTH) TV

Practicals:

1. Measurement of field strength – mobile towers
2. Any suitable practicals on the above topics

Books:

1. Mobile Cellular Telecommunication: William C. Y. Lee (MGH Inc., 1995)
2. Mobile communication : Jochen Schiller (2nd edition, Pearson Education, 2004)
3. Satellite Communication: T. Pratt, Wiley Eastern Publication
4. Satellite Communication: D. C. Agrawal, Khanna Publications, New Delhi

M. Sc. (Electronics)
Semester IV
Project and Seminar

M. Sc.-II (Electronics)/Semester IV students will have project of 80 marks. It includes seminar on the project work of 20 marks, totaling 80 marks.

The Projects will be evaluated at the time of final examination, jointly by the external and internal examiners, by conducting viva and demonstration of the project work.

[Note: - Not more than 6 to 8 projects be evaluated by a single external examiner]

A copy of the project work be made available to the external examiner at least a day before the actual date of examination.

GUIDELINES FOR PROJECTS:

1. The Project experiment should be open ended
2. It may be based on any topics of the syllabus
3. It may be based on collection of data and then analysis leading to some meaningful conclusion
4. It may be based on review of a suitable research topic
5. It may be based on development of a new idea and design/fabrications
6. It may consist of hardware and software

PRESENTATION OF THE PROJECT:

Actual presentation format of the project may be decided by the teacher and the student. However, the following guidelines are given for general consideration.

1. At least four copies of the project be submitted.
2. It should be typed on sunlit bond A4 paper, single side with one and half/double - spacing.
3. The project should be of 30 to 40 pages.
4. It should be duly certified by the project supervisor and countersigned by the Head of the Department.
5. The project record should include information under the following/suitable heads:
   (a) Introduction, (b) Theory (Related to the project),
   (c) Experimental details, (d) Observations and Graphs, if any,
   (e) Results and discussion, (f) References.

General Guidelines for Practical Examination (All Semesters):

(1) Each practical examination will have six hours duration.
(2) Each practical will have two parts, each of three hours duration.
(3) Practical's will be based on the theory papers, prescribed in each semester.
(4) Each practical will be of 80 marks or 4 credits. The distribution of marks will be
   (i) Record Book 10 Marks, (ii) Viva-voce 10 Marks,
   (iii) Experiments 60 Marks.
(5) At the time of examination, students will have to submit the practical record book, duly signed by the concerned teacher and certified by the Head of the department.

Guidelines: Seminar for all semesters

Each student has to prepare a power point presentation/OHP presentation and deliver a seminar of about half an hour on topics from the theory papers, practical or activity based.

The seminar carries 25 marks or 1 credit. The record of the performance of the student will be maintained at the department and the copy certified by the Head should be provided at the time of examination.

PATTERN OF QUESTION PAPER

Max. Marks: 80 **Time: 3 Hrs**

Q1. Either

Unit I 16 Marks

Or

Unit I 16 Marks

Q2. Either

Unit II 16 Marks

Or

Unit II 16 Marks

Q3. Either

Unit III 16 Marks

Or

Unit III 16 Marks

Q4. Either

Unit IV 16 Marks

Or

Unit IV 16 Marks

Q5. Attempt the following.

a) Unit I 4 Marks
b) Unit II 4 Marks
c) Unit III 4 Marks
d) Unit IV 4 Marks

Note: -

1. Four units in each paper.
2. One question on each unit.
3. Fifth question on all units.
4. Maximum marks of each paper is80.
5. Duration of question paper is of 3 hours.