

CC 1- Engineering Math

PAPER CODE-GAM-101

Course Objective: The course is designed to introduce the students to core mathematical concepts of basic analysis, one-variable calculus and linear algebra. The students will then be able to learn more advanced concepts of multi-variable calculus, complex analysis and Laplace transforms, which form the second part of the course. On successful completion of the course, the students will have the requisite mathematical understanding to apply in the design of gaming and mobile applications.

SI	Course Outcome	Mapped modules
1	Remember the concept of basic analysis	M1
2	Remember and understand the analysis of complex numbers	M1, M2
3	Understand the methods of one and several variable calculus	M1, M3
4	Understand and Apply the techniques of linear algebra	M4
5	Understand and Apply the theory of ordinary differential equations	M1, M3, M5
6	Understand and apply the methods of Laplace transforms	M1, M3, M5, M6

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	REAL ANALYSIS	5	10	1	
M 2	ANALYSIS OF COMPLEX VARIABLES	7	15	1,2	
M 3	CALCULUS	22	35	2	
M 4	LINEAR ALGEBRA	8	15	2,3	
M 5	ORDINARY DIFFERENTIAL EQUATIONS	7	15	2,3	
M 6	LAPLACE TRANSFORMS	7	10	2,3	
		56	100		

Credits 5L + 1T

Module 1: REAL ANALYSIS

De Moivre's theorem and roots of complex numbers. Euler's theorem, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses. Convergence and Divergence of Infinite series, Comparison test, d'Alembert's ratio

test. Higher ratio test, Cauchy's root test. Alternating series, Leibnitz test, Absolute and conditional convergence. **(Total hours -5)**

Module 2: ANALYSIS OF COMPLEX VARIABLES

Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Standard mappings – linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeros and Singularities / Taylor series, Laurent series, Calculation of residues. Residue theorem, Evaluation and real integrals. **(Total hours -7)**

Module 3: CALCULUS

Successive differentiation. Leibnitz theorem (without proof) McLaurin's and Taylor's expansion of functions, errors and approximation. Asymptotes of Cartesian curves. Curvature of curves in Cartesian, parametric and polar coordinates, Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardioid, Lemniscate of Bernoulli, equiangular spiral). Reduction Formulae for evaluating. Finding area under the curves, Length of the curves, volume and surface of solids of revolution.

(Total hours -7)

Partial differentiation, ordinary derivatives of first and second order in terms of partial derivatives, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Lagrange's method of undermined multipliers and Jacobians.

(Total hours -8)

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties.

Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stokes' theorem and Gauss divergence theorem (both without proof).

(Total hours 8)

Module 4: LINEAR ALGEBRA

Rank of matrix, Linear transformations, Hermitian and skew – Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalization of a matrix, Eigen values and eigen vectors. Cayley – Hamilton theorem (without proof).

(Total hours -8)

Module 5: ORDINARY DIFFERENTIAL EQUATIONS

First order differential equations – exact and reducible to exact form. Linear differential equations of higher order with constant coefficients.

Solution of simultaneous differential equations. Variation of parameters, Solution of homogeneous differential equations – Cauchy and Legendre forms.

(Total hours – 7)

Module 6: LAPLACE TRANSFORMS

Existence condition for Laplace transform, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and coinvolution theorem. Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

(Total hours – 7)

Readings

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).

2. Jain, R. K. and Iyengar, S. R. K., "Advanced Engineering Mathematics", Narosa, 2003 (2nd Ed.).
3. "Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna publications)
4. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill, 1995.
5. Garg, Reena, Engineering Mathematics-I, Khanna Publishing House, 2017.
6. Garg, Reena & Chandrika, Prasad, Advanced Engineering Mathematics, Khanna Publishing House, 2018.
7. Mitin, V. V.; Polis, M. P. and Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001

CC 2- Paper: Programming using C

Course Objective: This course is designed to introduce the students to the concepts of Creation, development and application of programs and applications. Students will be able to initiate initial *programming* processes and solve complex issues or problems. Students not only will learn how to think, but also how to begin thinking using different logic to solve the program. Besides, by learning the basic programming constructs they can easily be able to grasp any other new computer languages in future.

