

**North Eastern Regional Institute of Science and Technology
(Deemed University)
Nirjuli, Itanagar-791109, Arunachal Pradesh**

Department of Electronics and Communication Engineering

Base Module Syllabus

**Electronics and Communication Engineering
Certificate in Maintenance Engineering (Electronics)
Base Module**

Year I		Semester I		L	T	P	C	
HS 1101	English-I	2	0	2	3			
PH 1101	Physics-I	4	0	2	5			
CY 1101	Chemistry-I	3	0	2	4			
MA 1101	Mathematics-I	3	1	0	4			
ES 1151	Engineering Drawing-I	0	0	6	3			
ES 1152	Workshop Practice	0	0	8	4			
		Total				23		
Semester II								
HS 1201	English Language and Communication	2	0	2	3			
PH 1201	Physics-II	4	0	2	5			
CY 1201	Chemistry-II	3	0	2	4			
MA 1201	Mathematics-II	3	1	0	4			
EC 1251	Electronic Workshop & Drawing	1	0	4	3			
ES 1200	Basics of Electrical & Electronics Engg.	4	0	2	5			
		Total				24		
Year II		Semester I						
MA 2101	Mathematics-III	3	1	0	4			
EC 2100	Principles of Electronics Circuits and Devices	3	0	2	4			
EC 2101	Fundamentals of Telecommunication Engg.	3	0	2	4			
EC 2102	Electronic Measuring Instruments	2	0	2	3			
EC 2103	Radio Engineering	2	0	4	4			
EC 2151	Electronics Workshop II	0	0	5	3			
EC 2152	Electronic Servicing & Maintenance I	0	0	5	3			
		Total				25		
Semester II								
ES 2200	Basics of Computers and Programming	2	0	2	3			
ES 2201	Technical Mechanics	3	1	0	4			
EC 2200	TV Engineering	3	0	0	3			
EC 2201	Audio System Engineering	2	0	2	3			
EC 2251	TV Engineering Lab	0	0	6	3			
EC 2252	Electronic Servicing & Maintenance II	0	0	5	3			
HS 2201	Entrepreneurship	3	0	0	3			
ED 2288	Extracurricular activities and discipline	0	0	0	2			
		Total				24		

EC 2100 Principles of Electronics Circuits and Devices 4 credits (3-0-2)

Unit I	PN Junction Electronics: Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors, diffusion and drift current in semiconductors, forward and reverse bias, V-I characteristics, current equation, Zener and its characteristics. Diode Circuits: Diode as a circuit element, Load line concept, dc and ac equivalent circuits. Analysis of Clipper, clamper and multiplier circuits. Half wave, full wave rectifier circuits, Zener diode and LED.	7 Lectures
Unit II	Transistors: Basic principles of operation, I/V characteristics, Modes of operation Active, Saturation and cut off, α , β calculations.	10 lectures
Unit III	Amplifier configuration: CE, CB, CC, Biasing of Transistors, Load line and Q point. Introduction to Class A, B and C amplifier circuits. Simple calculation of Voltage/ current gain, Input/ output impedance power amplifier. Introduction to multistage amplifiers.	7 Lectures
Unit IV	Oscillators and Multivibrator: Operation principles of Colpitt and Hartley Oscillator. Specifications of other types of oscillators. Astable, Monostable, Bistable multivibrator	8 Lectures
Unit V	Introduction to IC: Familiarization with popular ICs like LM 117,317,741,555,7400/7402/7406,7805,7809,7812, Audio & Video amplifiers.	10 lectures

Books:

1. Electronic Devices and Circuit theory, 8th ed. by Robert L boylestad and Louis Nashelshky (PHI)
2. Electronics Principles by A.P. Malvino (TMH)
3. Microelectronics by J. Millman and Arvin Gabel.(TMH)
4. Integrated Electronics by J. Millman and C.C Halkias.(TMH)

EC 2101	Fundamentals of Telecommunication Engineering.:	4 Credit	(3-0-2)
Unit I	Introduction to EM waves and their spectrum. Principles of Radiation		5 Lectures
Unit II	Types of EM wave propagation –Ground wave, Sky wave, Space wave propagation. Structure of Ionosphere, Skip distance, Radio horizon, skip zone.		5 Lectures
Unit III	Introduction to Transmission lines –Twisted pair wires, coaxial cables and Wave guides		7 Lectures
Unit IV	Principles of Amplitude, Frequency and phase Modulation Techniques		8 Lectures
Unit V	Introduction to communication systems:Telephony ,Telegraphy ,Radio and TV transmission.		7 Lectures
Unit VI	Introduction to Antennas –HF, VHF, UHF and microwave antennas. Introduction to RADAR, Satellite and Optical communication systems.		10 Lectures

