



UNIVERSITY OF SARGODHA SARGODHA

Registrar's Office

Phone: 048-9230811-15 Ext: 517

No.UOS/Acad/1894

Dated: 19/11/2014

The Principal
University College of Engineering & Technology
University of Sargodha

Subject: **SCHEME OF STUDIES / COURSE OUTLINES FOR BS CIVIL,
ELECTRICAL & MECHANICAL TECHNOLOGIES PROGRAM**

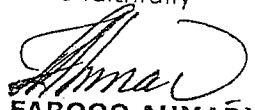
Dear Sir,

I am directed to refer to the minutes of the meeting of Academic Council held on 10.07.2014 (Item No.38) and request you to kindly process the curriculum / curricula at the earliest.

2. The curriculum shall be notified after vetting of the committee constituted by the Academic Council to review the course code / basic template of schemes of studies.

3. Please refer to annexed notification of the committee for the said purpose.

Yours faithfully


(Ch. FAROOQ AHMAD)
Assistant Registrar (Acad)
for Registrar

Encl: As Above (Curricula in original)

C.C:

- Prof. Dr. Mian Ghulam Yasin
Dean, Faculty of Social & Behavioral Sciences
University of Sargodha
- Secretary to the Vice-Chancellor
- P.A to Registrar

Copy to Dr. Waheed Y/S
25/11

Scheme of Study for BS ELECTRICAL TECHNOLOGY

Semester-I

Code	Subject	Credit Hours		Contact Hours
		T	P	
HU-111	Applied Mathematics-1	3	0	3
CS-112	Computer Applications	1	1	4
GS-113	Applied Physics	2	1	5
ET-114	Basic Mechanical Technology	2	1	5
ET-115	Engineering Drawing	1	1	4
Total		9	4	21

Semester-II

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-121	Basic Electronics	3	1	6
HU-122	Islamic Studies	2	0	2
ET-123	Electrical Machines-I	3	1	6
ET-124	Linear Circuit Analysis	3	1	6
HU-125	Pakistan Studies	2	0	2
Total		11	3	20
		13		22

Semester-III

Code	Subject	Credit Hours		Contact Hours
		T	P	
HU-211	Applied Mathematics- II	3	0	3
ET-212	Electrical Machines- II	3	1	6
ET-213	Digital Electronics	3	1	6
ET-214	Power Generation and Utilization	3	0	3
HU-215	Communication Skills-I	3	0	3
Total		15	2	21

Semester-IV

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-221	Instrumentation and Measurement	2	1	5
ET-222	Network Analysis	3	1	6

ET-223	Power Transmission	3	1	6
HU-224	Communication Skills-II	2	0	2
ET-225	Total Quality Management	2	0	2
	Total	12	3	21

Semester-V

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-311	Microprocessor Theory and Interfacing	2	1	5
ET-312	Power and Industrial Electronics	3	1	6
ET-313	Switchgear and Protective Devices	2	1	5
ET-314	Tele-Communication Technology	3	1	6
	Total	10	4	22

Semester-VI

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-321	Power System Analysis	3	0	3
ET-322	Data and Computer Communication	3	1	6
ET-323	Control Technology	3	1	6
ET-324	High Voltage Technology	3	1	6
ET-325	Power Distribution and Utilization	2	0	2
	Total	14	3	23

Semester-VII

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-411	Industrial and Environmental Safety	2	0	2
ET-412	Project	0	6	18
	Total	2	6	20

Semester-VIII

Code	Subject	Credit Hours		Contact Hours
		T	P	
ET-421	Supervised Industrial Training	0	36	108
	Total	0	36	108

Total Credit Hours = 136

Course Outlines

BS ELECTRICAL TECHNOLOGY

	APPLIED MATHEMATICS-I.....	32
	COMPUTER APPLICATIONS.....	32
27	APPLIED PHYSICS.....	33
	BASIC MECHANICAL TECHNOLOGY.....	33
	ENGINEERING DRAWING.....	34
	BASIC ELECTRONICS.....	35
	ISLAMIC STUDIES.....	35
28	ELECTRICAL MACHINES-I.....	37
	LINEAR CIRCUIT ANALYSIS.....	38
	PAKISTAN STUDIES.....	39
	APPLIED MATHEMATICS -II.....	40
	ELECTRICAL MACHINES - II.....	40
30	DIGITAL ELECTRONICS.....	41
	POWER GENERATION AND UTILIZATION.....	42
	COMMUNICATION SKILLS-I.....	43
	INSTRUMENTATION & MEASUREMENTS.....	43
	NETWORK ANALYSIS.....	44
41	POWER TRANSMISSION.....	45
	COMMUNICATION SKILLS-II.....	46
	TOTAL QUALITY MANAGEMENT.....	47
	MICROPROCESSOR THEORY AND INTERFACING.....	47
51	POWER AND INDUSTRIAL ELECTRONICS.....	48
	SWITCH GEAR AND PROTECTIVE DEVICES.....	49
	TELE-COMMUNICATION TECHNOLOGY.....	50
	INDUSTRIAL AND PROJECT MANAGEMENT.....	51
	POWER SYSTEM ANALYSIS.....	52
	DATA AND COMPUTER COMMUNICATION.....	52
53	CONTROL TECHNOLOGY.....	53
	HIGH VOLTAGE TECHNOLOGY.....	54
	POWER DISTRIBUTION AND UTILIZATION.....	54
55	INDUSTRIAL AND ENVIRONMENTAL SAFETY.....	55
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Course Curriculum BS Electrical TECHNOLOGY



Fall 2014

UNIVERSITY OF SARGODHA

University College of Engineering and Technology

Department of Technical Education

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Applied Mathematics-I

Course Code: HU-111

Credit Hours: 3

Objectives:

1. To review the knowledge and practice the skills acquired in diploma Courses
2. To understand the concept and use of differential equations
3. To learn different methods to solve differential equations
4. To understand the concept of complex numbers and their applications

Description:

A significant part of the course relates to the review of previous studies. The course aims at the learning of different mathematics skills and their applications in solving technical problems.

