

B.Tech ELECTRICAL Engineering (AKU Syllabus) SEMESTER- V

EC 1x04 ANALOG ELECTRONICS L-T-P : 3-0-3 Credit : 5

1. Four ideal amplifiers : Ideal voltage amplifiers, ideal current amplifiers, ideal transresistance amplifiers and ideal transconductance amplifiers and distortions(amplitude or harmonic distortions, frequency distortion and phase distortion); **Lecture : 4**

2. Mid frequency amplifiers :

a. Analysis of CB,CE &CC amplifiers using hybrid model(chapter eight of integrated electronics by Millman & Halkias). b. Low and High Frequency analysis of CB, CE & CC (Chapter 11 and Chapter 12 except Section 12-10 and 12- 11). c. rise time method for determination of f_b using the formula of $f_{th} = 0.35$ and 10% sag method for the determination of f_{lower} using sag method. **Lecture : 15**

3. Bootstrapping in emitter follower, Darlington pair, cascade amplifier, CC-CB cascade. Lecture : 4

4. Multistage amplifiers and band width shrinkage in multi stage amplifiers. **Lecture : 3**

5. Incremental model of FET and incremental analysis of common source at low & high frequencies. **Lecture : 3**

6. Noise and noise figure in amplifiers : Thermal noise, shot noise, flicker noise, Friss formula **Lecture : 4**

7. Class A, Class B and Class AB power amplifiers with reference to Complementary Symmetry Amplifiers. **Lecture : 5**

8. Barkhausen criteria and oscillator : Wien bridge, RC phase shift, quadrature, Hartley, Colpitts oscillator. **Lecture : 6**

9. Tuned amplifiers-single tuned amplifiers Lecture : 4

Text Books :

1. Micro Electronics by Millman And Grabel , McGRAW HILL

2. electronics by Millman & Halkias , McGRAW HILL

References :

1. Micro electronics circuit by Sedra and Smith, Oxford University;

2. Micro electronics circuit analysis and design, by Rashid , PWS publication house;

3. Semi conductor circuit application- an introduction to transistors and IC 's by Malvino, TMH;

4. Electronic devices and integrated circuit- BP Singh and Rekha Singh, Pearson education

5. Electronic Principles, 7th Ed. by Albert Malvino & Davis J.Bates, TMH

EE 1x05 NETWORK THEORY L-T-P:3-0-3 Credit : 5

1. Transient response of RC, RL, RLC circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform. **Lecture : 7**

2. Terminal pairs or ports, Network functions for one-port and two-port networks, poles and zeros of network functions, Restrictions on pole and zero locations for driving point functions and transfer functions, Time domain behavior from the pole-zero plot. **Lecture : 5**

3. Relationship of two-port variables, short circuit Admittance parameters, open circuit impedance parameters, Transmission parameters, hybrid parameters, relationships between parameter sets, Inter-connection of twoport networks. Lecture : 8

4. Principles of network topology, graph matrices, network analysis using graph theory. Lecture : 8

5. Filter fundamentals, high-pass, low-pass, band-pass, and band-reject filters. Lecture : 6

6. Positive real functions, synthesis of one-port and two-port networks, elementary ideas of Active networks. Lecture : 8

Text Books:

1. Networks and Systems by D Roy Choudhury; New Age International

2. Network Analysis by Van Valkenburg; PHI

3. Introduction to Modern Network Synthesis by Van Valkenburg; John Wiley

Reference Books:

1. Basic circuit theory by Dasoer Kuh; (McGraw Hill)

2. A Course in Electrical Circuit Analysis by Soni & Gupta; Dhanpat Rai Publication.

3. Circuit Analysis by G K Mittal, Khanna Publication.

EE 1x06 ELECTROMAGNETIC FIELD THEORY

L-T-P : 3-1-0 Credits : 4

1. Introduction of field co-ordinate systems **Lecture : 2**

2. Electrostatics : Coulomb's law, Gauss's law and its applications, the potential functions, Equipotential surface,

Poisson's and Laplace's equation, Applications (solution for some simple cases), Capacitance, Electrostatics energy, Conductor properties and boundary conditions between dielectric and dielectric-conductor, Uniqueness Theorems. **Lecture : 8**

3. Magneto statics : Biot-savart law, Ampere's circuital law, Curl, Stroke's theorem, Magnetic flux and magnetic flux density, Energy stored In magnetic field, Ampere force law, Magnetic vector potential, Analogy between electric and magnetic field. **Lecture : 6**

4. Maxwell's equations, Equation of Continuity for time varying field . Inconsistency of ampere circuital law, Maxwell's equations in differential and integral form. **Lecture : 3**

5. Electromagnetic wave : Solution of wave equation in free space, Uniform plane wave propagation, Uniform plane waves, the wave equation for conducting medium, Wave propagation in lossless medium and inductive medium, Conductors and dielectrics, Polarization. **Lecture : 4**

6. Reflections and refractions : reflection by a perfect conductor with normal as well as oblique incidence. Reflection and refraction by perfect dielectrics with normal and oblique incidence. Surface impedance. **Lecture : 7**

7. Pointing vector : Pointing theorem, instantaneous average and complex pointing vector, power loss in a plane conductor. **Lecture : 3**

8. Transmission Lines : Transmission line theory, low loss radio-frequency and UHF transmission line. UHF line as a transformer, voltage step up of the quarter wave transformer. Transmission line chart (Smith Chart). **Lecture : 10**

Text Books :

1. Electromagnetic waves and radiating system by E.C.Jordan, K.G.Balmain, Pearson
2. Engineering Electromagnetics by W.H.Hyatt, TMH.