- Books:**
1. An Introduction to Analog and Digital Communication. by Simon Haykin.(John Wiley & Sons)
 2. Electronic Communication Systems. by G.Kennedy and Bernard Davis (TMH).
 3. Electronics Communication Systems. by Dennis Roody and John Coolen.(PHI).
 4. Telecommunications. by S.Ramabhadran.

EC 2102	Electronic Measuring Instruments:	3 Credits	(2-0-2)
Unit I	Instruments and Measurement Systems: Definition, application and types of measurements, Instrument classification, Functional elements of an instrument, Standards, Calibration, Standards of measurements.		5 lectures
Unit II	Principle and working of PMMC instruments, moving iron, electrostatic type, electrodynamic type, thermocouple type and rectifier type instruments.		9 lectures
Unit III	Basic measuring meters: Working of voltmeter, ammeter and ohmmeter. Introduction to DVM, Electronic multimeter.		6 lectures
Unit IV	Cathode Ray Oscilloscope: Introduction, Cathode Ray Tube, Electron Gun, Electrostatic focusing, Electrostatic deflection, Deflection Plates. Basic CRO Circuit, Observation of waveform on CRO, Lissajous pattern.		6 lectures
Unit V	Introduction to Signal Generators.		2 lectures

- Books:**
1. A Course in Electrical Electronics Measurements and instrumentation by A.K. Sawhney, (Dhanpat Roy & Co.)
 2. Modern Electronics Instrumentation and Measurement Techniques by Albert D.Heltrick, W. D. Cooper (PHI.)
 3. Instrumentation, Measurement & Analysis by K K Chaudhury & R C Nakra, (TMH.)

EC 2103	Radio Engineering:	4 Credits	(2-0-4)
Unit-I	AM Transmitter: AM Modulation, Low level and high level modulation, Class C high level plate/collector modulators, Low level grid/base modulators, 1kW Transistor Class C collector modulator. Transmitter antenna, quarter wave and half wave dipoles, horizontal and vertical dipoles mast and top loading.	6 Lectures	
Unit-II	Aerials and Front stage: Ferrite rod MW band aerial, SW band Loop antenna, antenna coils and associated RF and mixer circuits.	3 Lectures	
Unit-III	Super heterodyne Radio Receiver: Tuned radio frequency (TRF) and super heterodyne AM receivers, selectivity and sensitivity of receivers, RF & local oscillator and IF frequencies, image frequency and image frequency rejection, Mixer stage, Single sweep capacitor tuning ratio, AGC need and types.	5 Lectures	
Unit-IV	Transistorized Radio Circuit: Over all transistorized 3 band radio receiver circuit assembly, tracking and alignment techniques, testing and repair and servicing methods of detector, volume control pot cum on/off switch, dc/ac fed power supply sections and audio stages.	5 Lectures	
Unit-V	Radio Bands: MW and SW ₁ , SW ₂ radio wave bands, Band changer-Switches, Push button switch, construction assembly and repair.	4 Lectures	
Unit-VI	FM radio Receiver: Basics principles of FM reception, FM frequency bands, FM band intermediate frequency, FM detection methods.	5 Lectures	
Books:	<ol style="list-style-type: none"> 1. Radio Engineering. by G.K.Mithal and Ravi Mittal.(Khanna Pub.). 2. Electronic Communication Systems. by George Kennedy. (TMH). 3. Electronics Communication Systems. by Dennis Roody and John Coolen.(PHI). 4. Basic Radio and Television, by S.P.Sharma. (TMH) 		

