

BE VII SEMESTER ELECTRONICS & COMMUNICATION ENGG.

COURSE CONTENTS (AICTE)

EC-7331	Microwave Theory and technique	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	0	2	4	70	22

Unit - I

Microwave Transmission System: General representation of E M field in terms of TEM, TE and TM components, uniform guide structures, rectangular wave guides, circular wave guides, solution in terms of various modes, properties of propagating and evanescent modes, dominant modes, normalized modal voltages and currents power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes strip line and micro strip lines – general properties, comparison of coaxial, micro strip and rectangular wave guides in terms of band width power handling capacity, economical consideration etc.

Unit - II

Microwave Networks and Component : Transmission line ports of microwave Network, scattering matrix, properties of scattering matrix of reciprocal nonreciprocal loss less passive networks, examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, flanges bends Irises posts, Loads, Principle of operation and properties of E – plane, H-plane Tee junctions of wave guides, hybrid T, Multi – hole directional coupler, directional coupler, Microwave resonators – rectangular, excitation of wave guide and resonators by couplers. Principles of operation of nonreciprocal devices, properties of ferrites, Isolators and phase shifters.

Unit - III

Microwave Solid State Devices and Application: PIN diodes, Properties and applications, Micro wave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley – Rowe power relation MASER, LASER, Amplifiers, Frequency converters and harmonic generators using Varactor diodes Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.

Unit - IV

Microwave Vacuum Tube Devices: Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, mode – frequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, cutoff magnetic field Resonant cavities in magnetron mode operation mode separation techniques rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.

Unit - V

Microwave Measurements: Squire law detection, broadband and tuned detectors. Wave – guide probes, Probe and detector mounts, slotted line arrangement and VSWR meter, measurement of wave – guide impedance at load port by slotted line, microwave bench components and source modulation. Measurement of scattering matrix parameters, High medium and low – level power measurement techniques, characteristics of bolometer, mounts, power measurement bridges, microwave frequency measurement techniques, calibrated resonators (transmission and absorption type). Network analyzer and its use in measurements.

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(Dr. Neha Sharma)

✓ Elective - IV

BE VII SEMESTER ELECTRONICS & COMMUNICATION ENGG.

COURSE CONTENTS AICTE

EC-7341	Mobile Communication and Network	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	3	70	22

Unit – I

Introduction to cellular mobile system, a basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning of cellular system. Elements of cellular radio system design: general description of problem, concept of frequency reuse, channels, interference reduction factor, Hand off mechanisms, cell splitting consideration of the components of cellular systems.

Unit – II

Co – channel interference real time co-channel interference measurement at mobile radio transceivers, design of antenna system-omni directional and directional, lowering the antenna height, reduction of co-channel interference, umbrella-pattern effect, diversity receiver, designing a system to serve a predefined area that experiences co-channel interference. Types of non co – channel interference-adjacent channel interference, near –End-Far-End interference, effects on Near –End mobile units, cross-talk, Effects on coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell site components, interference between systems, UHF TV interference, long distance interference.

Unit – III

Cell coverage for signal and traffic : General introduction, obtaining the mobile point-to-point model, propagation over water of flat open area, foliage loss, propagation in near in distance, long distance propagation, point-to-point prediction model, cell site antenna heights and signal coverage cells, Mobile-to-mobile propagation. Cell site antennas and mobile antennas: Equivalent circuits of antennas, Gain and pattern relationship, sum and difference patterns, Antennas at cell site, mobile antennas.

Unit – IV

Frequency management and channel assignment: Frequency management, frequency spectrum utilization, setup channels, fixed channels assignment, non – fixed channel assignment algorithms, traffic and channel assignment. Handoffs and Dropped Calls: Types of Handoff initiation of Handoff, delaying a handoff, forced handoff, queuing of handoff, power – difference handoff mobile assisted handoff and soft handoff, cell – site handoff and intersystem handoff, dropped call rate.

Unit – V

Digital cellular system: GSM, Architecture, Layer Modeling, Transmission, GSM channels and channel Modes, Multiple access scheme: CDMA Terms of CDMA systems output power limits and control, Modulation characteristics, call processing, Hand off procedures. Miscellaneous mobile systems: TDD systems, cordless phone, PDC, PCN, PCS, Non Cellular systems, Mobile integrated radio systems, mobile satellite communication.