Course Outlines:

1. **Review of the following:** Integral Calculus, Differential Calculus Matrices and Determinant, Vector Algebra and Analytical Geometry
2. **Introduction to Differential Equations Basic Concepts:** Geometric Interpretations, Separable Equations, Exact Differential Equations, Linear First Order Differential Equations, Bernoulli's Differential Equations, Families of Curves, Applications
3. **Higher Order Differential Equations:** Homogeneous Linear Equations of Second Order, Non- Homogeneous equations, Application of Higher Linear Differential Equations
4. **Partial Differential Equations:** Basic Concepts, Solution by Separable Variables, Classification
5. **Complex Numbers:** Invented Number Systems, The Argand Diagram, Complex Variables, Derivatives, Complex Series, Applications

Text Book:

1. Thomas G. B. and Finney R. L. "Calculus and Analytic Geometry"
(Latest edition)

Reference Books:

1. Kreyszig E. "Advanced Engineering Mathematics", John Wiley and Sons, USA (latest edition)
2. Cohen H. L. "Mathematics for Scientists and Engineers", Prentice-Hall, UK (latest edition)

Computer Applications

Course Code: CS-112

Credit Hours: 1 + 1

Objectives:

To enable students to comprehend fundamentals of computer essentials

Department of Technical Education, BS Electrical Technology

Course Outlines:

Basic Computer Organization: Major building blocks; their functions & inter connections.

Number Systems: Number conversion, Data Representation & Data structure. Processed operation, Memory & I/O of a computer

Languages: High level & Low Level Languages, Compilers interpreters, operating systems, computer programming.

Application Packages: Word processors, Data Bases, Spread Sheets.

Computer Networking Fundamentals

Recommended Book:

1. Charles Parker, "Computers today and tomorrow"
2. Tucker A. B. "Fundamentals of Computing", McGraw Hill Book Company

Applied Physics

Course Code: GS-113

Credit Hours: 2 + 1

Objectives:

To enable students to cover basic requirements of Physics

Course Outlines:

Basics of Mechanics, Moment of inertia, simple harmonics motion
Electrostatics And Magnetism: Coulombs Law, Electrostatic potential energy of discrete charges, continuous charge distribution, Gauss's Law, Electric field around conductors, dielectrics, dual trace oscilloscope, magnetic fields, Hall effect
Semiconductor Physics, Semiconductor materials, Insulation and Conduction in different materials. Illumination
Practical work will be based on above theory.

Recommended Books:

David Halliday, R. Resnick. "Physics" (Latest Edition)

Basic Mechanical Technology

Course Code: ET-114

Credit Hours: 2 + 1

Objectives:

To enable students to grasp necessary mechanical technology skills

Course Outlines:

Stress, strain, stress-strain relationships, tensile test theory of simple bending.
Shearing distributions in various sections. Bending moment and shearing force.
Deflection of beams, torsion of bars of circular cross-section
Introduction to pure bending and torsion

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Overview of design of shafts, pulleys, fly wheels, bearing and couplings.
Power transmission by belts, spur-gears and friction clutches

List of Practicals:

1. Study of Universal Testing Machine (UTM).
2. Perform tensile test on UTM for a mild steel specimen.
3. Verification of Hook's Law and determination of Modules of Elasticity.
4. Determination of Modules of Rigidity for circular shaft.
5. Determination of central deflection of rectangular section simply supported and fixed ended beams.
6. Verification of Bending moment and shearing force principles.
7. Determine the co-efficient of V shaped leather belt in contact with a cast iron pulley.
8. Determine mechanical advantage, velocity ratio and Mechanical efficiency of simple Gear Train.

Recommended Books:

1. Crustar Nieman, "Machine elements design and calculations in Mechanical Engineering", Springer International(Latest edition)
2. F. P. Beer and Johnston, "Mechanics of Materials", McGraw Hill Book Co. (Latest SI version)
3. T. Beven. "Theory of Machines"
4. F.L. Singer, "Strength of Materials" (Latest SI version)

Engineering Drawing

Course Code: ET-115

Credit Hours: 1 + 1

Objectives:

To enable students to learn and develop engineering drawing skills

Course Outlines:

Mechanical Drawing: Use of drafting instruments. Basic drafting techniques, drawing and lettering, dimensioning, projections and section of solids, Orthographic projections, Isometric views with particular reference to piping and ducting, Practice of assembly drawing.

Civil Drawing: Plan, Elevations (front, left and right) and details of buildings, elements of perspective drawings.

Electrical Drawing: Electric substation equipment layout, Schematic Diagrams of substations, lighting and power distribution boards, Electrical Symbols and one line diagrams of a typical power system.

Recommended Book:

1. Mitchel & Spencer, "Technical Drawing" (Latest Edition)

Basic Electronics

Course Code: ET-121

Credit Hours: 3 + 1

Objectives:

To enable students to understand fundamentals of Electronic principles and devices

Course Outline:

Semiconductor Diodes: Conduction in Solids; Doners and acceptors, Impurities, Simple Diode Circuits, Biasing and applications

Rectifiers and power supplies, special purpose diode, Zener diodes

Bipolar Junction Transistor (BJT) and field effect transistors (FET); JFET, MOSFET, Construction, Biasing and working as amplifiers

Operational amplifiers and relevant circuits such as summer, integrator, differentiator etc

List of Practicals:

1. Study and plot the characteristics of semiconductor diodes
2. Perform half-wave and full-wave rectification
3. DC non-regulated power supply
4. Regulated power supply using zener diode
5. Perform biasing of a BJT and determine Q-Point
6. Study and plot the characteristics of a BJT transistor for all configurations
7. Study and plot the characteristics of a junction field effect (JFET) and Metal oxide field effort transistor (MOSFET)
8. Study and observe the input / output parameters of operational amplifier
9. Use operational amplifier in inverting and non-inverting configuration
10. Use operational amplifier as summer, integrator and differentiator

Recommended Books:

1. Paynter, "Introductory Electronics"
2. Elder, R.L. Boylestod, "Electronic Devices and Circuit Theory"
3. A.P. Malvino, "Electronic Principals" (Latest Edition)
4. Thomas Floyd, "Electronic Devices" (Latest Ed.)

