E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai
Accredited by NAAC with „A" Grade | Accredited by NBA
NAGAPATTINAM – 611 002

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Full Time Curriculum and Syllabus

Second Year – FourthSemester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1902EE401	Generation, Transmission and Distribution	3	2	0	4	40	60	100
1902EE402	Synchronous and Asynchronous Machines	3	2	0	4	40	60	100
1902EE403	Linear Integrated Circuits	3	0	0	3	40	60	100
1902EE404	Communication Engineering	3	0	0	3	40	60	100
1901GEX09	Biology for Engineers	3	0	0	3	100	0	100
Laboratory Course								
1902EE451	Synchronous and Asynchronous Machines Laboratory	0	0	2	1	50	50	100
1902EE452	Analog and Digital Integrated Circuits Laboratory	0	0	2	1	50	50	100
1904GE451	Life Skills: Verbal Ability	0	0	2	1	100	0	100
Mandatory Course								
1901MCX01	Environmental Science	2	0	0	0	100	00	100
Total		**17**	**04**	**06**	**20**	**500**	**400**	**900**

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1902EE401	GENERATION, TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	2	0	4

PREREQUISITE :

1.Power Plant Engineering
2.Electric circuit analysis

COURSE OBJECTIVES:

1.To understand the structure of power system, insulators, cables and substation
2.To develop expressions for various parameters related to transmission lines.
3.To obtain the equivalent circuits for the transmission lines to determine voltage regulationand efficiency.

COURSE OUTCOMES:

After completion of the course, Student will be able to
CO1: Infer knowledge on the basics of generation, transmission and distribution of power system.
CO2: Apply the voltage distribution in insulator strings and lines.
CO3: Develop expressions for the computation of transmission line parameters and UG cables.
CO4: Obtain the voltage regulation and efficiency from the equivalent circuit of the transmissionLines.
CO5: Develop the transmission line and modern substation layout with grounding techniques.

MODULE I **ELECTRICAL POWER GENERATION (Block diagram/Qualitative approach only)** **12 Hours**

Structure of electric power system: Single line diagram, different operating voltages of generation, transmission and distribution.Types of energy and classification of power plants; Present power position in India, Future planning for power generation.

Power generation from Non-Renewable energy sources: Thermal and Nuclear based power generation

Power generation from Renewable energy sources: Solar, Wind, Hydro, Tidal, Geothermal, Fuel cell and Biomass based power generation.

MODULE II MECHANICAL DESIGN OF LINES, AND INSULATORS 12 Hours

Mechanical design of OH lines: Line supports, Types of towers, Stress and Sag calculation, Towers at equal heights , Unequal heights, Effects of wind and ice loading, stringing chart.

Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

MODULE III **PARAMETERS OF TRANSMISSION LINES, AND UNDERGROUND CABLES** **12 Hours**

Parameters of single and three phase transmission lines: Resistance, inductance and capacitance of symmetrical and unsymmetrical transposed solid, stranded and bundled conductors; self and mutual GMD.

Underground cables: constructional features of LT and HT cables; capacitance of single-core cable; grading of cables, power factor and heating, capacitance of 3- core belted cable; DC cables; Cable faults and testing.

MODULE IV PERFORMANCE OF TRANSMISSION LINES 12 Hours

Performance of Transmission lines - short line, medium line and long line, equivalent circuits, Phasor diagram, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation; Real and reactive power flow in lines;surge impedance loading; Power circle diagrams; Skin and proximity effects; Ferranti effect; Interference with neighboring communication circuits; Corona discharge characteristics, Critical voltage and corona loss; Methods of voltage control

MODULE V DISTRIBUTION SYSTEMS AND SUBSTATION 12 Hours

Distribution systems: General Aspects, Radial and ring main systems; Calculation of voltage in distributors with concentrated and distributed loads, Kelvin‟s law; Techniques of voltage control and power factor improvement.Substation: Types, typical key diagram of an 11kV / 400V substation; Grounding; Recent trends in transmission and distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).

