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North Bengal St. Xavier's College

B I (Three Year G)

Library

Under 1+1+1 System

Rajshahi, Post Box No.-1

Phn.- 735134, Dist.- Jalpaiguri

2018

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) Find the odd one out.

- (1) MS-Windows 7
- (2) MS-Office
- (3) Adobe Photoshop
- (4) CorelDRAW

(ii) Which one of the following languages facilitates structured programming?

- (1) FORTRAN
- (2) C
- (3) BASIC
- (4) COBOL

8MRD/337

(Turn Over)

(iii) Find the odd one out.

- (1) ASCII
- (2) EBCDIC
- (3) Gray code
- (4) Unicode

(iv) A _____ is a sequential circuit.

- (1) multiplexer
- (2) decoder
- (3) full adder
- (4) D flip-flop

(v) Which of the following gates can be used as a controlled inverter?

- (1) AND
- (2) OR
- (3) NOT
- (4) XOR

(vi) Which one of the following numbers does not belong to the octal number system?

- (1) 1011
- (2) 1835
- (3) 777
- (4) 101011

(vii) Master-slave design eliminates _____ in J-K flip-flop.

- (1) racing
- (2) race condition
- (3) clipping
- (4) toggling

(b) State True or False : 1×5=5

- (i) Gray code is non-weighted.
- (ii) Cache memory is faster than registers.
- (iii) $AB + \bar{A}C + BC = AB + \bar{A}C$.
- (iv) An algorithm may have an infinite loop.
- (v) Parity bit is used for error detection.

2. (a) Give a comparative account of different types of computer based on their functionalities. 8

(b) Define a pseudocode. Discuss the essential features of a pseudocode. 2+8=10

(c) Explain the term 'time complexity'. 2

3. (a) Define an algorithm. Discuss the essential features of an algorithm with suitable examples. 2+6=8

- (b) Describe the process of measuring the time complexity of an algorithm with the help of a suitable example. 7

- (c) Write a short note on ASCII or Unicode. 5

4. (a) What is the function of a multiplexer? Draw the logical circuit and explain the operation of a 4×1 multiplexer with the help of a truth table. What is a demultiplexer? $2+8+2=12$

- (b) Reduce the following Boolean expression using K-map : 6

$$F(A, B, C, D) = \sum(0, 1, 2, 3, 4, 5, 10, 11, 15)$$

- (c) Convert $(759)_{10}$ to its octal equivalent. 2

5. (a) What is the demerit of a ripple counter? Describe the construction of a 4-bit synchronous counter. $2+8=10$

- (b) Discuss the design of a 4-bit register having both serial and parallel loading facilities. 10

2018

COMPUTER SCIENCE (General)

SECOND 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. Write an algorithm of insertion sort to sort n elements in descending order. 10

2. (a) What is the difference between array and linked list?

- (b) Write an algorithm to multiply two matrices.

- (c) Write an algorithm to insert and delete elements in a singly linked list. $3+9+8=20$

3. (a) "A stack is a LIFO list." Explain. Write PUSH and POP operations with relevant examples.

- (b) Explain two file organization techniques. $10+10=20$

2017

COMPUTER SCIENCE (General)

FIRST PAPER

(Revised New Syllabus)

Full Marks : 50

Time : 2 hours

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) : 1×5=5

(i) 1 TB = ?

(1) 1024 GB

(2) 1024 MB

(3) 2048 GB

(4) 2048 MB

(ii) Which one of the following is the fastest memory?

(1) Hard disk

(2) Main memory

(3) Cache

(4) Register

(Turn Over)

MR7/340

(2)

4. (a) Explain binary search algorithm along with a suitable example.

(b) Define the following in the context of hashing :

(i) Synonyms

(ii) Overflow

(iii) Collision

(7+4)+9=20

5. (a) Explain the complexity of an algorithm.