Sl	Course Outcome (CO)
1	Remember and understand the basic concepts of Computer Fundamentals
2	Remember and understand the concepts of basic programming logic
3	Understand the concepts of I/O, decision making, branching and control statements
4	Understand and apply the ideas of arrays and structures
5	Apply the concepts of string operations
6	Application and analysis of functions, pointers and header files

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2	M1	20%
CO2	1,2	M1, M2	20%
CO3	1,2	M2, M3	20%
CO4	1,2,3	M2, M3, M4	20%
CO5	1,2,3	M2, M3, M4, M5	10%
CO6	1,2,3,4	M2, M3, M4, M5, M6	10%

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THEORY- GAM(T) 102

PRACTICAL- GAM 192

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2	M1	5%
CO2	1,2	M1, M2	10%
CO3	1,2	M2, M3	30%
CO4	1,2,3	M2, M3, M4	20%
CO5	1,2,3	M2, M3, M4, M5	10%
CO6	1,2,3,4	M2, M3, M4, M5, M6	25%
			100

Credits- 4T + 2P

Module 1-Computer fundamentals:

Introduction to components of a computer system: disks, memory, processor, where a program is stored and executed, operating system, compilers. Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation, Number Systems & Binary Arithmetic

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code. **(Total Hours-4)**

Module 2- Programming Basics:

The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

Brief History of Development of C language, Features of C language, Process of compiling and running a C program. Definition of Tokens, variables, Constant, Classification of constants, data types (Primary data types, User defined data types, Derived data types). Different types of Operators (Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special), expressions, type conversion, Operator precedence, associativity rules on operators. **(Total Hours-8)**

Assignments - Write C program to -Implement (main(), printf, scanf) , Print your (name , college name and address), Input an integer number and print it, Input two integer numbers and find sum and difference, Input floating point number and print it, Understand the purpose of header files such as <stdio.h> and <conio.h>

Write C program to - Declare variable of different data types and print them, Implement different types of integer and floating-point constants

Write C program to - Input integer number and apply different arithmetic operators (+,-,*,/,%), Implement ++ and – operators, Implement assignment operators, Implement bitwise operators.**(Total Hours –4)**

Module 3 – Formatted I/o, Decision Making Branching & Looping

scanf() Format code, printf() Format code, reading and writing character variable, character testing functions (isdigit(), islower(), isupper(), tolower(), toupper()). If statement, if..else, Nested if ..else, else if ladder, switch, ternary operator, goto statement (forward and backward jump)

Different types of loop (while, for, do), entry control loop, exit control loop, Applying break and continue within loop **(Total Hours – 6)**

Assignments - Write C programs to - Input character constant and print, Implement scanf() Format code, Implement printf() Format code, Implement isdigit(), islower(), isupper(), tolower() and other functions within <ctype.h>

Write C programs to – Implement relational operators using if statements, implement logical operators using if statements, implement simple if statement, Input two number and find larger number, Input three numbers and find largest, Implement else if ladder, Implement switch ... case, Input two numbers and find larger number using ternary operator, Implement nested ternary operator, Implement pseudo loop using goto statement.

Write C programs to - Implement while loop, Implement for loop, Implement do-while loop, Print all even numbers from 2 to 20, Print all odd numbers from 1 to 30, Print all prime numbers from 1 to 50, Print the first 15 Fibonacci terms, Implement nested loop, Print different number patterns, Apply break statement within a loop, Apply continue statement within a loop, Input a 3-digit number to find sum of digits, Input a 3-digit number and print in reverse order, Find factorial of a number. **(Total Hours – 6)**

Module – 4 Array & Structures

One dimensional array, Two dimensional array, Example using integer and floating array, Concepts of Structure **(Total Hours – 4)**

Assignments - Write C programs to - Implement an array arr[10] scanf value and print, Implement an array arr[10] scanf value and print value in reverse order, Implement an array arr[3][3] scanf value and print values, Find the sum of even and odd numbers within an array separately, Find the row wise sum of an 2-d array arr[4][4]. **(Total Hours – 4)**