TOTAL: 60HOURS

REFERENCES:

1. C.L.Wadhwa, „Electrical Power Systems‟, New Academic Science Ltd, seventh edition 2017.
2. J.Brian, Hardy and Colin R.Bayliss „Transmission and Distribution in Electrical Engineering‟, Newnes; Fourth Edition, 2011.
3. D.P.Kothari, I.J. Nagarath, “Power System Engineering”, TataMcGraw Hill Publishing Company limited, New Delhi, 2nd edition. 2008.
4. HadiSaadat, „Power System Analysis,‟ PSA Publishing; Third Edition, 2010.
5. S. L. Uppal and S. Rao“Electrical Power” Khanna Publishers, 15th Edition, 1987.
6. http://nptel.ac.in/courses/108108099/, http://nptel.ac.in/courses/108105053/2

		L	T	P	C
1902EE402	**SYNCHRONOUS AND ASYNCHRONOUS MACHINES**	**3**	**2**	**0**	**4**

PREREQUISITE :

1. Electrical Machinery-I.
2. Electromagnetic Field.

COURSE OBJECTIVES:

1. To impart the basic operation and construction of various AC machines.
2. To describe the performance of synchronous machine by different methods.
3. To analyze the performance characteristics and equivalent circuits of AC machines.

COURSE OUTCOMES:

CO1	Investigate the percentage regulation of three-phase AC generator using various regulation methods.
CO2	Inspect the performance characteristics of three-phase synchronous motor by conducting various test
CO3	Identify the performance characteristics of three-phase induction motor by conducting OC and SC test
CO4	Gain Knowledge about the concepts of starters & speed control methods
CO5	Describe the characteristics behavior of various types of single-phase induction motor and special machines

MODULE I SYNCHRONOUS GENERATOR 12 Hours

Constructional details-types of rotors;EMF equation; specifications; Armature reaction-phasor diagram; Predetermination of voltage regulation– EMF, MMF, ZPF & ASA methods; Load characteristics; Power transfer equations and capability curves; Two reaction theory;Sliptest;Parallel operation and synchronization to infinite bus bar; Application; Maintenance.

MODULE II SYNCHRONOUS MOTOR 12 Hours

Principle of operation, torque equation, power input and power developed equations; V and Inverted V curves; Effect of varying load and Excitation; Load test and characteristics; Starting methods; Hunting; Synchronous condenser; Applications. Synchronous induction motor.

MODULE III THREE PHASE INDUCTION MOTOR 12 Hours

Constructional details, types, principle of operation, rotating magnetic field, slip; Equivalent circuit; torque equation, Torque-Slip characteristics-Effect of supply voltage and rotor resistance on torque; Circle diagram, separation of losses; Tests; Cogging and crawling; Induction generator; Double cage deep bar induction motor.Role of asynchronous motor in industrial sector - Case study.

MODULE IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR 12 Hours

Need for starter; Types of starters – star delta starter, auto transformer starter, DOL starter, Comparison of starters; Speed control – voltage control, frequency control, pole changing, cascaded connection, v/f control, slip power recovery scheme; Braking methods.Safety procedures for installation of starters. Speed control applications in industry - Case study.

MODULE V SINGLE PHASE INDUCTION MOTOR & FRACTIONAL HP MOTORS 12 Hours

Principle of single phase induction motors-Rotating vs alternating magnetic field; double field revolving theory; Types or Starting methods; Construction; Torque - speed characteristics; equivalent circuit.

Construction and working of fractional HP motors: Hysteresis motor; stepper motor; universal motor; linear induction motor.Role of single phase induction motor in industrial and house hold appliances. Use of capacitor bank- Applications of single phase induction motor- Case study.

TOTAL: 60 HOURS

REFERENCES:

1. Fitzgerald A.E,CharlesKingsley, Stephen. D.Umans, „Electric Machinery", Tata McGraw-Hill Education Pvt. Ltd. 6th Edition, 2015.
2. Kothari D.P and I.J. Nagrath, "Electric Machines",McGraw -Hill,5th Edition, 2017.
3. BhimbhraP.S, "ElectricalMachinery",HannaPublishers,7thEdition, 2009.
4. Bandyopadhyay M.N, "Electrical Machines-Theory and Practice", PHI Learning Pvt. LTD., New Delhi, 2014
5. Charles A. Gross, "Electric /Machines", CRC Press, First Edition, 2006.
6. https://nptel.ac.in/courses/108/106/108106072/

1902EE403	LINEAR INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

PREREQUISITE :

1.Electric circuit Analysis
2.Electronic Devices and Circuits

COURSE OBJECTIVES:

1. To understand the fundamentals and fabrication of ICs.
2. To explain the functions, characteristics and applications of op. amp.
3. To describe operation of signal converters, special function ICs and voltage regulators

COURSE OUTCOMES:

CO1 Explain the fundamentals of IC technology and fabrication procedure for diode, capacitance, resistance, FET and typical circuits

CO2 Describe the functional block diagram, performance parameters and frequency compensation techniques of operational amplifier

CO3 Construct analog circuits using operational amplifier for linear and non-linear applications.