(b) Explain the following terms :

(i) Infix expression

(ii) Prefix expression

(iii) Postfix expression

(c) Write bubble sort algorithm to sort n numbers in descending order. 3+9+8=20

8MRD-890/338

(2)

(iii) Which one of the following is non-weighted?

- (1) Binary
- (2) Gray
- (3) Octal
- (4) Decimal

(iv) The consensus theorem of Boolean algebra states that

- (1) $A + \bar{A}B = A + B$
- (2) $AB + \bar{A}C + BC = AB + \bar{A}C$
- (3) $\bar{A} + \bar{B} = \bar{A}\bar{B}$
- (4) $\bar{A}\bar{B} = \bar{A} + \bar{B}$

(v) Which one of the following is a minterm of a Boolean function $f(A, B, C)$?

- (1) $\bar{A}\bar{B}\bar{C}$
- (2) $\bar{A} + BC$
- (3) $(A + \bar{B})C$
- (4) $\bar{A}B + \bar{A}\bar{C}$

(vi) If A, B, C are inputs to a full adder, then the carry is

- (1) $A \oplus B \oplus C$
- (2) $A \oplus B + B \oplus C + C \oplus A$
- (3) $(A \oplus B)C + AB$
- (4) $(A + B)(B + C)(C + A)$

MR7/340

(Continued)

(3)

(vii) Which one of the following is not an output of a four-bit ring counter?

- (1) 0000
- (2) 1000
- (3) 0100
- (4) 0010

(b) State True or False : $1 \times 5 = 5$

(i) MS-Word is an application software.

(ii) An XOR gate can be used as a controlled inverter.

(iii) Big O notation expresses size of a program.

(iv) If the J and K inputs of a JK flip-flop are tied together, it becomes a T flip-flop.

(v) Master-slave JK flip-flop is a combinational circuit.

2. (a) Discuss with the help of a diagram how different types of software maintain hierarchy between the user and the hardware. Explain the various functions of an operating system. $5+7=12$

(b) Discuss the merits and demerits of using pseudocodes in a programming environment. 8

MR7/340

(Turn Over)

(4)

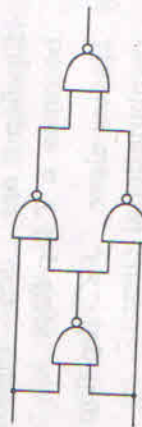
3. (a) Discuss memory hierarchy with the help of a suitable diagram. 6

(b) Give a comparative account of the different representations of negative binary numbers. 9

(c) Write a short note on floating-point numbers. 5

4. (a) What is the function of a decoder? Draw the logical circuit and explain the operation of a 3×8 decoder with enable input. Draw the logical circuit of a 3×8 decoder using 2×4 decoders. $2+7+4=13$

(b) Which gate does the following circuit represent? Justify your answer : 5



(c) Define a maxterm. 2

5. (a) Discuss the design of a 4-bit controlled shift register. 8

(b) Explain racing in a level clocked J-K flip-flop. Discuss how racing can be eliminated with edge triggering. $2+6=8$

(c) Write a short note on multivibrators. 4

MR-780/340

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B I (Three Year G)

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2017

COMPUTER SCIENCE (General)

SECOND PAPER

(Revised New Syllabus)

Time : 2 hours

Full Marks : 50

The figures in the margin indicate full marks.

Answer Question No. 5 and any two from the rest.

1. (a) Transform each of the following infix expressions to prefix and postfix forms :

(i) $A * (B + C) - D / E * F$

(ii) $(P - Q) * R + S * T$

(b) Write an algorithm to convert an infix expression to postfix form. $10+10=20$

2. (a) Write an algorithm to create a queue using linked list.

(b) What is the difference between queue and circular queue?

(c) Explain priority queue. $10+5+5=20$

MR7/341

(Turn Over)

(2)

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) Differentiate between linear search and binary search.

- (b) What is the prerequisite for the binary search?

- (c) Write a note on hashing.

- (d) Explain the complexity of an algorithm.

