

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 (CIVIL, CSE, ECE, EEE, IT, MECH)

NAGAPATTINAM – 611 002



B.E MECHANICAL ENGINEERING

First Year – Second Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1901MA204	Engineering Mathematics – II (Calculus, Ordinary Differential Equations and Complex Variable)	3	2	0	4	40	60	100
1901CH203	Materials Chemistry	3	0	0	3	40	60	100
1901GEX03	Programming for Problem Solving	3	0	0	3	40	60	100
1901ENX01	English for Engineers	2	0	0	2	40	60	100
1901GE201	Engineering Exploration	2	0	0	2	40	60	100
Laboratory Course								
1901CHX51	Engineering Chemistry Lab	0	0	2	1	50	50	100
1901GE253	Basic Workshop Lab	0	0	2	1	50	50	100
1901GEX52	Computer Programming Lab	0	0	2	1	50	50	100
1901HSX51	Communication Skill Lab	0	0	2	1	50	50	100
1901GE252	Engineering Intelligence - II	0	0	2	1	100	0	100

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

1901MA204	ENGINEERING MATHEMATICS – II	L	T	P	C
	(Calculus, Ordinary Differential Equations and Complex Variable)	3	2	0	4

MODULE I LAPLACE TRANSFORM 12 Hours

Laplace Transform – Conditions for existence – Transform of Elementary Functions – Basic Properties – Transform of Unit step function and Impulse function – Transform of Periodic function – Inverse Laplace Transform – Convolution Theorem (excluding Proof) – Initial and Final value Theorems – Solution of Linear ODE of Second order with constant coefficient using Laplace Transform techniques.

MODULE II VECTOR CALCULUS 12 Hours

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) – Applications of the above theorems to find surface area of a closed region and volume of cube and parallel piped.

MODULE III ORDINARY DIFFERENTIAL EQUATIONS 12 Hours

Second order linear differential equations with variable coefficients, method of variation of parameters.

MODULE IV COMPLEX VARIABLE – DIFFERENTIATION 12 Hours

Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; Conformal mappings, Mobius transformations.

MODULE V COMPLEX VARIABLE– INTEGRATION 12 Hours

Contour integrals, Cauchy Integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

TOTAL: 60 Hours

REFERENCES:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

1901CH203

MATERIALS CHEMISTRY

L T P C

3 0 0 3

MODULE I WATER TECHNOLOGY

9 Hours

Boiler -Boiler Types, boiler compounds - boiler troubles- Sources, hard & soft water-Degree of hardness and its estimation (EDTA method)- Water Quality Parameters. Boiler feed water-requirements - softening of hard water -external treatment -demineralization, Zeolite process internal treatment- desalination of sea water - reverse osmosis- Domestic water treatment.

MODULE II THERMODYNAMICS

9 Hours

Thermodynamics -Introduction - terms, Entropy as a thermodynamic quantity, entropy changes in isothermal expansion of an ideal gas, reversible and irreversible processes, physical transformations, work & free energy functions, Helmholtz and Gibbs free energy functions, Gibbs-Helmholtz equation, Clapeyron-Clausius equation & its applications, Van't Hoff isotherm and applications.

MODULE III CORROSION AND PROTECTIVE COATING

9 Hours

Corrosion And Protective Coating - Corrosion - types-chemical, electrochemical corrosion (galvanic, differential aeration) - Factors influencing corrosion -corrosion control - material selection and design aspects - electrochemical protection - sacrificial anode method and impressed current cathodic method. Protective coatings: Thermal Spray, Electroplating of gold and electroless plating of nickel. Paints - Constituents and Functions. Estimation of iron.

MODULE IV ALLOYS AND PHASE RULE

9 Hours

Alloys And Phase Rule -Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) - heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process

MODULE V FUELS AND ENGINEERING MATERIALS

9 Hours

Fuels And Engineering Materials-Fuel-Introduction- classification of fuels, carbonization- manufacture of metallurgical coke (Otto Hoffmann method)-Refining of petroleum- manufacture of synthetic petrol (Bergius process)- natural gas- compressed natural gas (CNG)- producer gas- water gas. Combustion- calorific value - Flue gas analysis (ORSAT Method). Fundamentals of nano chemistry, nano materials, synthesis, properties and application. Lubricants -types- application.