Islamic Studies

Course Code: HU-122

Credit Hours: 2

Objectives:

1. To provide Basic information about Islamic Studies
2. To enhance understanding of the students regarding Islamic Civilization
3. To improve Students skill to perform prayers and other worships
4. To enhance the skill of the students for understanding of issues related to faith and religious life

Department of Technical Education, BS Electrical Technology

Detail of Courses:

1. **Introduction to Quranic Studies:** Basic Concepts of Quran, History of Quran, Uloom-ul-Quran
2. **Study of Selected Text of Holly Quran:** Verses of Surah Al-Baqra Related to Faith (Verse No-284-286), Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18), Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11), Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77), Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)
3. **Study of Selected Text of Holly Quran:** Verses of Surah Al-Ihzaab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.), Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment, Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)
4. **Seerat of Holy Prophet (S.A.W) -I:** Life of Muhammad Bin Abdullah (Before Prophet Hood), Life of Holy Prophet (S.A.W) in Makkah, Important Lessons Derived from the life of Holy Prophet in Makkah
5. **Seerat of Holy Prophet (S.A.W) -II:** Life of Holy Prophet (S.A.W) in Madina, Important Events of Life Holy Prophet in Madina. Important Lessons Derived from the life of Holy Prophet in Madina
6. **Introduction To Sunnah:** Basic Concepts of Hadith, History of Hadith, Kinds of Hadith, Uloom -ul-Hadith, Sunnah & Hadith, Legal Position of Sunnah
7. **Selected Study from Text of Hadith Introduction To Islamic Law & Jurisprudence:** Basic Concepts of Islamic Law & Jurisprudence, History & Importance of Islamic Law & Jurisprudence, Sources of Islamic Law & Jurisprudence, Nature of Differences in Islamic Law, Islam and Sectarianism
8. **Islamic Culture & Civilization:** Basic Concepts of Islamic Culture & Civilization, Historical Development of Islamic Culture & Civilization, Characteristics of Islamic Culture & Civilization, Islamic Culture & Civilization and Contemporary Issues
9. **Islam & Science:** Basic Concepts of Islam & Science, Contributions of Muslims in the Development of Science, Quranic & Science
10. **Islamic Economic System:** Basic Concepts of Islamic Economic System, Means of Distribution of wealth in Islamic Economics, Islamic Concept of Riba, Islamic Ways of Trade & Commerce
11. **Political System of Islam:** Basic Concepts of Islamic Political System, Islamic Concept of Sovereignty, Basic Institutions of Govt. in Islam
12. **Islamic History:** Period of Khlaft-E-Rashida, Period of Ummayyads, Period of Abbasids
13. **Social System of Islam:** Basic Concepts of Social System of Islam, Elements of Family, Ethical Values of Islam

Reference Books:

1. Hameed ullah Muhammad, "Emergence of Islam" , IRI, Islamabad
2. Hameed ullah Muhammad, "Muslim Conduct of State"
3. Hameed ullah Muhammad, "Introduction to Islam
4. Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law", leaf Publication Islamabad, Pakistan.
5. Ahmad Hasan, "Principles of Islamic Jurisprudence", Islamic Research Institute, International Islamic University, Islamabad (1993)

6. Mir Waliullah, "Muslim Jrisprudence and the Quranic Law of Crimes", Islamic Book Service (1982)
7. H.S. Bhatia, "Studies in Islamic Law, Religion and Society", Deep & Deep Publications New Delhi (1989)
8. Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia", Allama Iqbal Open University, Islamabad (2001)

Electrical Machines-I

Course Code: ET-123

Credit Hours: 3 + 1

Objectives:

To enable students to comprehend principles and working of DC machines and transformers

Course Outlines:

Electromagnetic Induction and Basic Concepts in Rotating Machines: Introduction to magnetic circuits, magnetically induced e.m.f. and force, AC operation of magnetic circuits, Hysteresis and Eddy current losses. Magnetic fields in rotating machines, generated voltages, torque.

DC Generators: Constructional features and principle of operation, EMF equation, excitation types, load and no-load characteristics, commutation, armature reaction.

DC Motors: Principle of operation, back e.m.f., torque equation, types of DC motors, speed-torque characteristics, speed control, applications.

Transformers: Principle of operation, constructional features of single and three phase transformers, EMF equation, transformer on no-load and load, three phase transformer connections, auto- transformers.

Testing of DC Machines and Transformers: Losses and efficiency, testing of DC machines and different types of tests

List of Practicals

1. Running of DC motor as generator action.
2. Speed control of DC motor by armature control.
3. Speed control of DC motor by field control.
4. No load saturation characteristics of separately excited DC generator.
5. Speed/voltage characteristics of self-excited DC generator.
6. Speed/torque characteristics of DC motor.
7. Determination of BHP of motor by brake test.
8. Determination of torque and efficiency by dynamo meter.
9. Regenerative or Hopkinsons test.
10. Determination of efficiency of a single phase transformer by open and short circuit tests.

Recommended Books:

Stephen J. Chapman., "Electrical Machinery Fundamentals"

Linear Circuit Analysis

Course Code: ET-124

Credit Hours: 3 + 1

Objective:

To enable students to understand electric circuits and learn basic circuit solving skills

Course Outline:

Electrical Elements and Circuits: Resistance, inductance, and capacitance, laws of resistance, Ohm's law, Kirchoff's laws, DC node voltage and loop current methods of analysis of resistive network calculations, current and voltage divider

Network Theorem: Superposition, Thevenin, Norton, reciprocity and maximum power transfer theorems

A.C. Fundamentals: Periodic function, RMS, effective, average and maximum values of current and voltage for periodic wave forms, study of simple circuits using instantaneous values of current and voltages, introduction to three phase system.

