## II SEMESTER CURRICULUM

B.E. Instrumentation and Control Engineering

### SEMESTER II

#### THEORY

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**TOTAL** 19 4 7 27
II SEMESTER SYLLABI
B. E. INSTRUMENTATION AND CONTROL ENGINEERING

HS6251 TECHNICAL ENGLISH II

OBJECTIVES:
- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

OUTCOMES:
Learners should be able to
- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

UNIT I
9 + 3
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II
9 + 3
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one's friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students’ dialogues.

UNIT III
9 + 3
Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading
passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the
preparation of minutes - Writing summary after reading articles from journals - Format for journal
articles – elements of technical articles (abstract, introduction, methodology, results, discussion,
conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause
and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the
spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar and vocabulary
– Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials
– Attending a meeting and writing minutes.

UNIT IV
9 + 3
Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic
and video conferencing); Speaking - Role play practice in telephone skills - listening and responding,
asking questions, -note taking – passing on messages, Role play and mock interview for grasping
interview skills; Reading - Reading the job advertisements and the profile of the company concerned –
scanning; Writing - Applying for a job – cover letter – résumé preparation – vision, mission and goals
of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary
- Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on
Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language
Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V
9 + 3
Listening - Viewing a model group discussion and reviewing the performance of each participant -
Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the
discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness
in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from
books, or any form of written materials - Intensive reading; Writing - Checklist - Types of reports –
Feasibility / Project report – report format – recommendations / suggestions – interpretation of data
(using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-
materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion,
Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

TOTAL: 60 PERIODS

TEXTBOOKS
1. Department of English, Anna University. Mindscapes: English for Technologists and
   Engineers. Orient Blackswan, Chennai. 2012
   Orient Blackswan, Chennai. 2011

REFERENCES
   Delhi. 2008
   2011
4. Sharma, Sangeetha & Binod Mishra. Communication Skills for Engineers and Scientists. PHI
   Learning, New Delhi. 2009
   USA. 2007

EXTENSIVE Reading (Not for Examination)

Websites
2. http://owl.english.purdue.edu

TEACHING METHODS:
- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

EVALUATION PATTERN:

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like
- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.
✓ Speaking assessment: Individual presentations, Group discussions
✓ Reading assessment: Reading passages with comprehension questions graded following Bloom’s taxonomy
✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom’s taxonomy.

End Semester Examination: 80%

MA6251 MATHEMATICS – II

OBJECTIVES:
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.
UNIT I VECTOR CALCULUS 9+3
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS 9+3
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM 9+3

UNIT IV ANALYTIC FUNCTIONS 9+3
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: \( w = z+k, kz, 1/z, z^2, e^z \) and bilinear transformation.

UNIT V COMPLEX INTEGRATION 9+3
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor’s and Laurent’s series expansions – Singular points – Residues – Cauchy’s residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS
Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS

UNIT V ADVANCED ENGINEERING MATERIALS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  WATER TECHNOLOGY  9
Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat
exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion)
prevention of scale formation -softening of hard water -external treatment zeolite and
demineralization - internal treatment- boiler compounds (phosphate, calgon, carbonate,
colloidal) - caustic embrittlement-boiler corrosion-priming and foaming- desalination of brackish
water –reverse osmosis.

UNIT II  ELECTROCHEMISTRY AND CORROSION  9
Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation
potential- reduction potential, measurement and applications - electrochemical series and its
significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types-
chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material
selection and design aspects - electrochemical protection – sacrificial anode method and
impressed current cathodic method. Paints- constituents and function. Electroplating of Copper
and electroless plating of nickel.

UNIT III  ENERGY SOURCES  9
Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion-
differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power
generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy
conversion- solar cells- wind energy. Batteries and fuel cells:Types of batteries- alkaline battery-
lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H₂ -O₂ fuel cell-
applications.

UNIT IV  ENGINEERING MATERIALS  9
Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth.
Refractories: definition, characteristics, classification, properties – refractoriness and RUL,
dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina,
magnesite and silicon carbide, Portland cement- manufacture and properties - setting and
hardening of cement, special cement- waterproof and white cement- properties and uses. Glass
- manufacture, types, properties and uses.