EE 1x08 POWER SYSTEM – II L-T-P: 3-1-0 Credit : 4

1. Power station and sub-station : Hydro and power station: Site selection, Layout, calculation of available power classification, Salient features, Pumped hydro plants.

Thermal power Station : Site selection, Layout, calculation of coal requirements, cooling water tower efficiency, co-ordination of hydro and thermal power stations. **Lecture : 10**

2. Economy of power system : Load curves, Load duration curves, Diversity Factor, Base and peak Load station, Cost allocation of power station- fixed cost, Two par Tariff and Evaluation. **Lecture : 10**

3. Symmetrical three phase faults on synchronous machines : Short circuit current and reactance of synchronous machines, Internal voltage of loaded machines under transient conditions. **Lecture : 4**

4. Symmetrical components : Synthesis of unsymmetrical phases from their symmetrical components operators, The symmetrical components of unsymmetrical phase, phase shift in transformer bank: power in terms of symmetrical components; unsymmetrical series impedances; sequence impedances and sequence networks; sequence networks of unbalanced generators; sequence impedance of circuit elements positive and negative sequence networks; zero sequence network. **Lecture : 6**

5. Unsymmetrical Faults : Single line to ground fault, line to line fault, double line to ground fault on unloaded generator and power systems, Interpretation of inter guidance sequence networks. **Lecture : 6**

6. Power System Stability : Steady state power limit of cylindrical rotor and salient pole machines without saturation, Maximum power transmitted to a transmitting network, series capacitor, Transient stability power angle curve, Inertia clearance angle, equal swing equation, equal area criterion and its application. **Lecture : 6**

Text Books :

1. Elements of Power System Analysis 3rd Edition by Stevenson, McGraw Hill
2. A Course of Electrical Power by Soni Bhatnagar and Gupta, Dhanpat Rai & Sons.
3. Modern Power System Analysis by Nagrath and Kothari, Tata McGraw Hill.

Reference Books :

Electrical Power System by C.L.Adhwa, Wiley Eastern

EE 1x10 SIGNALS & SYSTEM L-T-P : 3-1-0 Credit : 4

1. System and Signal : Definition, classification of systems, standard test signal, properties of system, properties of linear system. **Lecture : 3**

2. Analogous System : Force voltage analogy, Force current analogy, Mechanical coupling devices, Electromechanical system. **Lecture : 5**

3. Laplace transformation : Laplace transform of some important function, shift theorem and its application, Laplace transform of periodic functional, analysis of response, initial & final values theorem, response to periodic sinusoidal excitation. **Lecture : 10**

4. Analysis of Fourier Methods : Fourier series expansion of periodic functional symmetry condition, exponential form of Fourier series, Fourier integral & Fourier transform, Analysis by Fourier methods, Fast Fourier transform.

Lecture : 15

5. Z transformation : Z transform, Discrete time, LTI system, solution of difference equation, Application of Z transform to open loop system. **Lecture : 9**

Text Books :

1. Analysis of Linear System by D.K Cheng, Narosa pub. House
2. Modeling & Analysis of Liner System by J.P Tiwari. Dhanpat rai&Sons

Reference Books :

1. Signal & system by H.P Hus, Tata McGraw Hill
2. Signal & system by I.J. et. at., Tata McGraw Hi

IT 1x05 INFORMATION SECURITY

L-T-P : 3-0-0 Credit : 3

1. Introduction, CRYPTO BASICS : Classic Crypto, Simple Substitution Cipher,, Cryptanalysis of a simple substitution, Double Transposition Cipher, One-time Pad, Project VENONA, Codebook Cipher.

2. SYMMETRIC KEY CRYPTO : Stream Ciphers, A5/1, RC4, Block Ciphers, Fiestel Cipher, DES, Triple DES, AES.

3. PUBLIC KEY CRYPTO : Knapsack, RSA, Diffie-Hellman, Uses for Public Key Crypto.

4. HASH FUNCTION :

AUTHENTICATION : Authentication Methods, Keys versus Passwords, Biometrics, Two-Factor Authentication.

AUTHORIZATION : Access Control Matrix, Multilevel Security Models, Firewalls, Intrusion Detection.

5. SOFTWARE FLAWS AND MALWARE : Software Flaws, Malware, Miscellaneous Software-Based Attacks.

6. OPERATING SYSTEM AND SECURITY : Operating System Security Functions, Trusted Operating System, Next Generation Secure Computing Base.

Text Book :

- (1) Information Security Principles & Practices by Mark Stamp, Wiley.

Reference Books :

- (1) Introduction to Computer Security by Bishop and Venkatramanayya, Pearson Education.
- (2) Cryptography and Network Security : Principles and Practice by Stallings, PHI.