TOTAL: 45 Hours

REFERENCES:

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New delhi 2010
3. Jain and Jain, "Engineering Chemistry", Sixteenth edition, Dhanpatrai publications, 2012.
4. <https://www.ccdc.cam.ac.uk/solutions/csd-system/components/csd/>
5. onlinelibrary.wiley.com/doi/10.1002/9780470661345.smc107/pdf
6. <https://books.google.co.in/books?isbn=008053239X>

1901GEX03	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
		3	0	0	3
MODULE I	INTRODUCTION TO PROGRAMMING				9 Hours
Components of Computers and its Classifications- Generations of Computers- Number System- Problem Solving Techniques – Algorithm Design– Flowchart–Pseudocode-Algorithm to program, Compilation and Execution.					
MODULE II	BASICS OF C PROGRAMMING				9 Hours
Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives					
MODULE III	ARRAYS AND STRINGS				9 Hours
Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.					
MODULE IV	FUNCTIONS AND POINTERS				9 Hours
Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference					
MODULE V	STRUCTURES & FILE PROCESSING				9 Hours
Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Dynamic memory allocation - Singly linked list -Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments.					
					TOTAL: 45 Hours

REFERENCES:

1. Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

1901EN101	TECHNICAL ENGLISH	L	T	P	C
		2	0	0	2

MODULE I FOCUS ON LANGUAGE (Vocabulary and Grammar) 6 Hours

Vocabulary -The Concept of Word Formation - prefixes- suffixes- Synonyms - Antonyms.
Grammar -Articles-Preposition- Adjective-Adverb-connectives -Tenses (present, past & future)-
Impersonal passive voice - Wh- Questions.

MODULE II LISTENING SKILLS 6 Hours

Listening- listening intently-arousing and sustaining interest-listening to short or longer texts- formal and informal conversations- telephonic etiquettes- narratives from different sources.-listening and Note taking-correlative verbal and non verbal communication-listening to TOEFL & IELTS programs .

MODULE III SPEAKING SKILLS 6 Hours

Speaking - stress and intonation –persuasive speaking -Describing person, place and thing - sharing personal information — greetings –taking leave -Individual and Group Presentation-impromptu presentation-public speaking-Group Discussion.

MODULE IV READING SKILLS 6 Hours

Reading– comprehending general and technical articles -cloze reading - inductive reading- short narratives and descriptions from newspapers – Skimming and scanning-reading and interpretation-critical reading-interpreting and transferring graphical information- sequencing of sentences.

MODULE V WRITING SKILLS 6 Hours

Writing- Precise writing –Summarizing- interpreting visual texts (pie chart, bar chart, picture, advertisements etc., -Proposal writing -report writing-job application-e-mail drafting- letter writing(permission, accepting and decaling)-instructions –recommendations –checklist.

TOTAL: 30 Hours

REFERENCES:

1. Raman, Meenakshi and Sangeetha Sharma. (2011). Technical Communication: Principles and Practice. New Delhi: Oxford University Press.
2. Rizvi and Ashraf M. (2005). Effective Technical Communication. New Delhi: Tata McGraw-Hill.
3. G. Radhakrishna Pillai. English for Success- Central Institute of English and Foreign Languages, Hyderabad: Emerald Publishers.
4. Jones, D. (2002).The Pronunciation of English. Cambridge: CUP; rpt in facsimile in Jones.
5. English for Engineers - Regional Institute of English (2006) .New Delhi: Cambridge University Press.
6. Rutherford and Andrea. (2001). Basic Communication Skills for Technology. New Delhi: Pearson.
7. Viswamohan A. (2008). English for Technical Communication. New Delhi: Tata McGraw-Hill.

1901GE201	ENGINEERING EXPLORATION	L	T	P	C
		2	0	0	2

What is Engineering: Engineering Requirement, Knowledge within Engineering disciplines, Engineering advancements.

Engineering Design: Problem definition, idea generation through brainstorming and researching, solution creation through evaluating and communicating, text/analysis, final solution and design improvement.

Defining problems and Brainstorming: Researching design, sketching problem solving.

Communicating solution: Dimensioning orthographic drawing, perspective drawing.

Modeling and Testing final output: Product evaluation, reverse engineering, final project report.

Civil Engineering: Structural forces structural analysis, bridge design components, structural design.

Mechanical Engineering: Types of motion, mechanical power system, mechanical power formula, mechanical design.

Electrical Engineering: Reading analog multimeter, measuring current, voltage and resistance, electricity from chemicals, solar cells, magnets, Ohms law and watts law, circuit identification and circuit calculation, resistor color code, continuity.

Computer Engineering: Logic gates, algorithms, computer architecture, binary code.

TOTAL: 30 Hours

REFERENCES:

1. Ryan A.Brown, Joshua W.Brown and Michael Berkihsier: "Engineering Fundamentals: Design, Principles, and Careers", Goodheart-Willcox Publisher, Second Edition, 2014.
2. Saeed Moaveni , "Engineering Fundamentals: An Introduction to Engineering", Cengage learning, Fourth Edition, 2011.

1901CHX51	ENGINEERING CHEMISTRY LAB	L	T	P	C
		0	0	2	1

List of Experiments:

1. Determination of total, temporary & permanent hardness of water by EDTA method
2. Determination of strength of given hydrochloric acid using pH meter
3. Estimation of iron content of the given solution using potentiometer
4. Estimation of sodium present in water using flame photometer
5. Corrosion experiment – weight loss method
6. Determination of molecular weight of a polymer by viscometer method
7. Conductometric titration of strong acid Vs strong Base
8. Estimation of dissolved oxygen in a water sample/sewage by Winkler's method.
9. Comparison of alkalinities of the given water samples
10. Determination of concentration of unknown colored solution using spectrophotometer
11. Determination of percentage of copper in alloy
12. Determination of ferrous iron in cement by spectrophotometry method
13. Adsorption of acetic acid on charcoal
14. Determination the flash point and fire point of a given oil using pen skyMartine closed cup apparatus
15. Determination the calorific value of solid fuels
16. Determination the structural of the compound using chemo software.

