

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

Interdisciplinary Course in Electronics (UG & PG)

(Credit Based Evaluation and Grading System)

Session: 2019-20



GURU NANAK DEV UNIVERSITY

AMRITSAR

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Interdisciplinary Courses in Electronics (UG & PG)
(Credit Based Evaluation and Grading System)

Course Name	:	Basic Electrical & Electronics
Course Code	:	ECL-051
Credits	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	20% weightage
End Semester Examination	:	80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand various A.C. Fundamentals like basic laws of electrical engineering, Introduction to semiconductor basics and devices and their characteristics. They also get to know the concept of feedback in amplifiers and oscillators, Introduction to basics of digital electronics and types of memories and their applications, Working principle and uses of various electronic instruments and concept of various operational amplifiers.

Topic		Number of Lectures
SECTION – A		
1	a) Electric current and ohm's: Ohm's law, Resistances in Series, Resistance in parallel, Division of current in parallel circuits, Equivalent resistance, Voltage and current sources and their characteristics. b) Electromagnetic Induction & A.C. Fundamentals: Faraday's law of Electromagnetic Induction, Generation of Alternating voltage, Parameters of A.C. signals ie. Cycle, Time period, Frequency, Amplitude, Phase, Phase difference.	12
SECTION-B		
2	a) Semiconductor Devices: Review of Semiconductors, p-n junction diode and its applications, Zener Diode, L.E.D, BJT and its configurations & characteristics. b) Amplifiers: Concept of feedback (positive and negative) in Amplifiers & Oscillators. Types of feedback amplifier voltage series, voltage shunt, current series and current shunt.	12

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SECTION-C		
3	Digital Electronics: Definition, symbol and Truth table of basic logic gates, concept of universal gate, Introduction to SR, D, JK and T Flip-Flops, counters, concept of RAM, ROM, EPROM and their applications.	12
SECTION-D		
4	a) Electronic Instruments: Introduction and uses of instruments- C.R.O, Digital Multimeter and function generator, Transducers like strain gauge, LVDT, thermistor. b) Linear Integrated Circuits: Operational Amplifier in inverting and non-inverting configuration, Characteristics of op-amp, Application of op-amp as a summing element, differentiator, integrator.	12

Course Outcomes:	
1	To gain knowledge regarding the various laws and principles associated with electrical systems.
2	Analysis of Resistive Circuits and Solution of resistive circuits with independent sources.
3	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor.
4	To get an insight about the basic introduction of Digital electronics.
5	To impart them the knowledge required for them, in understanding the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry.
6	Acquire knowledge on the fundamentals of analog integrated circuits.

Suggested / Reference Books:	
1	JB Gupta: Electrical Engineering.
2	Millman & Halkias: Integrated Electronics.
3	Malvino Leach: Digital Principles.
4	Cooper: Electrical Instrumentation.
5	Ramakant Gayakward: Op-amp & Linear Integrated Circuits.

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Course Name	:	Fundamentals of Communication Engineering
Course Code	:	ECL-052
Credits	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	20% weightage
End Semester Examination	:	80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the basic concepts of various communication systems like optical, microwave, wireless and radar communication like basic analog and digital communication techniques which in turn are used as the building blocks of the larger and more complex communication systems, to learn the basic elements of optical fiber transmission link, fiberglass modes configuration s and structures. They will also be able to understand mobile technologies like GSM and CDMA and know the mobile communication evolution of 2G, 3G and 4G detail. They also get to know the introduction to different microwave communication and radar communication systems and their applications.

Total No. of Lectures – 48

		Number of Lectures
SECTION – A		
1	<p>Introduction Concept of Communication and it's need, Types of Communication- Analog and Digital, Need of Modulation, , Types of Analog modulation- AM, FM and PM.</p> <p>Transmission Media Guided and Unguided Transmission Media, Comparison of Different Media-twisted pair, coaxial cable, Optical Fiber, Microwave.</p>	12
SECTION – B		
2	<p>Microwave Communication Line of sight propagation, role of curvature of earth on coverage, Concept of Terrestrial & Extra Terrestrial Communication, Satellite communication, Earth station, Transponder, VSAT, Direct Broadcasting Satellite (DBS), GEO, MEO, LEO, Multiplexing techniques, Applications.</p>	12