CO4 Build signal conversion circuits and filters using operational amplifier.

CO5 Design simple analog circuits for the given application using timer, VCO, PLL and voltage regulator ICs

MODULE I FABRICATION OF INTEGRATED CIRCUITS 9 Hours

IC classification; Fundamental of monolithic IC technology; Epitaxial growth, masking and etching, diffusion of impurities; realization of monolithic ICs and packaging; fabrication of diodes, capacitance, resistance and FET.

MODULE II OPERATIONAL AMPLIFIER 9 Hours

Op-Amp- functional block diagram, ideal and practical op-amp; IC741- Pin diagram, Features, Interpretation of IC 741 datasheet; Characteristics-CMRR, open loop gain, slew rate, transfer characteristics, input bias and output offset voltage, offset compensation techniques, frequency response characterization, frequency compensation.

MODULE III APPLICATIONS OF OPERATIONAL AMPLIFIERS 9 Hours

Inverting and non-inverting amplifiers, voltage follower, summing amplifier, differential amplifier, instrumentation amplifier; Comparators; Integrator and differentiator; Precision rectifier; Logarithmic and anti logarithmic amplifiers. Sinusoidal oscillators - phase shift, Wein bridge & Hartley; sample and hold circuit; clipper and clamper; Schmitt trigger.

MODULE IV SIGNAL CONVERSION APPLICATIONS 9 Hours

V/F and F/V converters; V/I and I/V converter; D/A converter - weighted resistor type, R-2R ladder type, inverted R-2R, comparison; A/D converters- flash type, successive approximation type, single slope type, dual slope type, A/D converter using voltage-to-time conversion, comparison**.**

Active filters-Low pass, High pass, Bandpass and Band reject filters; First, second and higher order filters.

MODULE V SPECIAL FUNCTION INTEGRATED CIRCUITS 9 Hours

555 Timer - functional block diagram and description, astable, monostable and bistable operations; 566 voltage controlled oscillator; 565 PLL - functional block diagram, principle of operation, characteristics; IC voltage regulators – regulation, need for voltage regulation; LM78XX, 79XX fixed voltage regulators; LM 317 & LM723; Interpretation of IC data sheets.

Total: 45 Hours

REFERENCES:

1. D Roy Choudhury and SheilB.Jani, “Linear Integrated Circuits” 4th Edition, New Age International, New Delhi, 2014.
2. S Salivahanan and V S KanchanaBhaaskaran, “Linear Integrated Circuits”, 2nd Edition, McGraw-Hill Education, 2014.
3. RamakantA.Gayakward, “Op-amps and Linear Integrated Circuits”, 4thEdition, PHI Learnings, 2003.
4. B Somanathan Nair, “Linear Integrated Circuits: Analysis, Design and Applications”, Wiley, 2009.
5. Floyd and Buchla, “Fundamentals of Analog Circuits”, Pearson, 2013.
6. James M. Fiore, “Operational Amplifiers & Linear Integrated Circuits: Theory and Application / 3E”, 2018.
7. Microelectronic circuits-by A.S.Sedra and K.C.Smith
8. http://nptel.ac.in/courses/117107094/

1902EE404	COMMUNICATION ENGINEERING	L	T	P	C
		3	0	0	3

PREREQUISITE :NIL

COURSE OBJECTIVES:

1. To provide an introduction on different analog modulation and demodulation systems.
2. To know the principles of sampling & quantization.
3. To learn the various baseband transmission schemes.
4. To understand the various Band pass signaling schemes.
5. To become skilled at fundamentals of mobile and wireless communication technologies and its applications.