$3+2+10+5=20$

5. Consider the following 4-digit employee numbers :

9614, 5882, 6713, 4409, 1825

Find the 2-digit hash address of each number using the—

- (a) division method, with $m = 97$;

- (b) midsquare method;

- (c) folding method without reversing;

- (d) folding method with reversing.

10

MR7—780/341

B I (Three Year G)
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2016

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 of the following gates can be used as a controlled inverter?

- (1) AND
(2) OR
(3) NOT
(4) XOR

(ii) _____ is the fastest machine.

- (1) Microcomputer
(2) Minicomputer
(3) Mainframe computer
(4) Supercomputer

RM16/338

(Turn Over)

(iii) Big O notation is used to indicate the _____ of algorithms.

- (1) complexity
- (2) correctness
- (3) completeness
- (4) compatibility

(iv) Which one of the following numbers does not belong to the octal number system?

- (1) 1011
- (2) 1835
- (3) 777
- (4) 101011

(v) If A, B, C, D are Boolean variables, which of the following is not a minterm of these variables?

- (1) $\overline{A}BC$
- (2) $\overline{A}\overline{B}\overline{C}D$
- (3) $\overline{A}BCD$
- (4) $AB\overline{C}D$

(vi) _____ is not a combinational circuit.

- (1) Multiplexer
- (2) Decoder
- (3) Full adder
- (4) Flip-flop

(vii) Master-slave design eliminates _____ in $J-K$ flip-flop.

- (1) race condition
- (2) racing
- (3) clipping
- (4) toggling

(b) State True or False : 1×5=5

(i) FORTRAN is a structured language.

(ii) Gray code is non-weighted.

(iii) Cache memory is faster than registers.

(iv) 1001 is one of the outputs of a 4-bit ring counter.

(v) $AB + \overline{A}C + BC = AB + \overline{A}C$.

2. (a) Give a comparative account of different types of computers based on their functionality. 9

(b) Discuss with a suitable diagram, the hierarchy of various layers of software with respect to the underlying hardware. 8

(c) What do you mean by utility software? Give examples. 2+1=3

2016

COMPUTER SCIENCE (General)**SECOND PAPER**

(Revised New Syllabus)

Full Marks : 50

Time : 2 hours

*The figures in the margin indicate full marks.*Answer Question No. 1 and any **two** from the rest.

3. (a) Define an algorithm. Discuss the essential features of an algorithm. 2+6=8

(b) Explain time complexity and space complexity of algorithms. How are they expressed? Describe the process of measuring time complexity with the help of a suitable example. (2+2)+2+6=12

4. (a) What is the function of a multiplexer? Draw the logical circuit and explain the working of a 4×1 multiplexer with the help of a truth table. What is a demultiplexer? 2+8+2=12

(b) Explain a full adder with the help of a logical circuit and truth table. Design a full adder using half adders. 3+5=8

5. (a) Discuss the circuit and operation of a master-slave $J-K$ flip-flop. What is the need for this type of design? 6+2=8

(b) What is the demerit of a ripple counter? Describe the construction of a 4-bit synchronous counter. 2+8=10

(c) What is the function of an A/D converter? 2

1. Explain binary search algorithm along with a suitable example. 10

2. (a) A stack is a LIFO list. Explain. Write PUSH and POP operations with relevant examples.

(b) Write an algorithm to evaluate a postfix expression.

(c) Explain queue, dequeue and priority queue with proper examples. 8+6+6=20

3. (a) Define the following in the context of hashing :

- (i) Synonyms
- (ii) Overflow
- (iii) Collision

- (b) Explain the complexity of an algorithm.

- (c) What is the difference between array and linked list? State the advantages and disadvantages of linked list over array.

$$9+3+8=20$$

4. (a) Write algorithms to insert and delete elements in a singly-linked list.

- (b) Explain two file organization techniques.

$$10+10=20$$

5. (a) Explain bubble sort algorithm along with a suitable example.

- (b) Explain the following terms :

- (i) Infix expression
- (ii) Prefix expression
- (iii) Postfix expression

$$14+6=20$$

★★★

2015

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 following is the fastest memory?