UNIT V  FUELS AND COMBUSTION  9
Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal-
analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto
Hoffmann method) - petroleum- manufacture of synthetic petrol (Bergius process)- knocking-
octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)-
Combustion of fuels: introduction- theoretical calculation of calorific value- calculation of
stoichiometry of fuel and air ratio- ignition temperature- explosive range - flue gas analysis
(ORSAT Method).

TOTAL PERIODS: 45

TEXT BOOKS
1.  Vairam S, Kalyani P and SubaRamesh.,“Engineering Chemistry”, Wiley India PvtLtd., New
   Delhi., 2011

6
REFERENCES

GE6251     BASIC CIVIL AND MECHANICAL ENGINEERING    L T P C    4 0 0 4

A – CIVIL ENGINEERING

UNIT I     SURVEYING AND CIVIL ENGINEERING MATERIALS    15
leveling – determination of areas – illustrative examples.

UNIT II     BUILDING COMPONENTS AND STRUCTURES    15
Foundations: Types, Bearing capacity – Requirement of good foundations.
plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges
and Dams – Basics of Interior Design and Landscaping.

TOTAL: 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III  POWER PLANT ENGINEERING    10
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric
and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of
Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV   IC ENGINES    10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel
Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines –
Boiler as a power plant.

UNIT V  REFRIGERATION AND AIR CONDITIONING SYSTEM    10
Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption
system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL: 30 PERIODS

REFERENCES:
5. Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai,
(2000).
UNIT I  BASIC CIRCUITS ANALYSIS

UNIT II  NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS
Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III  RESONANCE AND COUPLED CIRCUITS

UNIT IV  TRANSIENT RESPONSE FOR DC CIRCUITS
Transient response of RL, RC and RL Circuits using Laplace transform for DC input and A.C. with sinusoidal input – Characterization of two port networks in terms of Z,Y and h parameters.

UNIT V  THREE PHASE CIRCUITS
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:

GE6262  PHYSICS AND CHEMISTRY LABORATORY – II

PHYSICS LABORATORY – II
(Any FIVE Experiments)
1. Determination of Young’s modulus by uniform bending method
2. Determination of band gap of a semiconductor
3. Determination of Coefficient of viscosity of a liquid – Poiseuille’s method
4. Determination of Dispersive power of a prism - Spectrometer
5. Determination of thickness of a thin wire – Air wedge method
6. Determination of Rigidity modulus – Torsion pendulum

CHEMISTRY LABORATORY - II

(Any FIVE Experiments)

1. Determination of alkalinity in water sample
2. Determination of total, temporary & permanent hardness of water by EDTA method
3. Estimation of copper content of the given solution by EDTA method
4. Estimation of iron content of the given solution using potentiometer
5. Estimation of sodium present in water using flame photometer
6. Corrosion experiment – weight loss method
7. Conductometric precipitation titration using BaCl₂ and Na₂SO₄

TOTAL: 30 PERIODS

REFERENCES:

- Laboratory classes on alternate weeks for Physics and Chemistry.

GE6263 COMPUTER PROGRAMMING LABORATORY

LIST OF EXPERIMENTS

1. UNIX COMMANDS 15
Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING 15
Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX 15
Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL: 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS
Hardware
- 1 UNIX Clone Server
- 3 3 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

EE6211 ELECTRIC CIRCUITS LABORATORY

LIST OF EXPERIMENTS
1. Experimental verification of Kirchhoff’s voltage and current laws
2. Experimental verification of network theorems (Thevenin, Norton, Superposition and maximum power transfer Theorem).
3. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
4. Experimental determination of time constant of series R-C electric circuits.
5. Experimental determination of frequency response of RLC circuits.
6. Design and Simulation of series resonance circuit.
7. Design and Simulation of parallel resonant circuits.
8. Simulation of low pass and high pass passive filters.
9. Simulation of three phase balanced and unbalanced star, delta networks circuits.
10. Experimental determination of power in three phase circuits by two-watt meter method.
11. Calibration of single phase energy meter.
12. Determination of two port network parameters.

TOTAL: 45 PERIODS

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
2. Function Generator (1 MHz) - 10 Nos.
4. Oscilloscope (20 MHz) - 10 Nos.
5. Digital Storage Oscilloscope (20 MHz) – 1 No.
6. Circuit Simulation Software ( 5 Users ) (Pspice / Matlab /other Equivalent software Package) with PC( 5 Nos.) and Printer (1 No.)
7. AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.)
9. Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box Each - 6 Nos.
10. Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)