B. N. Mandal University, Laloonagar, Madhepura

Details of theory & Sessional Papers code of 3rd Year B. Tech. Course

Branch: ELECTRICAL ENGINEERING

Sl No.	Subject	Subject Code	Branch Code	L	T	P	Th. Ext.	Th. Int.	Sessional
01	Microprocessor and its application	µp	EE-301	3	0	1	70	30	Microprocessor and its application-50
02	Analog electronics	AE	EE-302	2	1	3	70	30	Analog electronics-50
03	Network theory	NT	EE-303	3	0	3	70	30	Network theory-100
04	Electromagnetic field theory	EMFT	EE-304	3	1	0	70	30	----------
05	Signal and system	SS	EE-305	3	1	0	70	30	---------
06	Electrical Instruments and measurement	EIM	EE-306	3	0	3	70	30	Electrical Instruments and measurement-50
07	Power system-II	PS-II	EE-307	3	0	0	70	30	----------
08	Power electronics	PE	EE-308	2	1	3	70	30	Power electronics-100
09	Industrial Training	IT	EE-309	0	0	3	---	---	Industrial Training-50

Expert-I (External)
Name:
Designation:
Address:

Expert-II (Internal)
Name:
Designation:
Address:

Dean
Faculty of Science & Engineering
BNMU, Madhepura

Principal
MIT
Rambagh
purnea

Member Secretary
Syllabus committee
BNMU
Madhepura

Subject: Microprocessor & its Applications **Branch Code: EE-301** (ECE/CSE/EE)

L-T-P: 2-1-3

First Term

Intel 8085

1. **Introduction:** CPU, register, memory, buses, memory addressing capacity of a CPU. Lecture:3
2. **CPU Architecture:** Pin configuration, instructions, addressing modes, instruction word size, languages. Lecture:4
3. **Timing diagram:** Read cycle, write cycle, fetch cycle, memory read, memory write, I/O cycle. Lecture:4
4. **Programming:** Simple programming: 8-bit addition & subtraction, 16-bit addition, delay subroutine using register, finding lowest and highest no. in data array. Lecture:5
5. **Data transfer** schemes, I/O port. Lecture:6

Second Term

6. **8255, 8251, 8253, 8257** chips, pin diagram, function of different modes. Lecture:4
7. **Interfacing** of ADC, analog multiplexer, simple and hold. Lecture:4

Intel 8086

8. **Architecture:** BIU and execution unit, pin diagram, function of different modes. Lecture:3
9. **Addressing modes:** Instruction. Lecture:3
10. **Programming.** Lecture:3

Text books:

1. Fundamental of Microprocessor & microcontroller by B Ram, Dhanpat Rai.
2. Advance Microprocessor by B Ram.

Reference books:

1. Microprocessor and interfacing by D V Hall, TMH.
2. Microprocessor Architecture by R S Gaonkar.
3. Microprocessor with application in process control by S I Ahson, TMH.
4. Programming Microprocessor interfaces by Michael Andrews, PHI.
5. The intel Microprocessor Architecture, programming and interfacing by B Brey, PHI.

Microprocessor Lab:

1. Different programs related to 8085 & 8086.
2. Application of different interfaces.

Subject: Analog Electronics Branch Code: EE-302 (ECE/EE)

L-T-P: 2-1-3

First Term

1. **Four ideal amplifiers:** Ideal voltage amplifier, ideal current amplifier, ideal transconductance amplifier, and ideal transresistance amplifier, distortions (amplitude or harmonic distortions, frequency distortion and phase distortion). Lecture: 4
2. **Mid frequency amplifiers:**
   Analysis of CB, CE & CC amplifiers using hybrid model.
   Low and High frequency analysis of CB, CE & CC.
   Rise time method for determination of fb using the formula for tr fh – 0.35 and 10% sag method for the determination of flower using sag method. Lecture: 16
3. **Bootstrapping in emitter follower:** Darlington pair, cascade amplifier, CC-CB Cascade. Lecture: 5