Phasor Quantities: Phasors; representation of phasors by „j“ notation, complex expression for current, voltage and impedance, solution of simple RL, RC and RLC series and parallel circuits. Resonance in series and parallel RLC circuits

List of Practicals

1. Demonstration of Ohm's law, Kirchoff's voltage and current laws
2. Demonstration of Superposition, Thevenin and Norton theorems with DC sources
3. Study of phase displacement using oscilloscope
4. Draw phasor diagrams for RL, RC and RLC circuits
5. Determine power factor for inductive and capacitive loads
6. Calculation and demonstration of RMS, average and peak values of a periodic waveform using signal generator and oscilloscope
7. Determine active and reactive power for single phase circuits
8. Determine active and reactive power for three phase circuits
9. Demonstration of series and parallel resonance in R, L and C circuits

Recommended Books:

1. Hughs, "Electrical Technology"
2. Floyd, "Circuit Analysis"
3. W. Hayt, "Engineering of Circuit Analysis"

Pakistan Studies

Course Code: HU-125

Credit Hours: 2

Objective:

1. Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
2. Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

Course Outline:

1. Historical Perspective
 - a) Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah
 - b) Factors leading to Muslim separatism
 - c) People and Land
 - i. Indus Civilization
 - ii. Muslim advent
 - iii. Location and geo-physical features.
2. Government and Politics in Pakistan Political and constitutional phases:
 - a) 1947-58
 - b) 1958-71
 - c) 1971-77
 - d) 1977-88
 - e) 1988-99
 - f) 1999 onward
3. Contemporary Pakistan
 - a) Economic institutions and issues
 - b) Society and social structure
 - c) Ethnicity
 - d) Foreign policy of Pakistan and challenges
 - e) Futuristic outlook of Pakistan

Recommended Books:

1. Burki, Shahid Javed. State & Society in Pakistan, The Macmillan Press Ltd 1980.
2. Akbar, S. Zaidi. Issue in Pakistan's Economy. Karachi: Oxford University Press, 2000.
3. S.M. Burke and Lawrence Ziring. Pakistan's Foreign policy: An Historical analysis. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. Pakistan Political Roots & Development. Lahore, 1994.
5. Wilcox, Wayne. The Emergence of Bangladesh., Washington: American Enterprise, Institute of Public Policy Research, 1972.
6. Mehmood, Safdar. Pakistan Kayyun Toota, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
7. Amin, Tahir. Ethno - National Movement in Pakistan, Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence. Enigma of Political Development. Kent England: WmDawson & sons Ltd, 1980.

8. Zahid, Ansar. History & Culture of Sindh. Karachi: Royal Book Company, 1980.
9. Afzal, M. Rafique. Political Parties in Pakistan, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
10. Sayeed, Khalid Bin. The Political System of Pakistan. Boston: Houghton Mifflin, 1967.
11. Aziz, K.K. Party, Politics in Pakistan, Islamabad: National Commission on Historical and Cultural Research, 1976.
12. Muhammad Waseem, Pakistan Under Martial Law, Lahore: Vanguard, 1987.
13. Haq Noor ul, "Making of Pakistan: The Military Perspective", Islamabad: National Commission on Historical and Cultural Research, 1993.

APPLIED MATHEMATICS – II

Course Code: ES-211

Credit Hours: 3

Course Outlines:

Differential equation; basic concepts and ideas; geometrical interpretation of first and second order differential equations; separable equations, equations reducible to separable form, exact differential equations, integrated factors. Linear first order differential equations, Bernoulli's differential equation. Families of curves, orthogonal trajectories and applications of differential equations of first order to relevant engineering systems. Homogeneous linear differential equations of second order, homogeneous equations with constant coefficients, the general solutions, initial and boundary value problems, D-operator, complementary functions and particular integrals. Real, complex and repeated roots of characteristics equations. Cauchy equation, non-homogeneous linear equations. Applications of higher order linear differential equations. Ordinary and regular points and corresponding series solutions; introduction to Laplace transformation

Recommended Books:

1. C.R. Wylie, "Advanced Engineering Mathematics 5th Edition", McGraw-Hill Education
2. Erwin Kreyszig, "Advanced Engineering Mathematics 8th Edition", John Wiley & Sons

Electrical Machines – II

Course Code: ET-212

Credit Hours: 3 + 1

Objective:

To enable students to understand principles and working of single and three phase AC machines.

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Course Outline:

Alternators: Construction, principle of operation, armature reaction, voltage regulation, synchronization and parallel operation

Single Phase Motors: Universal, shaded pole, split phase, repulsion motors, speed control, starting methods

SYNCHRONOUS MOTORS: Construction, principle of operation, characteristics, applications

THREE PHASE INDUCTION MOTORS: Construction, working principle, types, equivalent circuits, starting methods, speed control and applications.

List of Practicals

1. Study the effect of field excitation on the generation of voltage by an alternator.
2. Draw the load characteristic curve of an alternator.
3. Study the parallel operation of alternators using dark lamp and bright lamp methods.
4. Study the effect of applied voltage on an induction motor at no load.
5. Study the speed/torque characteristic of the single phase induction motor.
6. Study the speed/torque characteristic of 3-phase induction motor.
7. To carry out no load test of 3-phase induction motor.
8. Observe the changes in power factor and current with excitation of 3-phase synchronous motor.
9. Observe the effect of increasing load on power factor, armature current and speed of 3-phase synchronous motor.

Recommended Books:

Stephen J. Chapman, "Electrical Machinery Fundamentals"

Digital Electronics

Course Code: ET-213

Credit Hours: 3 + 1

Objective:

To enable students to understand and develop digital electronic circuits

Course Outline:

Number Systems, Decimal to Binary conversions, Binary Arithmetic, Boolean algebra.

Switching devices, logic gates, AND, OR, NOT, NAND, NOR, XOR, XNOR gate circuits, Modular implementation of combinational logic circuits. K-maps & truth tables

Different logic families: TTL, Emitter Coupled Logic, NMOS, CMOS.

Combinational logic circuits: adders, comparator, encoder, decoder, multiplexer, de-multiplexer, A/D and D/A converter.

Components of sequential circuits: Flip flops, their characteristics and transition tables for sequential circuit design, registers, and counters.