COURSE OUTCOMES:

After completion of the course, Student will be able to

Explain the fundamental techniques of generations and detections for Amplitude, Frequency and Phase modulations

CO1 - Construct an angle modulation system

CO2 - Construct a sampled and quantized signal for baseband transmission

CO3 - Describe the concepts of Digital modulation schemes for digital data transmission

CO4 - Describe the role of digital transmission

CO5 - Apply cellular concepts in mobile communication networks

MODULE I AMPLITUDE MODULATION SYSTEMS 9 Hours

Need for modulation – Classifications of modulation techniques-Generation and detection: AM, DSBSC, SSB-SC, VSB-Comparison of Amplitude modulation systems- AM transmitters-AM receivers.

MODULE II ANGLE MODULATION SYSTEMS 9 Hours

Frequency modulation: Narrowband and wideband FM- Phase Modulation- Generation of FM signal:Direct FM, indirect FM- Demodulation of FM signals -FM stereo multiplexing- FM transmitters- FM receivers.

MODULE III SAMPLING AND QUANTIZATION 9 Hours

Sampling Process – Aliasing – Instantaneous sampling – Natural Sampling –Flat Sampling – Quantization of signals –sampling and quantizing effects –channel effects – SNR for quantization pulses – data formattingtechniques –Time division multiplexing

MODULE IV DIGITAL TRANSMISSION 9 Hours

Baseband Transmission: Wave form representation of binary digits - PCM, DPCM, DM, ADM systems, Pass band Transmission: ASK, FSK, PSK, QPSK, DQPSK, MSK, QAM , Noise performance of ASK, FSK, PSK,QPSK, DQPSK, MSK, QAM

MODULE V CELLULAR COMMUNICATION 9 Hours

Introduction, Frequency reuse, Cell Assignment techniques, Hand off Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage and capacity in cellular systems. Multiple Accesstechniques: FDMA, TDMA, CDMA, SDMA

Total: 45 Hours

REFERENCES:

1. G.Kennedy and B.Davis, Electronic Communication Systems, fourth Edition, Tata McGraw-Hill -2008.
2. Simon Haykin, Communication Systems, John Wiley, 2001.
3. Simon Haykin, “Digital Communications”, John Wiley, 2006.
4. Amitabha Bhattacharya, “Digital Communication”, Tata McGraw Hill, 2006.
5. Rappaport. T.S., “Wireless Communications: Principles and Practices”, Second Edition, PHI, 2014
6. https://nptel.ac.in/courses/108/104/108104100/

1901GEX09	BIOLOGY FOR ENGINEERS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

The objective of the course is to enable learners to understand the basic concepts of biology and its application in engineering

COURSE OBJECTIVE

- **CO1** Classify the bio system based on morphological , bio chemical and ecological matters
- **CO2** Describe the concept of recessiveness and dominance during the passage of genetic material from parent off spring
- **CO3** Classify enzymes by distinguishing different mechanism of enzyme reaction
- **CO4** Apply thermodynamic system to biological system
- **CO5** Describe the modern bio inspired engineering techniques

MODULE I BIOLOGY INTRODUCTION AND ITS CLASSIFICATION 09 Hours

Introduction to Biology, fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Exciting aspect of biology - need to study biology- Discussion about biological observations of 18th Century - major discoveries. Examples from Brownian motion and the origin of thermodynamics - original observation of Robert Brown and Julius Mayor.

Classification - morphological, biochemical or ecological. Hierarchy of life forms at phenomenological level. Classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotripsy (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology- E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

MODULE II GENETICS AND MACROMOLECULAR ANALYSIS 12 Hours

Genetics - Newton‟s laws to Physical Sciences”- Mendel‟s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis - part of genetics. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Single gene disorders in humans. Complementation using human genetics.

Macromolecular analysis: analyses of biological processes at the reductionistic level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

MODULE III BIOMOLECULES AND ENZYMES 09 Hours

Biomolecules - Molecules of life. monomeric units and polymeric structures. Sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

Enzymes - monitor enzyme catalyzed reactions. Enzyme catalyzereactions. Enzyme classification. Mechanism of enzyme action -two examples. Enzyme kinetics and kinetic parameters. RNA catalysis. Information Transfer - The molecular basis of coding and decoding genetic information - universal Molecular basis of information transfer. DNA - genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Gene in terms of complementation and recombination.

