

7. Explain bubble sort technique with algorithm-Use bubble sort algorithm to sort the following list of numbers :

70, 30, 40, 10, 80, 20, 60, 50.

**UNIT - IV**

8. (a) Solve the recurrence relations subject to given initial conditions :

$$a_n = 5a_{n-1} - 6a_{n-2}, \text{ for } n \geq 2 \text{ with } a_0 = 7, a_1 = 15$$

- (b) Using Principle of mathematical induction, prove that for all  $n \in \mathbb{N}$ ,  $9^n - 8^n - 1$  is divisible by 8.

9. (a) Find the g.c.d of 595 and 252 and express it in the form  $252m + 595m$ .

- (b) Decrypt the message "YZW WKH ERPE" which is encrypted by the formula  $p + 3 \pmod{26}$ .

Roll No. ....

**97667**

**BCA 2nd Semester  
Examination – April, 2018**

**MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

Paper : BCA-108

Time : Three Hours ]

[ Maximum Marks : 80

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt five questions in all. Question No. 1 is **compulsory** and attempt **four** more questions by selecting **one** question from each Unit. All questions carry equal marks.

1. (a) If the mean of 7, 9, 11,  $x$  and 15 is 12, find the value of  $x$ .  
(b) Find the standard deviation of : 11, 14, 15, 17, 18.  
(c) Define Big-O notation.  
(d) Define binary search algorithm.

- (e) Convert the binary number 1101 into decimal number.
- (f) Define complete binary tree with the help of example.
- (g) Find the first four terms of a sequence from the recursive formula  $a_n = 3a_{n-1}$ ,  $n \geq 1$ , with the initial condition  $a_0 = 2$ .
- (h) Define LHRRWCC.

### UNIT - I

2. (a) Find the missing frequencies in the following frequency distribution table, it being given that the mean of this distribution is 50 :

Class in Interval	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	?	32	?	19	120

- (b) Find the median of the following frequency distribution : <http://www.HaryanaPapers.com>

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	15	17	19	27	19	12

3. (a) Find the line of regression of  $y$  on  $x$  for the following data :

$x$	10	9	8	7	6	4	3
$y$	8	12	7	10	8	9	6

- (b) Calculate Karl Pearson's Coefficient of Correlation for the following data :

$x$	1	2	3	4	5	6	7	8	9
$y$	7	6	8	10	9	11	12	14	13

### UNIT - II

4. (a) What do you mean by complexity of an algorithm ? Explain the concept of best case and worst case time complexity.
- (b) (i) Write the algorithm to find the roots of a quadratic equation.
- (ii) Write an algorithm to find whether given number is Prime or not.
5. (a) Prove that the degree of any vertex in a simple graph of ' $n$ ' vertices cannot exceed  $n - 1$ .
- (b) Explain isomorphic and homeomorphic graphs with the help of examples.

### UNIT - III

6. (a) What is minimum spanning tree. Explain Kruskal's algorithm for minimum spanning tree with the help of example.
- (b) Convert the following decimal numbers into binary numbers :
- (i) 123.123
- (ii) 74.125

Roll No. ....

**97667**

**B.C.A. 2nd Semester  
Examination – May, 2019**

**MATHEMATICAL FOUNDATION OF COMPUTER  
SCIENCE**

**Paper : BCA-108**

**Time : Three Hours ]**

**[ Maximum Marks.: 80**

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Question No. 1 is *compulsory*. Attempt *four* questions by selecting *one* question from each Unit.  
All questions carry equal marks.

1. (a) Find the median of the following series :

25 , 20 , 23 , 32 , 40 , 27 , 30 , 25 , 20 , 10 , 55 , 41

(b) What do you mean by correlation ?

(c) Explain the properties of algorithm.

(d) What is directed graph ?

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- (f) What do you mean by software documentation ? Explain. 2
- (g) What is software evolution ? Explain. 2
- (h) What do you mean by validation and verification ? 2

**UNIT – I**

- 2. (a) What is Software Engineering ? What are the essential characteristics and challenges of software engineering ? Explain. 8
- (b) What do you understand by project scheduling ? Also enumerate the activities involved in project scheduling. 8
- 3. (a) What do you understand by Software Process Models ? Compare waterfall model and spiral model of Software Development. 8
- (b) Explain elaborately the various strategies and steps involved in risk management. 8

**UNIT – II**

- 4. (a) What is Software Requirements Engineering ? Discuss the various requirements engineering processes in detail. 8
- (b) What are software metrics ? Discuss the effect of software metrics on software productivity. 8
- 5. (a) What is Software requirements ? Discuss different types of requirements in detail. 8

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- (b) What do you mean by Software Project Estimation models ? Explain COCOMO model in detail.

8

### UNIT - III

6. (a) What is software design Process ? State its relevance and also discuss the importance of software design Process in software engineering. 8  
 (b) What is Software Reliability ? How does it contribute to software quality ? Explain. 8

7. (a) What is software testing ? How is testing important in software life cycle ? Discuss the objectives of software testing. 8  
 (b) What is computer aided software engineering (CASE) ? What are various types of CASE tools ? Explain. 8

### UNIT - IV

8. (a) What is Software Maintenance ? What is the importance of Software Maintenance ? What are various type of software maintenance ? Discuss in detail. 8  
 (b) What is Software Reuse ? Illustrate the reasons for software reuse. Also discuss the benefits of Software Reuse. 8

7. (a) (i) Convert the decimal number  $(413.75)_{10}$  into binary number.

- (ii) Convert the binary number  $(1001.1101)_2$  into decimal number.

- (b) Explain merge sort and sort these elements by using merge sort 14, 72, 20, 9, 16, 27, 19 in increasing order.

### UNIT - IV

8. (a) Solve the recurrence relation subject to given initial conditions :

$$a_n = 5a_{n-1} - 6a_{n-2}, n > 2, a_1 = 1.5, a_2 = 3$$

- (b) Using principle of mathematical induction, prove that :

$$1 + 3 + 3^2 + 3^3 + \dots + 3^{n-1} = (3^n - 1)/2$$

9. (a) Find the g.c.d. of 190 and 34. Also find  $x$  and  $y$ , if  $\text{g.c.d.}(190, 34) = 190x + 34y$ .

- (b) Solve the congruences :  $342x = 5 \pmod{13}$