Module – 5 String

Character Array, Library functions related to string (strcat(), strcmp(), strcpy(), strlen()) **(Total Hours – 5)**

Assignments - Write C programs to - Implement scan and print string, implement different string functions such as strcat(), strcmp(), strcpy(), strlen() , Note – include <string.h> in the programs. **(Total Hours – 5)**

Module – 6 Function, Pointer and Header Files

Definition, Standard library functions, user-defined functions, recursion, scope of variables in function (auto, extern, static, register). Pointer Definition, pointer expression, pointer to an array, pointer to a function. Definition of Header file, Use of header files, Different header files. **(Total Hours – 7)**

Assignments - Write C program to – Implement different library functions, Implement UDF with no argument and no return type, Implement UDF with argument and no return value, Implement UDF with argument and with return value, Implement UDF with no return value and with return value, Implement auto, extern, static and register variables, Implement chaining of UDF, Implement recursion to find factorial
Write C program to - Implement Pointer, Implement pointer expression, Implement pointer to an array, Implement pointer to a function, implement simple macro, Implement nested macro. **(Total Hours – 3)**

Readings:

1. Problem Solving & Programming in C by R.S. Salaria, Khanna Publishing House
2. Programming in ANSI C by E Balagurusamy
3. Programming With C, Gottfried, TMH
4. The C Answer Book, Tondo, PHI
5. Programming & Problem Solving Through C Language, EXCEL BOOKS
6. Let us C, Yashavant P. Kanetkar, BBP Publications, Delhi

Paper: English Communication

Code: GAM-164

Course Objective: The course is designed to develop the student's communicative competence in English by giving adequate exposure in the four communication skills - LSRW - listening, speaking, reading and writing and the related sub-skills, thereby, enabling the student to apply the acquired communicative proficiency in social and professional contexts.

Sl	Course Outcome	Mapped modules
1	Students will be able to Remember & Understand the basic concepts of the usage of English grammar & vocabulary in communication.	M1
2	Students will be able to Comprehend facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas given in written texts.	M1,M2
3	Students will be able to Synthesise and Apply acquired linguistic knowledge in producing various types of written texts	M1, M3
4	Students will be able to Comprehend facts and ideas from aural inputs and Synthesise and Apply acquired linguistic knowledge in giving spoken response	M1, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	Functional grammar & Vocabulary	2	10	1,2	
M 2	Reading Skills	2	20	1,2	

M 3	Writing Skills	8	40	2,3,4,	
M 4	Listening & Speaking Skills	8	30	2,3,4	
		20	100		

Paper: English Communication

Code: GAM 164

Contact Hours / Week: 2L

Credits: 2

Module 1 : Functional Grammar & Vocabulary : Tense: Formation and application; Affirmative / Negative / Interrogative formation; Modals and their usage; Conditional sentences; Direct and indirect speech; Active and passive voice; usage of common phrasal verbs, synonyms & antonyms.

1L + 1T

Module 2 : Reading Skills: Comprehension passages; reading and understanding articles from technical writing. Interpreting texts: analytic texts, descriptive texts, discursive texts; SQ3R reading strategy.

1L + 1T

Module 3 : Writing Skills: Writing business letters - enquiries, complaints, sales, adjustment, collection letters, replies to complaint & enquiry letters; Job applications, Résumé, Memo, Notice, Agenda, Reports – types & format, E-mail etiquette, advertisements

4L + 4T

Module 4 : Listening & Speaking

Listening: Listening process, Types of listening; Barriers in effective listening, strategies of effective listening

Speaking: Presentations, Extempore, Role-plays, GD, Interview

4L + 4T

Suggested readings:

1. Bhatnagar, M & Bhatnagar, N (2010) Communicative English for Engineers and Professionals. New Delhi: Pearson Education.
2. Raman, M & Sharma, S (2017) Technical Communication. New Delhi: OUP.
3. Kaul, Asha (2005) The Effective Presentation: Talk your way to success. New Delhi: SAGE Publication.
4. Sethi, J & Dhamija, P.V. (2001), A Course in Phonetics and Spoken English. New Delhi: PHI.
5. Murphy, Raymond (2015), English Grammar in Use. Cambridge: Cambridge University Press