

M.Tech

3) COMPUTER SCIENCE & ENGINEERING G.S-C.S  
Syllabus & Model Question Paper

Syllabus

**Engineering Mathematics:** Mathematical Logic: Propositional Logic, First Order Logic.

Probability: Conditional Probability, Mean, Median, Mode and Standard Deviation, Random Variables; Distributions; uniform, normal, exponential, Poisson, Binomial.

Set Theory & Algebra: Sets; Relations, Functions; Groups; Partial Orders; Lattice; Boolean algebra.

Combinatorics: Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotic.

**Data Structures and Algorithms :** Notion of abstract data types, Stack, Queue, List, Set, String, Tree, Binary search tree, Heap, Graph;

Tree and graph traversals, connected components, Spanning trees, shortest paths; Hashing, Sorting, Searching; Design techniques (Greedy, Dynamic Programming, Divide-and-conquer);

Asymptotic analysis (best, worst, average case) of time and space, Upper and Lower bounds on the complexity of specific problems, NP-completeness.

**Logic Design and Computer Organization :** Logic functions, Minimization, Design and synthesis of Combinational and Sequential circuits; Number representation and Computer Arithmetic (fixed and floating point); Machine instructions and addressing modes, ALU and Data-path, hardwired and micro-programmed control, memory interface, I/O interface (Interrupt and DMA mode), Serial communication interface, Instruction pipelining, Cache main and secondary storage.

**Formal Languages and Automata Theory :** Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Un-decidability;

**System software :** Lexical analysis, Parsing, Syntax directed translation, Runtime environment, Code generation, linking (static and dynamic);

**Operating Systems :** Classical concepts (concurrency, synchronization, deadlock), Processes, threads and Inter-process communication, CPU scheduling, Memory

management, File systems, I/O systems, Protection and security.

**Databases** : Relational model (ER-model, relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B+ trees), Transactions and concurrency control;

**Computer networks** : ISO / OSI stack, Data encoding and transmission, data link control, sliding window protocols, LAN architecture, LAN systems, Ethernet, Token ring, routing protocols, Packet switching, Network devices - switches, gateways, TCP / UDP, application layer protocols and systems (http, smtp, dns, ftp), network security.

**Web technologies** : Three tier web based architectures; JSP, ASP, J2EE, .NET systems; html, XML

### Model Question Paper

#### PART - I

Each question carries One Mark  
Marks

50 x 1 = 50

1) Six boys and six girls sit in a row randomly. The probability that the boys and girls sit alternatively is:

- a)  $\frac{1}{462}$       b)  $\frac{7}{462}$       c)  $\frac{2}{462}$       d) None of these

2) Which one is not Divide and Conquer algorithm?

- a) Merge sort      b) Quick sort  
c) Heap sort      d) None of the above

3) Which of the following Boolean algebra expression is incorrect?

- a)  $A+0 = A$       b)  $A \cdot 1=1$   
c)  $A + A' = 1$       d)  $A \cdot A'=1$

4) A hub-in network is

- a) a multiport signal repeater or concentrator  
b) a multiplug like device to allow many computers to be connected  
c) the server which serves every mode  
d) the central power supply

5) What is an ASP?

- a) This is a language
- c) This is a package

- b) This is a scripting language
- d) This is a testing tool

## PART – II

**Each question carries 2 marks**

**25 x 2 = 50 Marks**

1) A four variable Boolean function is given by

$F(w,x,y,z) = \sum(1,2,3,4,5,6,7,8,9,10,11,12,13) + \sum d(0,14,15)$  the simplified form of this function is

- a) W
- b) 0
- c) 1
- d)  $wxy + wxy$

2) If in a point-to-point network, 5 systems require 10 connections then how many connections are required for connecting 10 devices so that each device can communicate with another

- a) 100
- b) 20
- c) 45
- d) 30

3) In sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain at least 3 defective parts?

- a) 0.332
- b) 332
- c) 0.323
- d) 323

4) The value of 6 to base 8 when expressed as a Gray code is

- a) 0011
- b) 0101
- c) 1010
- d) 1100

5) The Group  $(z, *)$  where  $a*b = a+b+7$ , find  $(-7)^{-1}$

- a) 7
- b) 1/7
- c) -7
- d) -1/7