- (1) Hard disk
- (2) Main memory
- (3) Cache
- (4) Register

- (ii) For which of the following gates the output is 1, when the number of 1's in the input is odd?

- (1) NAND
- (2) NOR
- (3) XOR
- (4) XNOR

(iii) Which one of the following is non-weighted?

- (1) Binary
- (2) Gray
- (3) Octal
- (4) Hexadecimal

(iv) Find the odd one out :

- (1) MS-Windows 7
- (2) MS-Office
- (3) Adobe Photoshop
- (4) CorelDRAW

(v) Which one of the following facilitates structured programming?

- (1) FORTRAN
- (2) C
- (3) BASIC
- (4) COBOL

(vi) Find the odd one out :

- (1) ASCII
- (2) EBCDIC
- (3) UNICODE
- (4) GRAY code

DR15-850/322

(Continued)

(vii) A — is a sequential circuit.

- (1) multiplexer
- (2) decoder
- (3) J-K flip-flop
- (4) full adder

(b) State True or False : 1×5=5

- (i) $A + \overline{A}B = A + B$
- (ii) Edge triggering eliminates racing.
- (iii) Pseudocodes are executable.
- (iv) An algorithm may have an infinite loop.
- (v) Parity bit is used for error detection.

2. (a) Define a pseudocode. Discuss the essential features of a pseudocode. 2+8=10

(b) Discuss the merits and demerits of using pseudocodes in a programming environment. 8

(c) Explain the term 'time complexity'. 2

3. (a) Define primary memory and secondary memory. How is ROM different from RAM? Discuss memory hierarchy with the help of a suitable diagram.

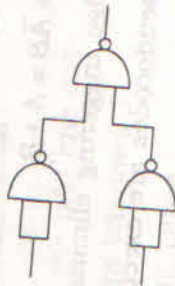
(2+2)+4+6=14

DR15-850/322

(Turn Over)

(4)

- (b) Write a short note on ASCII or UNICODE.
- (c) Convert $(759)_{10}$ to its octal equivalent.
4. (a) Which gate does the following circuit represent? Justify your answer.



- (b) Reduce the Boolean expression

$F(A, B, C, D) = \Sigma(0, 1, 2, 3, 4, 5, 10, 11, 15)$
using K-map.

- (c) What is the function of a decoder?
Discuss the design of a 3×8 decoder with enable input and explain its working with the help of a truth table.

2+6=8

5. (a) Discuss the design of a four-bit register having both serial and parallel loading facilities.
- (b) Design a four-bit ring counter. Mention one application for ring counters. 6+2=8

12

DR15-850/322

B I (Three Year G)
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2015

COMPUTER SCIENCE (General)

SECOND 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. Write and explain bubble sort algorithm along with a suitable example. 10

2. (a) What is the difference between array and linked list?

- (b) Write an algorithm to multiply two matrices.

- (c) Write algorithm to insert and delete elements in a singly linked list. 3+9+8=20

DR15-850/323

(Turn Over)

3. (a) Write an algorithm to convert an infix expression to postfix expression.
 (b) Convert the following infix expression into postfix expression using stack :

$$(A + B) - (C * D / E + F)$$

$$10 + 10 = 20$$

4. (a) Write an algorithm to create a queue using linked list.
 (b) What is the difference between queue and circular queue?
 (c) Explain linear searching method with a suitable example.

$$10 + 3 + 7 = 20$$

5. (a) Sort the following data using selection sort algorithm :

8 3 6 4 15 2 10 6

- (b) Explain random file organisation technique.

$$10 + 10 = 20$$

2014

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 following is closest to the hardware?

- (1) Operating system
- (2) Compiler
- (3) Loader
- (4) Linker

(ii) Pseudocodes

- (1) are executable but do not have syntax
- (2) are not executable but have syntax
- (3) are executable and have syntax
- (4) are not executable and do not have syntax