EC 2200	Television Engineering:	3 Credits	(3-0-0)
Unit-I	Introduction: Introduction to various Television systems, Elements of TV Communication – Nature of picture signals, line and field frequency, Sequential and Interlace scanning, Synchronization and Blanking pulses, equalization pulses, horizontal and vertical resolution, composite video signal, Band width of picture signal.		9 Lectures
Unit-II	Television Cameras and Picture Tube: Principle of operation, construction and working of Monochrome and CTV, Delta gun and PIL Picture tubes Image orthicon, vidicon, plumbicon camera tubes.		7 Lectures
Unit-III	Transmitter: Modulation systems used in sound, picture, and colour signals and various transmitters, Channel band width allocations, vestigial side band transmission. DSBSC transmission, block diagram of transmitter and receiver.		7 Lectures
Unit-IV	Monochrome TV Receiver circuits: Various stages of the B/W TV receiver set such as TV tuners, IF stage, keyed AGC, keyed and delayed AGC, sound separators, various trap circuits, inter carrier sound stage and audio and video amplifier stages.		11 Lectures
Unit-V	Colour T.V. and Applications: Operation of colour T.V., compatibility requirements, colour, Hue, saturation and luminance, colour signal generation, colour picture tubes colour television systems, N.T.S.C., PAL and SECAM systems and their comparison, colour difference signals, colour diagram, synchronous quadratic modulation, Colour TV Receiver, video CD recording, digital T.V. receiver. HDTV, Concept of plasma and LCD screen, computer monitors.		8 Lectures

Books:

1. Television and Radio Engineering. by Arvind M. Dhake.(TMH).
2. Monochrome and Colour Television. by R.R.Gulati. (Wiley Eastern)
3. Monochrome and Colour Television. Practice by R.R.Gulati. (Wiley Eastern)
4. Basic Radio and Television. by S.P.Sharma . (TMH)

EC 2201	Audio System Engineering:	3 Credits	(2-0-2)
Unit I	Microphones- Basic principles, various types and their applications		3 Lectures
Unit II	Loudspeakers- Basic principles, various types and their applications		3 Lectures
Unit III	Audio Systems: Acoustics, vibration, loudness, pitch and sound quality of the sound wave .high fidelity and high quality sound		5 Lectures
Unit IV	Design considerations of Public address systems		3 Lectures
Unit V	Sound Recording Systems- Tape mono and stereo, Compact Discs and DVD recording systems and components. Various equalization Techniques		6 Lectures
Unit VI	Surround Sound, Movie Sounds-DTS(Digital Theater Systems), Different Dolby Surround types ProLogic, , 5.1 , AC-3(Dolby's third audio-coding design), SR-D(Spectral Recording Digital), 8 channel SDDS(Sony Dynamic Digital Sound)		5 Lectures
Unit VII	Advances in Audio Systems and Sound Cards		3 Lectures

Books:

1. Audio Video System Principle, Maintenance and Troubleshooting by R.G.Gupta.(TMH).
2. Sound and Recording-An Introduction by Francis Rumsey and Tim McCormic (Focal Press)
3. Sound System Engineering, Don Davis and Eugene Patronis (Focal Press)
4. Fundamentals of Audio and Video Systems. M.L. Anand.(Khanna Pub.)

EC 2251 T.V. ENGG LAB 3 Credit (0-0-6)

Unit-I Study of monochrome and colour TV Kits
Unit-II Study of TV circuit diagram , familiarization of different stages and their tracing. Tracing, study of pattern generators and wave form analysis.

Unit-III Demonstration of video IF alignment. Voltage measurements at different test points.
Unit-IV Study and demonstration of tuner alignment and linearity adjustment, demonstration of horizontal and vertical Oscillator alignment. Study of tuner for different channels.
Unit-V Study and repairing of computer monitor.

Books:

1. Radio Engineering.by G.K.Mithal and Ravi Mittal.(Khanna Pub.).
2. Electronic Communication Systems.by George Kennedy. (TMH).
3. Electronics Communication Systems.by Dennis Roody and John Coolen. (PHI).
4. Basic Radio and Television. by S.P.Sharma . (TMH)

EC 2252 Electronic Servicing & Maintenance –II 3 Credits (0-0-5)

Unit I Servicing and maintenance of voltage stabilizer

Unit-II Servicing and maintenance of AM signal generator, FM signal generator and CRO.

Unit III Servicing and maintenance of TV, DTH/STB, CD &DVD players.

Unit IV Servicing and maintenance of telephone receiver, mobile phone and cordless phone sets.

Books: 1. Troubleshooting and Repairing Major Appliances by Kleinert, Eric , Tab Books

2. Major Appliances: Operation, Maintenance, Troubleshooting and Repair by Langley, Billy C, Prentice Hall.