SBCS-(2.3)

2017

Full Marks : **80**
Time : **3** hours

*Answer **All** questions.*
All questions carry equal marks.

(COMPUTER ORGANIZATION AND ARCHITECTURE)

1. (a) What is a microprocessor ? Explain the working of a 16 bit microprocessor.

(b) Draw and explain the timing diagram for opcode fetch in a 8 bit microprocessor.

Or

(c) What do you mean by addressing mode ? Explain the different between auto-increment and auto-decrement addressing mode.

(d) What are the different instruction format available. Explain each one.

2. (a) Explain DMA data transfer with neat diagram.

(b) What is meant by interfacing ? Explain the Concept of I/O interfacing.

Or

(c) How you will interface a storage device ? Explain.

(d) Discuss the method of handling prioritised interrupt.

3. (a) Outline the rules used in Boolean algebra.

(Turn over)

(b) Draw the Karnaugh map and simplify the following Boolean expression : $X(A, B, C) = \Sigma(1, 2, 4, 6)$.

Or

(c) Synthesize an AND – OR network for the following Boolean function : $Y = (A.B) + (C.D)$.

(d) Distinguish between AND and NOR gates with logic diagram.

4. (a) Explain the working of Edge-trigged flip-flop.

(b) Draw and explain 4 – bit shift register.

Or

(c) Realize 3 – bit binary counter.

(d) Explain the working principle of parallels adder.

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(NUMERICAL ANALYSIS AND STATISTICAL METHOD)

1. (a) Find the real root of the equation $x^3 - x - 1 = 0$ correct to two decimal places by interative method.

(b) Solve the following equations by Gauss – Jordan method.

$$x + 2y + z - w = -2$$
$$2x + 3y - z + 2w = 7$$
$$x + y + 3z - 2w = -6$$
$$x + y + z + w = 2$$

Or

(c) Find the real root of the equation

$$x^4 - x - 9 = 0$$

By Newton – Raphson method, correct to three decimal places.

(d) Solve by Jacobi iteration method the system

$$8x - 3y + 2z = 20$$
$$6x + 3y + 12z = 35$$
$$4x + 11y - z = 33$$

2. (a) Given Sin 45^o = 0.7071, Sin 50^o = 0.7660
Sin 55^o = 0.8192, Sin 60^o = 0.8660
Find Sin 52^0, using Newton's forward interpolation Formula.

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$

Using Simpson's $^1/_3$ rule taking h $\frac{1}{4}$

Or

(Turn over)

(c) Using Lagrange's Formula, Find the form of the function $f(x)$ given that

X	0	2	3	6
$F(x)$	659	705	729	804

(d) Use trapezoidal rule to evaluate $\int_4^8 \frac{dx}{4}$ Using Four equal Sub-intervals.

3. (a) A bag x contains 2 white and 3 red balls and a bag y contains 4 white and 5 red bills. One ball 5 drawn at random from one of the bags and is found to be red. Find the Probability that it was drawn from bag y.

(b) Six dice are thrown 729 times. How many times do you expect at least three dice to show a five of six ?

Or

(c) In a class of 10 students, 4 are boys and rest are girls. Find the probability that a student selected will be a girl.

(d) Find the mean and variance of the poisson distribution.

4. (a) (i) Prove that, if $a \equiv b \pmod m$ and c is any integer, then $ac \equiv bc \pmod m$

(ii) Prove that the prime factorization of an integer $n > 1$ is unique.

(b) Solve the Linear congruence $345 \equiv 15 \pmod{912}$.

Or

(c) Prove that $n^p - n$ is divisible by p. Where p is a Prime number and for any natural number n.

(d) If a and b are relatively prime then $ax \equiv 1 \pmod m$ has a unique solution otherwise it has no solution.

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(INTRODUCTION TO OPERATING SYSTEM)

1. (a) Explain the different steps of Evolution of operating system.
(b) Explain DMA with neat diagram.

Or

(c) What is an interrupt ? Explain the use of I/O interrupt.
(d) Explain briefly the difference between multi programming and time sharing operating system.

2. (a) What is a file system ? Discuss briefly operation of a file.
(b) Explain different types of file access method.

Or

(c) Discuss in detail of file directory structure.
(d) Describe how a file in protected and accessed in operating system.

3. (a) Define process. Describe the different state of process with transition diagram.
(b) What is Cpu scheduling ? Define FCFS Cpu scheduling algorithm with suitable example.

Or

(c) What is process control Block. Explain the content of process Control Block.

(Turn over)

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(INTRODUCTION TO DATABASE MANAGEMENT SYSTEM)

1. (a) What is a Database ? Explain the advantage of database management system over file management system.

(b) Explain the architecture of DBMS with a neat block diagram.

Or

(c) Draw a ER diagram for a banking enterprise.

(d) What is data independence ? Explain different types of data independence.

2. (a) What is indexing ? Explain three different type of indexing.

(b) What is a file ? Explain different file organization.

Or

(c) Write the difference between sequential and direct access files.

(d) What is hashing ? What is meant by address collision ? How to avoid it ?

3. (a) Define normalization. Explain INF, 2NF using appropriate example.

(b) Explain the basic relational algebra operations sith the symbol used and example for each.

Or

(c) Outline the structure of relational database.

(d) Explain different types of join operation in relational algebra.

4. (a) Explain ACID in detail.

(b) Explain lock based protocol.

Or

(c) Illustrate the principles of Deadlock avoidance and Recovery in database transaction.

(d) What is concurrency control ? How is the implemented in DBMS.