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SECTION – C		
3	Fiber Optic Communication Concept of Optical fiber, Advantages, Disadvantages and Applications, Types of Fibers- Single mode, Multi mode, Step-index, Graded Index, Fiber optic sources and detectors, concept of Wavelength Division Multiplexing,	12
SECTION – D		
4	Cellular Mobile Communication Concept of cellular communication, Types of Cells, Frequency reuse, Hand off techniques, Generations of wireless networks. Radar and Navigation Principle, Types, Applications, Navigational Aids, Instrument landing System, Radar Beacon, Microwave Landing system, Electronic Counter Measures(ECM), LORAN.	12

Course Outcomes:	
1	Understand different blocks in communication system and Distinguish between different modulation schemes with their advantages, disadvantages and applications..
2	Understand the importance of different types of transmission media.
3	Learn the operation and components of fiber optic communication system and different types of fibers.
4	Know modern multiple access schemes, the concept of frequency reuse.
5	Knowledge of different types of microwave communication systems and their applications.
6	Able to discriminate different Radars, find applications and use of its supporting systems.

Suggested / Reference Books:	
1	Kennedy: Electronic Communication Systems.
2	Tomasi: Electronic Communication Systems.
3	Kulkarni: Radar and Navigational Aids.
4	Dr. Kamilo Feher: Wireless and Digital Communications (PHI).
5	William, C Y Lee: Mobile Cellular Telecommunications; McGraw Hill.
6	Keiser– Optical Fiber Communications, McGraw Hill
7	John M. Senior– Optical Fiber Communications: Principles and Practices PHI

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Course Name	:	Fundamentals of Wireless & Mobile Communication
Course Code	:	ECL-053
Credits	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	20% weightage
End Semester Examination	:	80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the fundamentals of mobile communication systems, the requirements of mobile communication as compared to static communication and to identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems. Also they will learn to choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.

Total No. of Lectures – 48

		Number Of Lectures
SECTION – A		
1	<p>Introduction: A basic cellular system, operation of cellular systems, introduction to analog & digital cellular systems. Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems.</p> <p>Cellular System Concepts: Channel Assignment Frequency reuse, cell repeat patterns, cell splitting, Sectorization, Co-channel interference, adjacent channel interference, Roaming and Handoffs.</p>	14
SECTION – B		
2	<p>Multiple Access Techniques for Wireless and Mobile Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA).</p>	8
SECTION – C		

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3	Basic Cellular Standards: Global system for Mobile (GSM): Services, Features, System Architecture, and Channel Types, Frame Structure for GSM, GPRS/EDGE specifications and features.	12
SECTION – D		
4	Basic Cellular Standards: 3G Systems: UMTS & CDMA 2000 standards and specifications Wireless Technologies Bluetooth technology, 4G Mobile techniques, Wi-Fi Technology, Wi Max Technology.	14

Course Outcomes:	
1	To understand the basics of wireless communication.
2	To understand the concept of cellular communication.
3	Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
4	Knowledge of various wireless technologies.

Suggested / Reference Books:	
1	Wayne Tomasi: Advanced Electronic Communication Systems, 6th Edition, Pearson Education.
2	T.S.Rappaport: Wireless Communications: Principles and Practice, 2nd Edition, Pearson Education Asia, 2010.
3	William C Y Lee: Mobile Cellular Telecommunications, 2nd Edition, MGH, 2004.
4	Raj Pandya: Mobile and Personal Communication Systems and Services , Prentice Hall of India, 2001.
5	Dr. Kamilo Feher: Wireless and Digital Communications (PHI).

Interdisciplinary Courses in Electronics (UG & PG)
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Course Name	:	Introduction to Fiber Optics
Course Code	:	ECL-054
Credits	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	20% weightage
End Semester Examination	:	80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the basic elements of optical fiber transmission link along with different kinds of losses, signal attenuation in optical fibers & other dispersion factor. They also get to know various optical sources, LED/LASER structures and various modulation formats, receivers (PIN, APD), and noise performance and understand various applications of optical fiber communication.

