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COMPUTER SCIENCE (General)

FIRST PAPER

(Revised New Syllabus)

Time : 2 hours

Full Marks : 50

The figures in the margin indicate full marks.

Answer Question No. **1** and *any two* from the rest.

1. (a) Select the correct option (any *five*) : $1 \times 5 = 5$

(i) Which one of the circuits selects one of the several outputs and passes a single input to it?

- (1) Inverter
- (2) Demultiplexer
- (3) Multiplexer
- (4) Decoder

(ii) Which of the following is not an OS?

- (1) Windows XP
- (2) UNIX
- (3) MS Office
- (4) LINUX

- (iii) Transistors were the main components of — computers.
- (1) first generation
 - (2) second generation
 - (3) third generation
 - (4) fourth generation
- (iv) Big O notation is used for expressing
- (1) time complexity
 - (2) order of an equation
 - (3) floating-point numbers
 - (4) overflow
- (v) Which one of the following circuits gives 1 as output when there are odd number of 1's in the input?
- (1) Multiplexer
 - (2) Encoder
 - (3) XNOR
 - (4) XOR
- (vi) Master/slave design for *J-K* flip-flop eliminates
- (1) racing
 - (2) race condition
 - (3) propagation delay
 - (4) parity error

- (vii) Find the odd one out
- (1) $(101)_2$
 - (2) $(5)_{10}$
 - (3) $(2A)_{16}$
 - (4) $(5)_8$
- (b) State true or false : 1×5=5
- (i) A DVD player is a computer.
 - (ii) Mantissa is a part of a BCD number.
 - (iii) A half-adder cannot add more than two bits.
 - (iv) The control unit control all the activities of a CPU.
 - (v) A BAT file is not executable.
2. (a) Explain time and space complexities with suitable examples. 2+2=4
- (b) What do you mean by structured programming? Discuss the features, merits and demerits of structured programming. 2+6=8
- (c) What are pseudocodes? Discuss the importance of using pseudocodes in a programming environment. 2+6=8

3. (a) Explain the importance of binary and hexadecimal number systems in computation. 2+2=4
- (b) Describe with example any method to convert a binary number to its decimal equivalent. Convert $(21625)_{10}$ to its binary equivalent. 4+2=6
- (c) Describe with example any method for binary multiplication. 8
- (d) What is excess notation? 2
4. (a) State and prove De Morgan's laws for Boolean algebra. 4
- (b) For the Boolean expression
 $\overline{A}B\overline{C} + \overline{A}BCD + \overline{A}BC\overline{D} + A\overline{B}\overline{C} + A\overline{B} + ABC\overline{D}$
- (i) Draw the circuit using basic gates.
- (ii) Reduce using Karnaugh map.
- (iii) Draw the reduced circuit diagram. 3+7+2=12
- (c) Explain min-term and max-term with examples. 2+2=4

5. (a) What is the function of a multiplexer? Draw the logic circuit and explain the working of an 8×1 multiplexer. 2+6=8
- (b) What is racing in *J-K* flip-flop? Discuss how edge-triggering eliminates racing. 2+5=7
- (c) Write a short note on ASCII. 5

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SECOND PAPER

(Revised New Syllabus)

Time : 2 hours

Full Marks : 50

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Answer Question No. 1 and any **two** from the rest.

1. Consider the following 4-digit employee numbers :

9614, 5882, 6713, 4409, 1825

Find the 2-digit hash address of each number using (a) the division method, with $m=97$, (b) the mid-square method, (c) the folding method without reversing and (d) the folding method with reversing. 10

2. (a) Write an algorithm to insert and delete elements in a singly linked list.
- (b) What is the difference between array and linked list?

(2)

- (c) Explain the following terms :

(i) Infix expression

(ii) Polish expression

(iii) Reverse Polish expression 10+4+6=20

3. (a) Write an algorithm selection sort-to-sort n elements in ascending order.

- (b) Explain your algorithm on the following data :

10 2 5 8 4 15 11 3

10+10=20

4. (a) Write an algorithm to convert an infix expression to a postfix expression.

- (b) Explain any one file organization technique. 10+10=20

5. (a) Write an algorithm to find an element from a list using binary search.

- (b) Take ten integer numbers and explain your algorithm. 10+10=20