Second Term

4. **Multistage amplifiers** and band width shrinkage in multistage amplifiers. Lecture: 3
5. **Incremental model** of FET and incremental analysis of common source at low and 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, Push Pull amplifier. Lecture: 5
8. **Barkhausen criteria and oscillator:** Wein bridge, RC phase shift, quadrature, Hartley, colpitts oscillators. Lecture: 6
9. **Tuned amplifiers:** Single tuned amplifiers. Lecture: 4

Text books:

1. Micro electronics by Millman and Grabel, McGraw Hill.
2. Integrated Electronics by Millman & Halkias, McGraw Hill.

Reference:

1. Microelectronics circuits by Sedra and Smith, Oxford university.
2. Microelectronics circuit analysis and design by Rashid, PWS publication.
3. Semiconductor circuit application- an introduction to transistors and IC's by Malvino, TMH.
4. Electronic devices and integrated circuit- B P Singh and Rekha Singh, Pearson.
5. Electronic principles, 7th edition by Albert Malvino & Davis J Bates, TMH.
6. A Hand book of Electronics by Gupta & Kumar, Meerut Pub.

Analog Electronics Lab:

1. Two stage RC-coupled amplifier.
2. Class-C tuned voltage amplifier.
3. Wein-bridge oscillator.
4. Colpitts oscillator.
5. Hartley oscillator.
6. Multistage amplifier.
7. Operational amplifier.

Subject: Network Theory **Branch Code: EE-303** (ECE/EE)

L-T-P: 2-1-3

First Term

1. **Transient response** of RC, RL, RLC Circuits to various excitation signals such as step, ramp, impulse and sinusoidal excitations using Laplace transform. **Lecture: 6**
2. **Terminal pairs or ports:** Network functions of 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: 10**
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 two port networks. **Lecture: 8**

Second Term

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: 8**
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 Choudhary, 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 and Gupta, Dhanpat rai & sons.
3. Circuit analysis by G K Mittal, Khanna pub.

Network Theory Lab:

Practical based on Syllabus.

17/1/13 17/1/13 17/1/13 Viva 17/1/13 17/1/13 17/1/13

Subject: Electromagnetic Field Theory **Branch Code: EE-304** (ECE/EE)

L-T-P: 3-1-0

First Term

1. **Introduction** to field co-ordinate systems. **Lecture: 3**
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), capacitances, electrostatics energy, conductor properties and boundary conditions b/w dielectric and dielectric-conductor, uniqueness theorems. **Lecture: 9**
3. **Magneto statics:** Biot-savart law, Ampere's circuital law, Curl, Divergence, Stoke's theorem, Magnetic flux, and magnetic flux density, energy stored in magnetic field, Ampere's force law, Magnetic vector potential, analogy b/w electric and magnetic field. **Lecture: 8**
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: 4**

Second Term

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 inconductive medium, conductors and dielectrics, polarization. **Lecture: 4**
6. **Reflection and refractions:** Reflection by a perfect conductor with normal as well as oblique incidence. Reflection refraction by perfect dielectrics with normal and oblique incidence. Surface impedance. **Lecture: 6**
7. **Poynting vector:** Poynting 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 Hayt, TMH.

Subject: Signals & Systems **Branch Code: EE-305** (ECE/EE)

L-T-P: 3-1-0

First Term

1. **System and Signal:** Definition, classification of systems, standard test signal, properties of system, properties of linear system. **Lecture: 5**
2. **Analogous System:** Force-voltage analogy, force-current analogy, mechanical coupling devices, electromechanical system. **Lecture: 7**
3. **Laplace transformation:** Laplace transform of some important functions, shift theorem and its applications, laplace transform of periodic functions, analysis of response, initial and final values theorem, response to periodic sinusoidal excitation. **Lecture: 12**

Second Term

4. **Analysis of fourier methods:** Fourier series expansion of periodic functions, symmetry condition, exponential form of fourier series, fourier integral and fourier transform, analysis by fourier methods, fast fourier transform. **Lecture: 15**
5. **Z transformation:** Z transform, discrete time, LTI system, solution of difference equation, applications of Z transform to open loop system. **Lecture: 9**

Text books:

1. Analysis of linear system by D K Cheng, Narosa pub.
2. Modeling and analysis of linear system by J P Tiwari, Dhanpat Rai & Sons.