MODULE IV METABOLISM AND MICROBIOLOGY 08 Hours

Metabolism: principles of energy transactions. Thermodynamics to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP - energy currency. Breakdown of glucose to CO2 + H2O (Glycolysis andKrebs cycle) - synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge

Microbiology Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

MODULE V BIO-INSPIRED ENGINEERING 07 Hours

Introduction to biologically-inspired designs (BID for Biomedical and Non-biomedical applications): Human-organs-on-chips; Muscular Biopolymers; Bio-optics; Nanostructures for Drug Delivery; Genetic Algorithms; Artificial neural networks; Swarm intelligence algorithms; Biosensors: role in medical diagnostics (Sensium digital plaster); environmental monitoring; Bio-filters; Bio-robotics; 3D Bio-printing; Self healing concrete

TOTAL: 45 HOURS

REFERENCES:

1. Biology for Engineers, Rajiv Singal , CBS Publishers and Distributors Pvt Ltd; FirstEdition edition (4 June 2019)
2. Biology for Engineers, Wiley Editorial, Wiley (2018).
3. Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, Wiley; Third edition(2018).
4. Computational Medicine: Tools and Challenges, Zlatko Trajanoski, Springer; 2012edition (19 September 2012).
5. Health Informatics - E-Book: An Interprofessional Approach, Ramona Nelson, NancyStaggers, Elsevier; 2nd edition (December 8, 2016).
6. Biology for Engineers, G.K..Suraishkumar, Oxford University Press
7. Biology for Engineers, Arthur T. Johnson, CRC Press

1902EE451	SYNCHRONOUS AND ASYNCHRONOUS MACHINES LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE :

Electrical Machinery Laboratory-I

COURSE OBJECTIVES:

1. To know the performance characteristics of induction motors.
2. To compare various regulation methods of Synchronous machines.
3. To study the characteristics of brushless DC motor.
1. To know the performance characteristics of induction motors.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1 - Investigate various regulation methods of synchronous machines by conducting OCC and SCC test

CO2 - Experiment on synchronous machines for obtaining performance characteristics by conducting V and inverted V curve test

CO3 - Compute the performance characteristics of single phase and three-phase induction motor by conducting load, no load and blocked rotor test

CO4 - Construct the characteristics of Synchronous Induction machines

CO5 - Study about various types of starters in AC motor

LIST OF EXPERIMENTS:

1. No load, blocked rotor test and load test on single phase induction motor.
2. Parallel operation of alternators/ synchronization of alternator with infinite bus bar
3. No load, blocked rotor test and load test on three phase induction motor.
4. Induction motor
5. Separation of no load losses ofthree-phase induction motor.
6. Voltage regulation of an alternator by EMF and MMF method.
7. Voltage regulation of an alternator by ZPF and ASA method.
8. V & inverted V curve of three phase synchronous motor.
9. Determination of Xd,Xq and regulation of a salient pole alternator.
10. Determine the characteristics of three phase induction generator.
11. Speed control of single phase/three phase induction motor.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS:

Determination of negative & zero sequence reactance of a three phase alternator.

REFERENCES:

1. Suresh Babu.P.J, “Electrical Machinery Lab II Manual”, 2018.
2. Kothari.D.P&Umre.B.S “Laboratory manual for electrical machines”, I.K international Publishing House (P) Ltd. 2nd Edition, 2017

		L	T	P	C
1902EE452	**ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY**	**0**	**0**	**2**	**1**

PREREQUISITE:

1. Electronic Devices and Circuits Lab
2. Digital Electronics

COURSE OBJECTIVES:

1. To test the characteristics of Amplifiers
2. To design and testing of logic gates
3. To implement and characterizing the circuit behavior with digital and analog IC‟s

COURSE OUTCOMES:

After completion of the course, Student will be able

CO1: Apply various types of biasing and amplifier configuration

CO2: Use simplification techniques to design a combinational hardware circuit

CO3: Design and Implement combinational and sequential circuits

CO4: Design and Implement a simple digital system

CO5: Apply analog and digital electronic circuits

LIST OF EXPERIMENTS:

1. Inverting and non-inverting amplifiers using op-amp.
2. Adder, subtractor and comparators using op-amp.
3. Sinusoidal oscillators using op-amps.
4. Schmitt trigger using op-amp.
5. Weighted resistor type DAC and R-2R ladder type DAC
6. Astable and monostable multivibrators using NE555 timer.
7. Implementation of Boolean functions, Adder/ Subtractor circuits
8. Design and implementation of code converters using logic gates
9. Design and implementation of encoder and decoder using logic gates.
10. Construction and verification of 4 bit ripple counter (up/down).
11. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops.
12. Design and implementation of Multiplexer and De-multiplexer using logic gates.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS :

1. Applications of 565 Phase locked loop (PLL)
2. Applications of 566 voltage controlled oscillator (VCO)
3. Adjustable voltage regulators using LM317 and LM723.

REFERENCES:

1. Dr. T. Suresh Padmanabhan and Mr.K.Nandakumar, “Analog and Digital Integrated Circuits Manual”, 2018.
2. D Roy Choudhury and SheilB.Jani, “Linear Integrated Circuits” 4th Edition, New Age International, New Delhi, 2014.
3. James M. Fiore, “Operational Amplifiers & Linear Integrated Circuits: Theory and Application / 3E”, November 2018.
4. RamakantA.Gayakward, “Op-amps and Linear Integrated Circuits”, 4thEdition, PHI Learnings, 2003.

1904GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1.To help students comprehend and use vocabulary words in their day-to-day communication.
2.To apply appropriate reading strategies for interpreting technical and non-technical
3.To ensure students will be able to use targeted grammatical structures meaningfully and
4.To enable the students to arrange the sentences in meaningful unit and to determine whether
5.To apply the principles of effective business writing to hone communication skills.

COURSE OUTCOMES

CO1: Use new words in their day-to-day communication.
CO2: Gather information swiftly while reading passages.
CO3: Students are proficient during their oral and written communication.
CO4: Rearrange the sentences and able to identify the voice of the sentence.
CO5: Students use their knowledge of the best practices to craft effective business documents

MODULE1 VOCABULARY USAGE **6 hours**

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

MODULE 2 COMPREHENSION ABILITY **6 hours**

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages.

MODULE 3 BASIC GRAMMAR AND ERROR DETECTION **6 hours**

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

MODULE 4 REARRANGEMENT AND GENERAL USAGE **6 hours**

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

MODULE 5 APPLICATION OF VERBAL ABILITY **6 hours**

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

TOTAL: 30 HOURS

REFERENCES:

1. Arun Sharma and MeenakshiUpadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007

		L	T	P	C
1901MCX01	**ENVIRONMENTAL SCIENCE** (Common to all Branches of B.E/ B.Tech)	**2**	**0**	**0**	**0**

COURSE OBJECTIVES:

1.To create awareness about environmental problems
2.To impart basic knowledge about environment
3.To develop and attitude of concern for the environment

COURSE OUTCOME

CO1	Describe the physical, chemical and biological components of the eco systems and their function.
CO2	Describe the water quality parameter and removal of pollutants
CO3	Describe the scientic principles to analysis various environment implications in day to day life.
CO4	Describe the various environmental protection acts for key social systems affecting the environment.
CO5	Summarize the major diseases, women welfare child development and the impacts of population explosion

MODULE I ECOSYSTEMS AND BIODIVERSITY 10 Hours

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Documentation of the medicinal plants in your native place

MODULE II NATURAL RESOURCES 10 Hours

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Documentation of the effect of modern Agriculture in your nearby Village

MODULE III ENVIRONMENTAL POLLUTION 9 Hours

Definition – Source, causes, effects and control measures of: (a) Air pollution - Mitigation procedures- Control of particulate and gaseous emission, Control of SO_X, NO_x, CO and HC) -Technology for capturing CO_2 (metallo organic frame works)(b) Water pollution – Waste water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies.
Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural.

MODULE IV SOCIAL ISSUES AND THE ENVIRONMENT 8 Hours

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management -environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments-scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards- disaster management: floods, earthquake- Public awareness. Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India)

MODULE V HUMAN POPULATION AND THE ENVIRONMENT 8 Hours

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA) -GIS-remote sensing-role of information technology in environment and human health – Case studies.
Documentation study of the Human health and the environment in nearby Hospital (Statistical report)

TOTAL: 45 HOURS

REFERENCES:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
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