List of Practicals:

1. Study the characteristics of a Transistor as a switch.
2. Construction of a NOT gate using TTL.
3. Construction of AND and OR gates.
4. Construction of NAND and NOR gates.
5. Construction of adder and comparator.
6. Construction of Analog to Digital and Digital to Analog convertors.
7. Study the operation and truth tables of S-R, D, JK and T flip-flops.
8. Study of encoder/decoder circuits.
9. Study of multiplexer/de-multiplexer circuits.
10. Study and construction of digital counters.

Recommended Books:

1. T. L. Floyd, "Digital Fundamentals"
2. M. M. Mano, "Digital Circuits and Computer Logic"

Power Generation and Utilization

Course Code: ET-214

Credit Hours: 3

Objective:

To enable students to familiarize with important topics related to power generation and utilization.

Course Outline:

Conventional and non-conventional sources of energy, various types of plants and their efficiencies

Hydroelectric Power Plant: Site selection, plant layout, types of dams and turbines.

Thermal Power Plant: Site selection, plant layout, steam and gas turbines; flue gas, coal and ash flow diagrams.

Nuclear Power Plant: Basic theory of nuclear energy, reactors, shielding, generating station layout, safety and health hazards.

Electrical Energy Utilization: Design techniques for electrical wiring for domestic and industrial applications, Cable selection,

Electrical Heating: Resistive, inductive and dielectric heating, electric furnaces.

Recommended Books:

1. S. L. Uppal, "Electric Power"
2. Soni, Gupta, "A course in Electrical Power"

Communication Skills-I

Course Code: HU-215

Credit Hours: 3

Objectives:

1. To understand the importance and basic concepts of communication
2. To enhance the listening skills and to become active listener
3. To enhance the reading skills and to become active reader
4. To improve the writing skills in general

Description:

This course is based upon lectures, group discussions, case studies and practice sessions

Course Outlines:

1. **Introduction to Communication**
Importance, Theories, Barriers, Components
2. **The Seven C's for Effective Communication**
3. **Listening Skills**
Blocks, Thinking and Feeling Notes Taking, Giving Feedback
4. **Reading Skills**
Active Reading Techniques, Skimming, General Reading and Careful Reading
5. **Introduction to Writing Skills**
Planning, Drafting and Editing Emphasis and Connections
6. **Grammar and Vocabulary**
Technical and Business Vocabulary, Constructing Formal Sentences

Text Book:

1. Murphy H. A., Hildebrandt H. W. and Thomas J.P., "Effective Business Communications", McGraw-Hill, USA (Latest Edition).

Reference Books:

1. T Norman S., "We're in Business", Longman Group Ltd., UK (Latest Edition)
2. Thomson A. J. and Martinet A. V., "A Practical English Grammar", Oxford University Press, UK (Latest Edition)

INSTRUMENTATION & MEASUREMENTS

Course Code: ET-221

Credit Hours: 2 + 1

Objective:

1. To understand the basic principles of measurement. To understand the principles of basic component and instruments used in electronics.
2. To understand the basic factors involve in measurement & designing of Electronic Systems.
3. To understand the basic functions & the applications of transducer/sensors.

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Course Outline:

Precision measurements terminologies including resolution, sensitivity, accuracy, and uncertainty; principles of different measurement techniques; instruments for measurement of electrical properties, pressure, temperature, position, velocity, flow rates (mass and volume) and concentration; systems for signal processing and signal transmission; modern instrumentation techniques; static and dynamic responses of instrumentation and signal conditioning; principles of operation, construction and working of different analog and digital meters, oscilloscope, recording instruments, signal generators, transducers and other electrical and non-electrical instruments; types of bridges for measurements of resistance, inductance and capacitance; power and energy meters; high voltage measurements.

Lab Outline:

1. Design, construction and analysis of measurement circuits
2. Measurement of electrical parameters using different lab instruments
3. calibration of measurement instruments
4. Use of simulation and instrumentation languages (Lab VIEW).

Recommended Books:

1. Klaas B. Klaassen and Steve Gee, "Electronic Measurement and Instrumentation".
2. Cooper, W.D, "Electronic Instrumentation and Measurement Techniques".
3. Herrick, "Instruments and Measurements for Electronics".
4. Gregory, B.A., "An Introduction to Electrical Instrumentation".

Network Analysis

Course Code: ET-222

Credit Hours: 2+1

Objective:

To enable students to learn advanced circuit solving skills

Course Outline:

AC Circuit Analysis: Loop and node analyses for AC circuits. Power factor, power factor improvement. Transients in RL, RC and RLC circuits

AC Network Theorems: Superposition, Thevenin, Norton, reciprocity and maximum power transfer theorem.

Poly-Phase Circuits: Star and Delta connections and conversions. Voltage, current and power calculations

Electric Filters: RC low pass and high pass filter circuits, band pass and band stop filters

List of Practicals

1. Verification of mesh and nodal circuit methods for AC analysis.
2. Observe variation of impedance and current in RLC series circuit with changes in frequency.

3. Study and observe transient response of R, L, C circuits with the help of oscilloscope.
4. Demonstration of Superposition, Thevenin and Norton theorems with AC sources.
5. Demonstration of maximum power transfer theorem with AC sources.
6. Study of Star and Delta connection.
7. Demonstration of RC low pass filter circuits.
8. Demonstration of RC high pass filter circuits

Recommended Books:

1. Boylested, "Introductory Circuit Analysis"
2. Floyd, "Circuit Analysis"
3. W. Hayt, "Engineering of Circuit Analysis"
4. K. Y. Tang, "Circuit Analysis"

Power Transmission

Course Code: EH-223

Credit Hours: 3 + 1

Objective:

To enable students to familiarize with topics in transmission and distribution

Course Outline:

Transmission Lines: Purpose of transmission, choice of frequency and voltage, parameters of overhead transmission lines, types and calculations of transmission lines. Ferranti, corona and skin effects on transmission lines

Mechanical Design of Overhead Lines: Line supports, sag and tension calculations, effect of wind pressure and ice loading, conductor vibration and use of dampers.

Insulators: Insulator material, types of insulators, voltage distribution over insulator string, string efficiency, methods of improving the string efficiency, testing of insulators.

DC and AC Distributors: Pointed and uniform AC and DC distributors, distributors fed at one and both ends, ring mains, stepped mains, unbalanced loading of three-phase AC distributors.

