



**GITAM INSTITUTE OF TECHNOLOGY**  
**GITAM UNIVERSITY**  
(Estd.u/s 3 of UGC Act, 1956)  
**Accredited by NAAC with 'A'Grade**  
Rushikonda, Visakhapatnam-530 045(AP)

---

**GITAM Ph.D. Admission Test -2017**

**COMPUTER SCIENCE & ENGINEERING**  
**and**  
**INFORMATION TECHNOLOGY**  
**SYLLABUS**

**Part A: Research Methodology**

What is Research; Definitions, Research Process, Reasons for doing research, Outcome of Research, Sources of Research Ideas, Innovative Research, steps in Developing and Refining Research Problems, Basic vs applied research, Literature survey. Experimental Research, Experimental skills; Data analysis; Modeling skills Technical writing; Technical Presentations; Creativity in Research; Group discussion on Ethics in Research

**Part B:**

**DIGITAL LOGIC DESIGN:**

Logic functions, minimization, design and synthesis of combinatorial and sequential circuits, number representation and computer arithmetic (fixed and floating point).

**COMPUTER ORGANIZATION:**

Machine instructions **and addressing** modes, ALU and control, memory interface, I/O interface (interrupt and instruction pipelining, cache, main and secondary storage.data path, hardwired and micro programmed DMA mode), serial communication interface,instruction pipelining, cache, main and secondary storage.

**DATA STRUCTURES AND ALGORITHMS:**

The 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, divide and conquer, Algorithm design by induction), asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes – P, NP, NP-hard, NP-complete.

**OPERATING SYSTEMS:**

Classical concepts (concurrency, synchronization, deadlock), processes, threads and interprocess communication, CPU scheduling, memory management, file systems, I/O systems, protection and security, shell programming.

**SOFTWARE ENGINEERING:**

Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

**DATABASE MANAGEMENT SYSTEMS:**

E-R diagrams, relational model, database design, integrity constraints, normal forms, query languages (SQL), file structures (sequential, indexed), b-trees, transaction and concurrency control.

**DATA COMMUNICATION AND NETWORKS:**

ISO/OSI stack, transmission media, data encoding, multiplexing, flow and error control, LAN technologies (Ethernet, token ring), network devices – switches, gateways, routers, ICMP, application layer protocols – SMTP, POP3, HTTP, DNS, FTP, Telnet, network security – basic concepts of public key and private key cryptography, digital signature, firewalls.

\*\*\*\*\*

# COMPUTER SCIENCE & ENGINEERING and INFORMATION TECHNOLOGY

## Model Paper for Ph.D. Admission Test

### Part – A: Research Methodology

Max Marks: 80

#### Summary, Writing and Citation Style

20 Marks

Given checklist about Typographical, Plagiarism, References and Technical Content guidelines, write a summary (in 200 words) about your proposed research area of interest.

#### Multiple Choice Questions 20 Questions with 3 Marks Each

60 Marks

##### Sample Questions

Q1) Assuming no modelling error, what is the effect of SNR on the quality of parameter estimates?

- a) High value leads to poor estimates
- b) High value leads to good estimates
- c) Low value leads to poor estimates
- d) None

Q2) In general, which of the following is used for linearizing a non-linear function?

- a) Taylor's series expansion
- b) Power series expansion
- c) Fourier series expansion.
- d) None of the above

Q3) Identify the methods for doing research

- a) Transformation of facts
- b) To test or disprove a theory
- c) To come out with a better way
- d) Information gathering

### Part – B: Computer Science & Engineering and Information Technology

Max Marks: 80

Twenty Questions: Marks = 1 x 20 = 20

20 Marks

1. Normalization of database is essential to

- (i) avoid accidental deletion of required data when some data is deleted
- (ii) eliminate inconsistencies when a data item is modified in the database
- (iii) allows storage of data in a computer's disk
- (iv) use a database management system

- (a) i and iii                      (b) i and ii  
 (c) ii and iii                      (d) ii and iv

2. Which of the following sorting algorithms can be used to sort a random linked list with minimum time complexity?

- a) Merge Sort                      b) Heap Sort                      c) Quick sort                      d) Insertion

3. A process executes the code. How many child processes are created

```
fork()
fork()
fork()
```

- a) 3                      b) 5                      c) 7                      d) 8

4. The truth table represents the following function

X	Y	F(X,Y)
0	0	0
0	1	0
1	0	1
1	1	1

- a) X                      b) Y                      c) X+Y                      d) X xor Y

5.  
 6..  
 .  
 .  
 .  
 20

**Twenty Questions: Marks = 3 x 20 = 60**

**60 Marks**

1. The grammar  $S \rightarrow aSa \mid bS \mid c$  is

- a) LL(1) but not LR(1)                      b) LR(1) but not LL(1)                      c) Both LL(1) and LR(1)  
 d) Neither LL(1) nor LR(1)

2. A n Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization A, and a quarter to Organization B, while retaining the remaining with itself. Which of the following is a valid allocation of addresses to A and B?

a) 245.248.136.0/21 and 245.248.128.0/22  
245.248.128.0/22

b) 245.248.128.0/21 and

c) 245.248.132.0/22 and 245.248.132.0/21  
245.248.132.0/21

d) 245.248.136.0/24 and

3. Consider the CFG with {S,A,B} as the non-terminal alphabet, {a,b} as the terminal alphabet, S as the start symbol and the following set of production rules  
Which of the following strings is generated by the grammar?

S → aB      S → bA  
B → b      A → a  
B → bS      A → aS  
B → aBB     A → bAA

a) aaaabb  
abbbba

b) aabbbb

c) aabbab

d)

4. Pick the best statement for the following program snippet:

```
#include <stdio.h>

int main()
{
    int var; /*Suppose address of var is 2000 */

    void *ptr = &var;
    *ptr = 5;
    printf("var=%d and *ptr=%d", var, *ptr);

    return 0;
}
```

a) It will print "var=5 and \*ptr=2000"  
and \*ptr=5"

b) It will print "var=5

c. It will print "var=5 and \*ptr=XYZ" where XYZ is some random address    d) Compile error

5.  
6.  
7.  
8.  
9.  
....  
20.