Reference:

1. Lee: cellular and mobile communication, 2nd edition Mc Graw Hill.
2. D.P. Agrawal and Q. An Zeng: Wireless and mobile systems, Cengage learning , 2006.
3. Faher Kami lo: wireless digital communication, prentice Hall of India, new Delhi, 2006.
4. G.J. Mullet: introduction to wireless communication systems and networks, Cengage learning.
5. Raj Kamal: Mobile Computing, Oxford University Press.

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Elective - II

BE VII SEMESTER ELECTRONICS & COMMUNICATION ENGG.								
COURSE CONTENTS AICTE								
EC- 7351	Satellite Communication	L	T	P	C	Max. Marks	Min. Marks	
Duration	3 Hours	3	0	0	3	70	22	

Unit - I

Overview of satellite systems: Introduction, Frequency allocations for satellite systems.

Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Unit - II

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits. **Polarization:** antenna polarization, polarization of satellite signals, cross polarization discrimination.

Depolarization: ionospheric, rain, ice.

Unit-III

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft. **The Earth segment:** introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.

Unit-IV

The space link: Introduction, Equivalent isotropic radiated power (EIRP), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, intermodulation noise, inter-satellite links. Interference between satellite circuits.

Unit-V

Satellite services

VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. **Direct broadcast satellite (DBS) Television and radio:** digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

References:

1. D. Roddy: Satellite Communications, 4th Edition, TMH, New Delhi.
2. T. Pratt, C. Bostian and J. Allnut: Satellite Communications, 2nd Edition, Wiley India Pvt. Ltd.
3. W. L. Pritchard, H. G. Suyderhoud and R. A. Nelson: Satellite Communication Systems Engineering, 2nd Edition, Pearson Education.
4. D.C. Agarwal: Satellite Communications, Khanna Publishers.
5. R. M. Gangliardi: Satellite Communications, CBS Publishers.
6. M. R. Chartrand: Satellite Communication, Cengage Learning.
7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.
8. Monojit Mitra: Satellite Communication: PHI Learning.


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BE VII SEMESTER ELECTRONICS & COMMUNICATION ENGG. AICTE							
COURSE CONTENTS (AICTE)							
EC-7311	Information Theory & Coding	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	3	70	22

Unit - 1

Uncertainty, Information and Entropy Information Measures: Characteristics on information measure, Shannon's concept of information, Shannon's measure of information, Model for source coding theorem communication system: coding and line/ channel coding, channel mutual information capacity (Bandwidth).

Unit - 2

Channel coding, theorem for discrete memory less channel, Information Capacity theorem: Error detecting & error correcting codes, types of codes: Block codes, tree codes, Hamming and Lee Metrics, Description of linear block codes by matrices, Description of linear tree codes by matrices, Parity check codes, and parity check polynomials.

Unit - 3

Compression : Lossless and lossy, Huffmann codes, Binary image compression schemes, Runlength encoding, CCITT group 31 - D compression, CCITT group 3 2D compression, CCITT group 4 2D compression.

Unit - 4

Video Image Compression : Requirement of full motion video compression. CITT H 261 Video coding algorithm, MPEG compression methodology. MPEG - 2 compression, Audio (speech) compression.

Unit - 5

Cryptography: Encryption Decryption, Cryptogram (cyphertext). Concept of cipher, cryptoanalysis. Keys: single key (secret key) cryptography, two - key (public - key) cryptography. Single key cryptography ciphers: Block cipher codes, Stream ciphers, Requirement for secrecy, The Data Encryption Standard public Key Cryptography: Diffie - Hellman public key distribution, The Rivest - Shamir Adelman (R - S - A) system for public key cryptography. Digital signature.

Reference Books:

1. Error correcting codes by W.W Peterson and E.J. Welton, The Mit press (1978) ISBN 0262160390.
2. Multimedia System Design by P.K. Andleith & Kiran Thapar, Prentice Hall PTR Upper Saddle River, NJC (1996).
3. Bruce Schneier, Applied Cryptography: protocol Algorithms & Source Code in C, John Wiley & Sons, NY, 1994.
4. Network Security by Stalling, PHI.
5. Communication System 3/e by Simon Haykin, John Wiley & Sons (1995).

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