Underground Cables: Cable resistance, inductance and capacitance, methods of cable installation, voltage drop and power loss, types of cables used in industries, cable fault localization.

Static Substation: Substation location and layout, classification of substations, bus bar arrangement, grounding of star neutral point.

List of Practicals:

1. Determine the phase sequence of 3-phase source.
2. Observe the flow of real and reactive power in a 3-phase transmission line with known passive loads.
3. Observe the voltage regulation at receiving end of a 3-phase transmission line as function of type of load.
4. Study of various types of insulators used in transmission and distribution

- systems.
5. Study of voltage distribution along a model of string of suspension insulators.
 6. Study of various poles and towers used for transmission and distribution systems.
 7. Design of cables for various loads.
 8. Prepare a layout scheme for a substation.
 9. Visit of substation for familiarization with substation equipment.

Recommended Books:

1. AT Starr, "Transmission and Distribution"
2. Turan Gonan, Transmission and Distribution.

Communication Skills-II

Course Code: HU-224

Credit Hours: 2

Course Outline:

Communication Environment: Organizational Structure, International Communication, Nondiscriminatory Communication, Communication Channels.

Communication and Technology: Presentation Graphics and Word Processing, Fax, E-mail, Internet and Voice Mail, CD-ROM and Online Databases, Teleconferencing, Audio Visual Aids.

Presentation Skills: Defining objective, audience analysis, style and tone, credibility, opening, closing and main ideas, use of Audio Visual Aids.

Meetings and Interviews: Participating in Meetings, Chairing a Meeting, Asking and Answering Questions in Meetings, Preparing Resumes, Preparing for Interviews, Asking and Answering Questions in Interviews.

Letters and Memos: Formats, Positive and Negative Messages, Persuasive Communication, Requests.

Technical Report Writing: Introduction and Importance, General Formats, Short and Long Reports, Proposals, Quoting References.

Recommended Books:

1. Murphy H. A., Hildebrandt, H. W. and Thomas J.P., "Effective Business Communications", McGraw Hill USA
2. Morrissey G.L., Sechrest T.L. and Warman W.B., "LOUD AND CLEAR", Addison-Wesley Publishing Company, USA
3. Beebe S.A. and Beebe S.J., "PUBLIC SPEAKING", Allyn and Bacon, USA.

Total Quality Management

Course Code: ET-225

Credit Hours: 2

Objective:

To enable students to develop quality management skills

Course Outline:

Introduction to Quality: Quality concepts, types and aspects, Significance of quality.

Commitment and Leadership: Commitment and Policy, Creating or changing the culture, effective leadership.

Quality Planning: Flow charting, process charting, purchase planning, planning for JIT.

Design for Quality: Innovation, Quality Function Deployment and the House of Quality.

Quality Related Costs: Prevention, Appraisal and Failure Costs, Models for Quality Costing.

Quality Measurement: Significance, Methods, Tools and Techniques for Quality Improvement: Basic Tools, Advanced Tools.

Quality Management System (ISO 9000 series): Significance, Documentations, Implementation and Certification, Audits, Expected Problems.

Environmental Management System (ISO 14000 series): Significance, Documentations, Implementation and Certification, Audits, Expected Problems.

Recommended Books:

1. Oakland J. S., "TOTAL QUALITY MANGEMENT", Bulterworth Heinemann Ltd. UK.
2. ISO 9000 series of standards
3. ISO 14000 series of standards
4. Feigenbaum, "TOTAL QUALITY CONTROL", McGraw Hill Book Co., USA.
5. Gillow H. S. and Gillow S. J., "TOTAL QUALITY MANGEMENT IN ACTION", Prentice Hall UK

Microprocessor Theory and Interfacing

Course Code: ET-311

Credit Hours: 2 + 1

Objective:

To enable students to learn essential theory and application of microprocessors

Course Outline:

Department of Technical Education, BS Electrical Technology

Microprocessor Fundamentals: Introduction, simplified CPU organization and instruction set, Bus systems

Microprocessor Architecture And Programming Techniques: Structure of Intel 8086/88 microprocessor and its architecture, pin diagram and functions, data sheet descriptions, Interrupts, 8086/88 Instruction set, programming techniques. Assembly language programming of Intel microprocessor

Interfacing the Microprocessors: Interfacing concepts, Interfacing of Microprocessor with RAM & ROM, Basic of I/O Interfacing with I/O ports (serial and parallel), Memory Map and Address Decoding, D/A & A/D interfaces, Study of CD – ROM, controllers

Microprocessor Controlled Systems: Closed loop control systems, temperature monitoring and control system, washing machine controller, diesel generator set controller, stepper motor controller

List of Practicals:

1. Study of 8086/88 processor, its instruction set and pin layouts.
2. Execute Data transfer group of instructions.
3. Execute Arithmetic group of instructions.
4. Execute I/O instructions.
5. Execute Logic group of instructions.
6. Execute Shift and rotate instructions.
7. Execute Transfer of control instructions
8. Use ADC/DAC with 8086/88.
9. Interface a printer with 8086/88.

Recommended Books:

1. Daglas V. Hall., Microprocessing Interfacing.
2. Berry B. Bari., Intel Microprocesses.

Power and Industrial Electronics

Course Code: EH-312

Credit Hours: 3 + 1

Objective:

To enable students to learn use of Power Electronic devices and their industrial applications

Course Outline:

Introduction: Introduction to power semiconductor devices, power diodes, power transistors, power MOSFET, Insulated Gate Bipolar Transistor (IGBT) and their characteristics, diodes with RC, RL, LC and RLC loads.

Thyristors: Principle of operation, characteristics, two transistor model of SCR, thyristor types, ratings, protection and cooling, thyristor turn-on and turn-off, series and parallel operation of thyristors, thyristor firing circuits.

Thyristor Converters: AC voltage controllers, controlled rectifiers, inverters, DC link converters, DC choppers, cyclo-converters.

