GOKUL GLOBAL UNIVERSITY
विद्या अनन्तम्
SIDHPUR, GUJARAT

NAAC GRADE A

Faculty of Computer Science & Applications

Paper II

Total Marks: 100

Ph.D. Coursework Examination Syllabus (Computer Science)

Digital Logic:
Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point).

Computer Organization and Architecture:
Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Programming language concepts:
Programming in C: Data types, Operators, expressions. Flow of control: Control structures, I/O statements, user-defined and built-in functions, parameter passing, arrays, string, structured data types, structures, union, pointers, file management, dynamic memory allocation.

Object oriented Programming Concepts:
Class, object, Inheritance, polymorphism, overloading, virtual/friend class/function, file management.

Data Structures & Algorithms:
Linear/Non-linear data structure and operations on them, Searching/Sorting methods, pre/post/in-fix conversion, tree traversal, graph, time/space complexities.

Analysis of Algorithms:
Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes P, NP, NP-hard, and NP-complete.

Database:
ER-model, relational model (relational algebra, tuple calculus), database design (integrity constraints, normal forms), query languages (SQL), file structures (sequential files, indexing, B and B+ trees), transactions and concurrency control.

Operating System and System Software:
Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU Scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security. System software and application software, layered organization of system software. Assemblers, Macros, Compilers, Cross compilers, Linking and loading, Relocation.

Compiler Design:
Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.