SBCA—(2.1)

2018

Time : 3 hours

Full Marks : 80

Answer **all** questions

All questions carry equal marks

Candidates are required to answer in their own words as far as practicable

(NUMERICAL ANALYSIS AND STATISTICALS METHODS (MATHEMATICS-II))

1. (*a*) Find a real root of the equation $x^3 - 8x - 4 = 0$ correct upto 3 decimal places.

   (*b*) Write a short note on different types of errors in numerical computation.

   Or

   (*c*) Explain Gauss elimination method with suitable example.

(*d*) Solve the following by Gauss-Jordan elimination method :

$$3x_1 + 18x_2 + 9x_3 = 18$$
$$2x_1 + 3x_2 + 3x_3 = 117$$
$$4x_1 + x_2 + 2x_3 = 283$$

2. (*a*) Write short notes on the following :

(*i*) Newton's Forward interpolation method

(*ii*) Newton's divided difference formulae.

(*b*) Calculate $f(0{\cdot}35)$ using the table

x	0·3	0·5	0·6
$f(x)$	0·6179	0·6915	0·7257

Or

(*c*) Calculate by Simpson's 1/3 rule the value of

$$\int_{1{\cdot}2}^{1{\cdot}6} \left(x + \frac{1}{x}\right) dx$$

correct upto 2 significant figures taking 4 intervals.

(*d*) Form the divided difference table for the function given in the table :

x	0	2	4	6	8
y	− 18	6	54	174	414

3. (*a*) Write short notes on :

(*i*) Probability of intersection

(*ii*) Binomial distribution

(*iii*) Sample space

(*iv*) Complement of event.

Or

(*b*) Given $P(A)=0\cdot60, P(B)=0\cdot50, P(A\cap B)=0\cdot20$ compute $P(A\cup B)$, $P(\overline{A\cup B})$, $P(\overline{A\cap B})$, $P(\overline{A}\cap B)$.

(*c*) Prove that $P(A\cap\overline{B})=P(A)P(\overline{B})$.

4. (*a*) Write short notes on :

(*i*) Divisibility

(*ii*) Concepts of prime and convergence in number theory.

Or

(*b*) **What is the application of number theory in problem solving.**

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(COMPUTER ORGANIZATION)

1. (*a*) Simplify the following expression using Boolean Algebra :

(*i*) $AB + A(CD + CD')$

(*ii*) $(BC' + A'D)(AB' + CD')$

(*b*) Simplify the following Boolean function using three variable maps :

(*i*) $F(x, y, z) = \Sigma(0, 1, 5, 7)$

(*ii*) $F(A, B, C) = \Sigma(0, 2, 3, 4, 6)$

Or

(*c*) Explain the difference between combinational circuit and sequential circuit.

(*d*) Explain different type of Flip-Flops.

2. (*a*) Explain with a suitable example for Floating point binary data addition.

(*b*) Explain the flowchart for add and subtract operation.

Or

(*c*) Explain the multiplication algorithm with a suitable example.

(*d*) Explain the flowchart for divide operation.

3. (*a*) Explain the stack organisation process of CPU.

(*b*) What is Program Interrupt ? Write about different types of Interrupts.

Or

(*c*) Explain about Data Transfer and Data Manipulation Instructions with examples.

(*d*) Explain about different type of Instruction Formats.

4. (*a*) Explain the difference between Synchronous and Asynchronous data transfer process.

(*b*) Explain about DMA transfer techniques.

Or

(*c*) Explain the difference between Isolated versus Memory-Mapped I/O.

(*d*) Explain Hand Shaking data transfer technique with diagram.

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The figures in the right-hand margin indicate marks

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(INTRODUCTION TO OPERATING SYSTEMS)

1. (*a*) What is multi-programming ? How is it realized in a single processor system ? Write its merits. 10

   (*b*) What is an interrupt ? How interrupts are handled by an operating system ? 10

   Or

   (*c*) Distinguish between batch processing and time sharing operating systems. 10

   (*d*) What is DMA ? Explain its working ? Write its advantages. 10

2. (*a*) What is a file system ? What are the attributes of a file ? Explain four file operations. 10

(*b*) Write the relative merits and limitations of single-level and two-level directory structures. 10

Or

(*c*) Explain the Indexed Sequential Access file system. Write its merits as compared to a sequential file system. 10

(*d*) What is meant by file protection ? Explain access control mechanism for file systems. 10

3. (*a*) What is a CPU-I/O burst cycle ? What is meant by CPU scheduling ? Distinguish between preemptive and non-preemptive CPU scheduling. 10

(*b*) Compute the average waiting time for the following workload using Round-Robin scheduling with time slice = 4 ms. 10

Process Id	Next CPU Burst time in ms
P1	6
P2	3
P3	10
P4	4

Or

(c) Write the necessary conditions for a deadlock . Explain how a Resource allocation graph can be used to detect a deadlock state. 10

(d) Compute the average turn-around time for the following workload using non-preemptive Shortest-Job-First scheduling. 10

Process Id	Next CPU Burst time in ms	Arrival time
P1	8	0
P2	6	2
P3	10	4
P4	4	6

4. (*a*) What is meant by memory management ? Distinguish between contiguous and non-contiguous memory allocation. 10

(*b*) How does a paging system work ? What is demand paging ? Explain the concept of virtual memory. 10

Or

(*c*) What is a Page fault ? How is it handled ? What is Belady's anomaly ? When is it observed ? 10

(*d*) Compute the number of page faults for the following memory reference string using FIFO and Least-Recently-Used techniques, assuming 3 frames per process. 10

1, 3, 4, 2, 3, 7, 6, 5, 3, 7, 1, 3, 2, 7, 2, 1

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(INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS)

1. (*a*) What is data independence ? Describe.

(*b*) Describe the different components of DBMS and write its advantages.

Or

(*c*) What is data modeling ? Explain by giving one example.

(*d*) What is E-R diagram ? What are the different components used in E-R diagram ? Give one example.

2. (*a*) Define the role of Database Administrator.

(*b*) Describe three levels architecture of DBMS.

Or

(*c*) Define Functional dependency. Write the closure of a set of dependencies.

3. (*a*) What are the different types of database file structure ? State their advantage and disadvantage.

Or

(*b*) What is normal form ? Show the different types of normal form and describe boyce/codd normal form (BCNF).

4. (*a*) What are the different types of operations used in relational database ? Discuss some of them with example.

Or

(*b*) Write short notes on the following :

(*i*) Data Retrieval

(*ii*) Data Structure Diagram

(*iii*) DBTG CODASYL Model

(*iv*) HSAM and HISAM.