Protection: Protection of alternators and transformers, protection of bus bars and transmission lines, protection against over voltages, neutral grounding

List of Practicals:

1. Study of various types of circuit breakers
2. Study of various types of relays
3. Study of protection system for alternators
4. Study of protection system for transformers
5. Study of protection system for bus bars
6. Study of protection system for transmission lines
7. Visit of Grid station for familiarization with relevant protective devices
8. Visit of Switch yard of a power house for familiarization with relevant protective devices

Recommended Books:

1. V.K. Mehta, R. Mehta, "Principles of Power Systems"
2. The Art and Science of Protective Relaying, Vol I and II

Tele-Communication Technology

Course Code: ET-314

Credit Hours: 3 + 1

Objective:

To enable students to cover essential topics of Tele-communication systems

Course Outline:

Review of Fourier series, transform and its properties.

Amplitude Modulation: Principle of amplitude modulation. AM transmitter and receiver

Frequency Modulation: Principle of frequency modulation, FM transmitter and receiver, Aerial and wave propagation. Time division multiplexing (TDM), Frequency division multiplexing (FDM), Comparison of FDM and TDM. Digital modulation, Types of digital modulations, effect of sampling and quantization of signals. Digital transmission, AWGN and Inter symbol interference, matched filtering and pulse shaping. Introduction to Satellite System, Earth satellite station, Orbit satellite station

Mobile communication system: Concept of cellular phone, various types of mobile communication systems

Optical fiber: Characteristics, types, sources and detectors

List of Practicals:

1. Generate signals of different frequency from signal generator and observe their superposition using oscilloscope
2. Implement lowpass and highpass filters to separate low frequency signals from high frequency
3. Perform Amplitude modulation and demodulation
4. Perform Frequency modulation and demodulation

5. Demonstrate the effects of sampling and quantization through ADC and DAC
6. Prepare a GSM mobile communication network structure
7. Visit a base transceiver station (BTS) site to familiarize with BTS equipment
8. Study optical fiber data sheets and determine signal losses in optical fiber
9. Splicing techniques for optical fiber

Recommended Books:

1. B.P. Lathi, "Communication System"
2. Bruce Carlson, "Communication System"

Industrial and Project Management

Course Code: ET-315

Credit Hours: 2

Objective:

1. To understand the basic factors involve in Industrial Management Systems
2. To understand the basic functions & the applications of Project Management

Course Outline:

Introduction to management, history of management, management functions, organizational structure, types of organizations, organizational hierarchy, properties of narrow and wide organizations; production processes, types of production, scale of production, selection of technology, input requirements, capacity utilization, productivity basic concepts, classification, quantitative measurement, productivity improvement; project management, properties of projects, project life cycle, project network analysis, resource requirements, monitoring and control, computer tools; inventory management, inventory replenishment, economic lot size, re-order point, safety stock level, JIT, computer tools; human resource management, management styles, psychological types, recruitment and training, job evaluation, performance appraisal, motivation and incentives

Recommended Books:

1. Babcock D. L., "MANAGING ENGINEERING AND TECHNOLOGY", Prentice Hall, UK
2. Zuberi M. H., "INDUSTRIAL MANAGEMENT", Rabbani Printing Press, Lahore.
3. Bateman T. S. and Snell S. A., "MANAGEMENT: BUILDING COMPETITIVE ADVANTAGE". Times Mirror Higher Education Group, USA
4. Spinner M., "ELEMENTS OF PROJECT MANAGEMENT", Prentice Hall, UK

Power System Analysis

Course Code: ET-321

Credit Hours: 3

Objective:

To enable students to learn various types of electrical faults and their calculation

Course Outline:

Generalized Circuit Constants: General circuit equation, generalized constants of simple networks, constants of combined networks, measurement of generalized circuit constants, numerical problems

Representation of Power Systems: One-line diagram, impedance and reactance diagram, percent or per-unit quantities, selection of base and change in base of p.u. quantities, per unit representation of single phase transformer, per unit reactance diagram of a power system, per unit impedances of three winding transformers.

Symmetrical Three Phase Faults: Symmetrical three phase faults on an unloaded synchronous machine, short circuit currents and reactances of synchronous machines, internal voltages of loaded machines under transient conditions, fault calculation and numerical problems.

Symmetrical components: Symmetrical components of unsymmetrical phasors, power in terms of symmetrical components; sequence networks positive, negative and zero sequence networks, unsymmetrical series impedances

Unsymmetrical faults: Unsymmetrical faults on unloaded generators, unsymmetrical faults on power systems; single line-to-ground faults; line to-line faults, double line-to-ground faults, double line to line faults; demonstration problems

Power system stability: Steady state and transient stability, swing equation, the power angle equation, equal area criterion of stability and its application, demonstration problems.

Recommended Books:

1. W. D. Stevenson, Jr., "Elements of Power System Analysis"

Data and Computer Communication

Course Code: ET-322

Credit Hours: 3 + 1

Objective:

To enable students to develop necessary computer communication and networking skills

Course Outline:

Introduction to computer networks, network topologies, OSI and TCP/IP reference models, the physical layer

Department of Technical Education, BS Electrical Technology

Transmission media, data encoding, data communication interfaces, data link layer and its protocols.

LAN, Ethernet, wide area networks, routing, hub and switches

Inter-networking, IP protocol and addressing modes, transport Layer, services provided by transport layer, worldwide web

List of Practicals

1. Study basic network topologies and IP addressing modes.
2. Use hyper terminal to establish a console session between two PCs.
3. Use of LAN switch to create simple networks.
4. Study and familiarization of Router.
5. Configure a Router for different network scenarios.
6. Perform network operations such as file and printer sharing.
7. Interface serial, parallel and USB ports for data transfer.
8. Study of Wide Area Network (WAN).
9. Understanding World Wide Web (WWW) network structure and IP assignment.
10. Understanding web hosting process on internet.