Total No. of Lectures – 48

		Number of Lectures
SECTION – A		
1	<p>Fiber as Transmission Media: Evolution of optical fiber communication, Types of optical fiber, Step index fiber, Graded index fiber, Need of optical fibre, Advantages and limitations of optical fibre, Basic transmission system.</p> <p>Ray Theory and Modes : Total internal reflection (TIR), Numerical aperture, Acceptance angle, critical angle, V- Number, Cut-off wavelength, Single mode fiber, Multimode fiber.</p>	12
SECTION – B		
2	<p>Optical Transmitter: Basic principle of LASER and LED optical sources and their P-I characteristics, Requirements of a good optical source, NRZ, RZ modulation formats, Direct modulation, External modulation, Need of external modulators.</p>	12

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SECTION – C		
3	<p>Optical Receiver: PIN and APD photo detector, Receiver sensitivity and Responsivity, Regenerators.</p> <p>Signal Degradation in Optical Fibers: Attenuation and its causes, Absorption, Scattering losses and bending losses in optical fibers.</p>	12
SECTION – D		
4	<p>Signal Degradation in Optical Fibers: Dispersion and its types, Dispersion compensation techniques.</p> <p>Applications of Optical Fiber Communication TDM, WDM, DWDM, PON, BPON, G-PON, XG-PON, FSO (Free Space Optics).</p>	12

Course Outcomes:	
1	To apply the fundamental principles of optics and light wave to design optical fiber communication systems.
2	To differentiate losses in optical fiber link.
3	To design of optical fiber communication links using appropriate optical fibers light sources, detectors.
4	To explore concept of designing and operating principles of modern optical systems and networks.

Suggested / Reference Books:	
1	G. Keiser, “Optical Fiber Communications”, McGraw Hill, 2009.
2	D.K. Myanbaev & Lowell E. Scheiner, “Fiber Optin Comuunication Technology”, Pearson Education Asia, 2008.
3	G.P. Agrawal, “Fiber Optic communication Systems”, John Wiley Publication
4	J.M. Senior, “Optical Fiber Communication”, Prentice Hall, India, 2008.

Interdisciplinary Courses in Electronics (UG & PG)
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Course Name	:	Consumer Electronics
Course Code	:	ECL-055
Credits	:	4 (4-0-0)
Total Marks	:	100
Mid Semester Examination	:	20% weightage
End Semester Examination	:	80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Course Objectives:
At the end of this course, the student should be able to understand the working principles, block diagram and advance features of consumer electronics appliances like audio-video systems, microwave oven, washing machine, Electronics cordless telephone, Telephone instruments, Photostat machine, VCD player etc. which in-turn will develop skills to diagnosis fault and rectification of that in systematic way. Knowledge so gained would also help in working in production units of these consumer gadgets.

Total No. of Lectures – 48

		Number of Lectures
SECTION – A		
1	Audio Systems:Microphones: Construction, working principles and applications of microphone: carbon, moving coil, crystal, condenser type. Loud Speakers: Direct radiating, horn, loaded woofer, tweeter, mid-range, multi speaker system and baffles.	12
SECTION – B		
2	PA Systems: Block diagram, setting up of PA system (general requirements, positioning of microphones and loudspeakers, indoors and outdoor installation of tape recorder.	12
SECTION – C		
3	CD systems, Hi-Fi systems, pre-amplifiers, amplifiers, Stereo Amplifiers Installation of Dish TV (general requirements, positioning of antenna) Installation of CCTV camera.	12

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SECTION – D		
4	Basic Block Diagram, Working principles and applications of the following: Digital watch/clock: Calculator, Washing machine, Microwave ovens, Electric oven, Electronics cordless telephone, Telephone instruments, Photostat machine, VCD player, Digital camera, Cellular phone.	12

Course Outcomes:	
1	Students will be able to list technical specification of electronics Audio system (microphone and speaker)
2	Install and Trouble shoot consumer electronics products like dish TV and CCTV camera.
3	Maintain various electronic home appliances.

Suggested / Reference Books:	
1	SP Bali: Consumer Electronics, Pearson Education India.
2	B R Gupta: Consumer Electronics, Katson.