Total: 30 Hours

References:

1. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry", LBS Singapore (1994).
2. Jeffery G.H., Bassett J., Mendham J.and Denny vogel's R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
3. aniel R. Palleros, "Experimental organic chemis ry" John Wiley & Sons, Inc., New Yor (2001).
4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

1901GEX52	COMPUTER PROGRAMMING LAB	L	T	P	C
		0	0	2	1

List of Experiments:

1. Working with word and style sheets
2. Write a C program to implement basic concepts
3. Write a C program to implement Decision Making and Branching statements
4. Write a C program to implement looping statements
5. Write a C program to implement Arrays
6. Write a C program to implement Strings
7. Write a C program to implement pointers
8. Write a C program to implement Structures
9. Write a C program to work with files in C

Total: 30 Hours

References:

1. Paul Deitel and Harvey Deitel, —C How to Programl, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

1901HSX51	COMMUNICATION SKILLS LAB	L	T	P	C
		0	0	2	1

List of Experiments:

1. Activities on Fundamentals of Inter-personal Communication

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

2. Activities on Reading Comprehension

General Vs Local comprehension, reading for facts, guessing meanings from context, Scanning, skimming, and inferring meaning, critical reading & effective googling.

3. Activities on Writing Skills

Structure and presentation of different types of writing - letter writing/ Resume writing/e-correspondence/ Proposal writing/Technical report writing/ Portfolio writing - planning for writing - improving one's writing.

4. Activities on Presentation Skills

Oral presentations (individual and group) through JAM sessions / seminars / PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.- creative and critical thinking.

5. Activities on Soft Skills

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation-Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews-Timemanagement-stress management –paralinguistic features- Multiple intelligences – emotionalintelligence – spiritual quotient (ethics) – intercultural communication – creative and critical.

Total: 30 Hours

References:

1. Raman, Meenakshi and Sangeetha Sharma, “Technical Communication: Principles and Practice”, Oxford University Press, New Delhi, 2011.
2. Sudha Rani, D , “Advanced Communication Skills Laboratory Manual” , Pearson Education 2011.
3. Paul V. Anderson ,“Technical Communication”,. Cengage Learning pvt. Ltd. New Delhi, 2007.
4. “English Vocabulary in Use series”, Cambridge University Press 2008.
5. “Management Shapers Series” ,Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Rizvi and Ashraf M., “Effective Technical Communication”, Tata McGrawHill, New Delhi, 2005.
7. Jones, D, “The Pronunciation of English”, CUP, . Cambridge,2002.

1901GE252	ENGINEERING INTELLIGENCE II	L	T	P	C
		0	0	2	1

MODULE I VOCABULARY BUILDING 6 hours

Parts of Grammar- SVA- Art of Writing- word building activities

MODULE II COMMUNICATION WORKSHOP 6 Hours

Story Telling- Newspaper Reading-Extempore

MODULE III INTERPERSONAL SKILLS 6 Hours

Personality Development - Creativity and innovation –Critical Thinking and Problem Solving – Work Ethics-Technical Skill Vs Interpersonal Skills

MODULE IV LEADERSHIP& EMPLOYABILITY SKILLS 6 Hours

Levels of Leadership-Making of a leader-Type of leadership-Transactions Vs Transformational Leadership –Exercises - Industry Expectations & Career Opportunities- Recruitment patterns.

MODULE V RESUME BUILDING 6 Hours

Importance of Resume- Resume Preparation - introducing oneself

TOTAL: 30 Hours

REFERENCES:

1. Barun K. Mitra; (2011), "*Personality Development & Soft Skills*", First Edition; Oxford Publishers.
2. Raymond Murphy, *Essential English Grammar in Use*, Cambridge University press, New Delhi, Third Edition , 2007
3. Arun Sharma and Meenakshi Upadhyav, *How to Prepare for Verbal Ability and Reading Comprehension for CAT*, McGrawHill Publication, Seventh Edition 2017

1901GE253	BASIC WORKSHOP LAB	L	T	P	C
		0	0	2	1

List of Experiments

1. Forming of simple object in sheet metal using suitable tools (Example: Dust Pan, Soap Box, Aluminum Cup, etc).
2. Prepare V (or) Half round (or) Square (or) Dovetail joint from the given mild Steel flat.
3. Prepare simple components using arc and gas weldings
4. Making a simple component using carpentry power tools. (Example: Electrical switch Box/Tool box/ Letter box.
5. Construct a household pipe line connections using pipes, Tee joint, Four way joint, elbow, union, bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump using pipes, bend, gate valve, flanges and foot valve.
6. Rapid Prototyping

REFERENCES: Lab manual

TOTAL: 30 Hours