Recommended Books:

1. W. Stallings, "Data and Computer Communication"
2. M. Kaufmann, "Computer Networks"

Control Technology

Course Code: ET-323

Credit Hours: 3 + 1

Objective:

To enable students to understand principles and working of control systems

Course Outline:

Introduction to control systems, open and close loop control systems. Principle of feedback systems, Modeling of electrical and mechanical control systems, time and frequency domain analysis, Block diagram, transfer function, unit and impulse response, signal flow graphs, Control system components, gear trains, levers, servo mechanism; study of feedback system for automatic control of physical quantities such as voltage, speed and mechanical position. Industrial application of servo mechanism. Overview of PID controllers Stability, Routh-Hurwitz stability criteria, compensation techniques, steady state error

List of Practicals

1. Study of DC servomechanism.
2. Perform speed control of servo motor in open loop configuration.
3. Perform position control of servo motor in open loop configuration.
4. Perform speed control of servo motor in closed loop configuration.
5. Perform position control of servo motor in closed loop configuration.

6. Study of AC Servomechanism.
7. Servomotor control using PID controller.
8. Mini-project – demonstration of feedback control system using micro-controller.

Recommended Books:

1. Norman Nice, "Control Systems"
2. B. Kuo, "Automatic Control Systems"

High Voltage Technology

Course Code: ET-324

Credit Hours: 3 + 1

Objective:

To enable students to familiarize with theory and practices in High voltage technology.

Course Outline:

Introduction to high voltage technology, Conduction and Breakdown in gases, liquid dielectrics, breakdown in solid dielectrics, Applications of Insulating materials in power transformers, rotating machines, circuit breakers, cables, Generation of high voltage and currents, measurement of high voltage and currents, Overvoltage phenomenon and insulation coordination in power systems, Testing of high voltage electrical apparatus.

List of Practicals

1. Study of high voltage testing transformers.
2. Study of Vandegriff generator
3. Observation of corona inception and breakdown voltage in air.
4. Measurement of high voltage by sphere gap and uniform field gap.
5. Measurement of dielectric strength of solid insulation.
6. Measurement of Dielectric strength of insulating liquids.
7. Measurement of Impulse voltage.
8. Flashover along line insulators.

Recommended Books:

1. Naidu, "High Voltage Engineering"
2. Alston, "High Voltage Technology"
3. Dr. Abdullah, "High Voltage"

Power Distribution and Utilization

Course Code: ET-325

Credit Hours: 2

Objective:

Department of Technical Education, BS Electrical Technology

Students are introduced to the basics of power distribution systems and effective utilization of power in heating and illumination applications

Course Outline:

Introduction to distribution system, Urban, suburban and rural distribution systems, Primary, secondary and tertiary voltages, Radial and ring main systems, application of distribution transformers, estimation of load, load characteristics, substation switch gears and bus bar arrangements, calculation of voltage drop and regulation in distribution feeders. Grounding and earthing, distribution transformer neutral earthing resistance, earthing practice in L.V. networks, Power Factor: Disadvantages and causes of low power factor, methods for improvement, application of shunt capacitors in distribution network, Batteries & Electrochemical Processes: Main types of batteries and their working, battery charging, electroplating, electrolysis and electro-metallurgical process. Cathodic protection of poles, gas pipes, oil pipes and water structures, Heating and Welding: Electric heating, resistance, induction and dielectric heating, electric furnaces, microwave heating, electric welding, resistance welding and its types. Fundamentals of Illumination Engineering: Laws, units and terms used, requirements for good lighting, illumination schemes for various situations (street lighting, commercial/industrial lighting, stadium/flood/stage/spot lighting etc.), types of lamps, their working and relative merit.

Recommended Books:

1. M. L. Anand, "A Text Book of Electrical Power", Latest Edition
2. Turan Gonen, "Electrical Power Distribution System", Latest Edition.

Industrial and Environmental Safety

Course Code: ET-411

Credit Hours: 2

Objective:

To enable students to develop occupational health and safety awareness skills

Course Outline:

Occupational Health:

Classification of health hazards: Physical, Chemical and biological

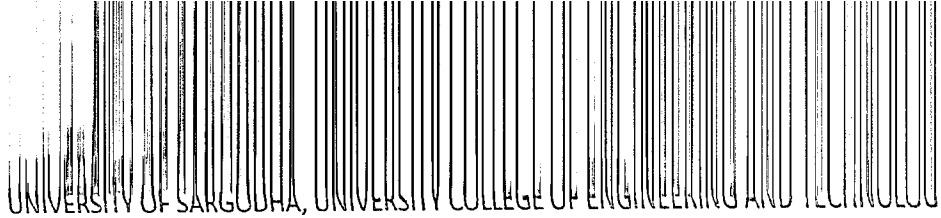
Sources of risk: machinery, noise, electrical failure, indoor air, poor ventilation and lighting conditions, radiation, and ergonomics □

Classification of dangerous substances and their toxicity;

Routes of entry: skin and eyes, lungs and stomach, Occupational exposure limits

Environmental monitoring at the work place: measurement techniques, data evaluation and analysis.

Safety Technology: Importance of safety practices, basic concepts of plant safety, safe machinery, design and guarding, Mechanical handling, Manual handling, Access equipment, transport safety, Chemical safety, electricity and



electrical equipment. Firefighting techniques, Construction safety, Demolition, Personal protective equipment

Safety Management Techniques: Accident prevention, health and safety policy, safe systems of work, first aid provisions, health and safety training, spill response protocols, accident investigation, recording and analysis, communicating safety measures, techniques of inspection, Health and safety regulations at work place.

Recommended Books:

1. Mark Friend, "Fundamentals of Occupational Safety and Health"
2. CIRIA Report 125, "A Guide to the Control of Substances Hazardous to Health in Design and Construction", Thomas Telford Publications, 1993
3. F.A. Patty, "Industrial Hygiene and Toxicology Vol-I: General Principles"

Technical Project

Course Code: MT-412

Credit Hours: 0 + 6

Objective:

To develop the ability of exercising the B-Technology program in the analysis and design of projects

Supervised Industrial Training

Course Code: MT-421

Credit Hours: 0 + 36

Guidelines:

The students shall undergo Supervised Industrial Training (minimum duration of 36 Credit Hours)

The students are required to submit monthly Progress Report to the institute duly verified by their Industrial supervisor.

The institute is responsible to contact with all industrial supervisors to check the student's performance

At the end of the training, the students are required to submit a detailed report to the institute and undergo viva-voce examinations