Reference books:

1. Signal & system by H P Hus, TMH.
2. Signal &system by I J et. at. TMH.

Subject: Electrical Instruments & Measurements (ECE/EE) **Branch Code:** EE-306

L-T-P: 2-1-3

First Term

1. **Measurements** of voltage, current, power and power factor, energy and frequency. Lecture: 10
2. **Range extension** including current and potential transformer. Lecture: 8
3. **Galvanometer:** Dynamics of D'Arsonval Galvanometer, vibration galvanometer, ballistic galvanometer. Lecture: 6

Second Term

4. **Measurement of inductance and capacitance:** AC bridges, Maxwell, Wein, Anderson and shearing bridges, general equations and vector diagram under balanced conditions, error and precaution in bridge measurements, wagner's earth connection and shielding of bridge measurement and elements. Lecture: 10
5. **Standard** AC and DC potentiometers, principle, standardization and application. Lecture: 5
6. **Measurement of resistances:** Measurements of low resistance by Kelvin double bridge and potentiometer method, measurement of high resistance by loss of change method. Lecture: 4
7. **Digital measurements.** Lecture: 5

Text books:

1. Electrical measurement and measuring instruments by E W Golding.
2. Basic electrical measurement by M B Stout, PHI.

Reference books:

1. Measurement systems: Application and Design by Doebein, 5th edition, TMH.

Electrical Instruments & Measurements Lab:

Practical based on Syllabus.

POWER SYSTEM-II

BRANCH CODE-EE-307 L-T-P: 3-0-0

FIRST TERM

1. **Power station and sub-station :** Hydro power station; Site selection, layout , calculation of available power, classification , salient feature , pumped hydro plants.

   THERMAL POWER STATION: Site selection, layout, calculation of coal requirement cooling water tower, efficiency, co-ordination of hydro and thermal power stations.

   LEC-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 part Tariff and evaluation.

   LEC-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.

   LEC-4

SECOND TERM

4. **Symmetrical components** : Synthesis of unsymmetrical phases from their symmetrical components operation , the symmetrical components of unsymmetrical phase , phase shift in transformer bank: power in term of symmetrical component ; unsymmetrical series impedances; sequence impedances and sequence networks; sequence network of unbalance generation; impedance of circuit elements positive and negative sequence network ; zero sequence network.

   LEC-8

5. **Unsymmetrical faults**: Single line to ground fault, line to line fault, double line ground fault on unloaded fault generator and power system, interpretation of inter guidance sequence networks.

   LEC-8

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, swing equation, equal area criterion and its application.

   LEC-8

Text Books:

1. Elements of power system analysis 3rd edition by Stevenson , McGraw Hill.
2. A Course of Electrical power by Soni Bhatnager and Gupta , Dhanpat Rai &Son.
3. Modern power system analysis by Nagrath and Kothari , Tata McGraw Hill.

Reference Book:

1. Electrical power system by C.L.ADHWA, Wiley Eastern.

Subject: Power Electronics Branch Code: EE 308 (EE)

L-T-P: 2-1-3

First Term

1. Introduction to thyristor and control circuits; terminal, characteristics, rating and protection. Lecture:8
2. Thyristor Firing Circuits: Trigring circuit suitable for 1-phase and 3-phase fully controlled convertors. Lecture:10
3. Convertors: Uncontrolled three phase power rectifiers, 1 phase and 3 phase line commutated A.C to D.C convertors. Lecture:8

Second Term

4. Inverters: Basic Bridge inverter circuit 1-phase and 3-phase McMurray- Bedford method communication, pulse width modulation inverters. Series inverter gating circuits. Lecture:8
5. Choppers: Types of choppers, steady state analysis of type A chopper, communication methods, chopper control of D.C Motor. Lecture:8
6. Other applications: A.C voltage regulator, cyclo converter. Lecture:4
7. Application of thyristors for industrial drives. Lecture:4

Text Books:

1. Power Electronics by Rashid, PHI.
2. Power Electonics by Ned Mohan, John Wiley4 Sons

Reference Books:

1. Thyristorised Power Controllers by G.K dubey, Wiley Eastern Ltd.
2. Power semiconductor circuits by Dewan & Strangten, John Wiley& Sons.

Power Electronics Lab

Practical Based On Syllabus