

2021
COMPUTER SCIENCE
[HONOURS]
Paper : IX

Full Marks : 80

Time : 4 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **seven** questions: 1×7=7
- What is system call?
 - What is Foreign key?
 - What is context switching?
 - What do you mean by domain of an attribute?
 - What is the most important feature of spiral model?
 - What is data model?
 - What is critical section?
 - What is stress testing?
 - State the disadvantages of using network data model.

[Turn over]

2. Answer any **six** questions: 2×6=12
- What is meta data? Explain with suitable example.
 - What is process? How does it differ from program?
 - What is the utility of fork() system call?
 - What is the difference between Alpha testing and Beta testing?
 - What are the necessary conditions for deadlock?
 - Give an example of a relational schema that is in 3NF but not in BCNF.
 - Differentiate between binary and counting semaphores.
 - What do you mean by the terms cohesion and coupling in the context of software design?

GROUP-AAnswer any **three** questions: 7×3=21

3. Consider the following page reference string :

1, 3, 2, 7, 2, 1, 4, 6, 2, 4, 2, 3, 7, 8, 3, 2

How many page faults will occur for 4 page frames for each of the following algorithms?

- Optimal page replacement

ii) LRU 7

4. a) Write the concept of dense index and sparse index with examples.
b) When is it preferable to use a dense index rather than a sparse index? Explain with suitable example.
c) What is a B-tree? $2+3+2=7$
5. a) What are the functions of Naive user and Database Administrator?
b) Briefly explain the three-layer-architecture of DBMS. What do you mean by Data Independence? $2+(3+2)=7$
6. a) What is software failure? How is it related with fault?
b) What is software reliability? $(3+2)+2=7$
7. a) What are the three main requirements of a solution of a critical-section problem?
b) How the requirements are preserved in Bakery algorithm for multi process solution? $2+5=7$

GROUP-B

Answer any **four** questions: $10 \times 4 = 40$

8. a) What is meant by Software Development Life Cycle (SDLC)?
b) What are the different phases of spiral model? Explain each phase.
c) State the advantages and disadvantages of waterfall model. $2+5+3=10$
9. a) Discuss the insertion anomalies, updation anomalies, and deletion anomalies with respect to normal forms with suitable example. Suggest a method to overcome them. $5+1=6$
b) What is an entity? What are the features of ER-model? Discuss the importance of functional dependency in database design through an example. $1+1+2=4$
10. a) Consider the following set of processes with the length of CPU burst given in milliseconds.

Process	Arrival Time	Burst Time
P ₁	0	5
P ₂	1	2
P ₃	1	4
P ₄	2	2
P ₅	3	3

Draw the Gantt chart for the execution of these processes using following scheduling algorithms and determine the average waiting time for each process :

- i) SJF
- ii) Round Robin (time quantum=2)
- iii) Round Robin (time quantum=3)

- b) Give an example of Derived attributes. Explain why duplicate tables are not allowed in RDBMS. What is database trigger?

$$(2+2+2)+(1+2+1)=10$$

11. Write short notes on any **two** of the following :

$$5 \times 2 = 10$$

- a) B+ tree
- b) Cyclomatic Complexity
- c) Process Control Block

- d) File Processing system vs DBMS.

12. State Producer-Consumer problem. Give a solution to the problem using semaphore. Justify that your solution guarantees mutual exclusion. $2+5+3=10$
13. a) Explain the difference between logical and physical address.
- b) Discuss the demand paging system.
- c) What is compaction? Explain with suitable example.
- d) Describe the actions taken by the operating system when a page fault occurs. $3+2+3+2$