FBCS—(1.4)

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

(DATA STRUCTURE)

1. (*a*) Write an algorithm to find factorial of a no. Write the time complexity and Big O notation of it.

   (*b*) Write an algorihm to delete an item from specific location of an linear array.

   Or

   (*c*) What is an Algorithm ? Define different notation of algorithm.

(*d*) What is record ? Write in details of structure and indexing the record.

2. (*a*) Convert the following infix notation to postfix using stack

$$Q = ((A + B) * D) \uparrow (E - F) + G$$

(*b*) What is linked list ? Write an algorithm to delete an item from the beginning of the linked list.

Or

(*c*) What is priority Queue ? Write an algorithm to insert an item in a priority Queue.

(*d*) What is circular linked list ? Write an algorithm to create a circular linked list.

3. (*a*) Define Binary tree. Write the recursive algorithm for preorder and inorder traversing of binary tree.

(*b*) What is Binary search tree ? Write an algorithm to search the location of specific node of Binary search tree.

Or

(*c*) What is Threaded Binary tree ? Define different types Threaded Binary tree with diagram.

(*d*) Construct a Binary search tree with following nodes :

60, 25, 33, 15, 50, 44, 75

Write the linked representation above Binary search tree.

4. (*a*) Define searching and it's type. Explain serial search with suitable example.

(*b*) What is merging ? Write an algorithm to merge the elements of two one dimensional array to third array.

Or

(*c*) What is sorting ? Write an algorithm to sort the element of an linear array according to Bubble sort.

(*d*) **Write an algorithm to search location of an item according to binary search. Write the time complexity and Big O notation of it.**

FBCS—(1.1)

2018

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The figures in the right-hand margin indicate marks

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(ENGLISH FOR TECHNICAL COMMUNICATION)

1. (*a*) Do as directed : 2 × 5

(*i*) If it (rain) we would not play cricket.
(Use correct verb form)

(*ii*) We are not interested _____ your story.
(Use correct preposition)

(*iii*) The thieves have stolen my car.
(Turn into passive)

(*iv*) I (smell) something burning.
(Use correct tense form)

(*v*) Nelson was _____ for his courage.
(Use the correct form of the word fame)

(*b*) Correct the following sentences : 2 × 5

(*i*) He has passed BCA last year.

(*ii*) It is raining since this morning.

(*iii*) I prefer coffee than tea.

(*iv*) Three miles are not a long distance.

(*v*) Neither of the brothers are guilty.

Or

(*c*) Use suitable prepositions : 2 × 5

(*i*) He died _____ overheating.

(*ii*) Let us hope _____ the best.

(*iii*) They agreed _____ my proposal.

(*iv*) The work was done _____ haste.

(*v*) Do not cry _____ spilt milk.

(*d*) Do as directed : 2 × 5

(*i*) I just don't trust a word you say; everything looks so _____ .
(Use appropriate phrasal verb made up/off)

(*ii*) There is no milk to be wasted.
(Change the voice)

(*iii*) He has been appointed the Vice Chancellor. (Correct the sentence)

(*iv*) I (wish) I were a king.
(Use the correct verb form)

(*v*) Water _____ (boil) at 100 °C.
(Use correct tense form)

2. (*a*) Write the synonym and antonym of the following words : 2 × 5

(*i*) Enemy

(*ii*) Cold

(*iii*) Wet

(*iv*) Strong

(*v*) Easy.

(*b*) Substitute the following expressions in one-word : 2 × 5

(*i*) A government by the people, of the people and for the people.

(*ii*) A place where young plants are grown.

(*iii*) That which cannot be seen.

(*iv*) A sound that cannot be heard.

(*v*) A place for books.

Or

(*c*) Transcribe the following words phonetically : 2 × 5

(*i*) Man

(*ii*) Mistake

(*iii*) Prefer

(*iv*) Active

(*v*) Cup.

(*d*) Make two sentences using each of the following words so as to bring out the literal and figurative meaning : 2 × 5

(*i*) Ton

(*ii*) Cat

(*iii*) Apple

(*iv*) Banana

(*v*) Honey.

3. (*a*) Read the passage given below and answer the questions that follow : 4 × 5

Familiar to most people for its medicinal properties, the Neem is recognised by few despite its distinctive curved leaves and annual profusion of star-shaped sweet scented flowers. It is a medium sized or large tree with a straight trunk and evergreen, a native of India, Burma and Sri Lanka.

Young leaves are pale, tender green tinged with rust. These are eaten on New Year days to ward off sickness during the coming year.

Some people to whom the tree is sacred, also festoon fresh leaves across their houses when there is an epidemic of chicken pox to keep evil spirits away when there is a birth or death. Dried leaves put in drawers or cupboards keep out moths and cockroaches. Another use of these 'magic' leaves is in poultice form of healing wounds.

From the yellow fruit is obtained the famous Margosa oil, so effective in the treatment of leprosy and skin diseases. External application of oil from the seed is believed to cure rheumatism. The bark and yield valuable medicines.

Neem timber is beautifully mottled, hard and heavy and is used for ship building, carts and furniture wood. Timber from old trees is so bitter that no insects will attack it.

(*i*) Why is the Neem tree well known ?

(*ii*) How can its leaves be recognised ?

(*iii*) The leaves of the Neem tree are called 'magic' leaves, why ?

(*Continued*)

(*iv*) What is Margosa Oil ? How is it used ?

(*v*) What is advantage of using old Neem timber ?

Or

(*b*) What is Note-Making ? Discuss different methods and importance of Note-Making. 20

4. (*a*) Write a composition in about *250* words on any *one* of the following topics : 20

(*i*) Child labour : A curse for the society

(*ii*) Benefits of Internet

(*iii*) Women Empowerment

(*iv*) Pollution.

Or

(*b*) Write a letter to the editor of a newspaper making a public appeal not to misuse water in towns and cities with suggestions to check the same. 20

2018

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(MATHEMATICS AND NUMERICAL ANALYSIS)

1. (a) Define tautology and verify that $(p \to q) \to [(q \to r) \to (p \to r)]$ is a tautology or not.

(b) Prove that $1^3 + 2^3 + 3^3 + \cdots \ldots \ldots \ldots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$, n∈N by using mathematical induction.

Or

(c) (i) Show that $A - (BUC) = (A - B) - C$.
(ii) Show that $B - \bigcup_{i=1}^{n} A_i = \bigcap_{i=1}^{n} (B - A_i)$.

(d) Define composite function. Find out the value of $g\ of\ (\frac{\pi}{3})$ if $g(x) = x^2 - 2$ and $f(x) = sinx$.

2. (a) Solve the following equations by using matrix method :
$x + 2y - 3z = 4,\quad 2x + 4y - 5z = 12,\quad 3x - y + z = 3$

b) Find the Eigen value and Eigen Vector of the matrix
$\begin{pmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{pmatrix}$

Or

(c) (i) How many 5 – digit odd numbers with district digits can be formed with the digits 0, 1, 2, 3, and 4 ?
(ii) Find m and n if $P(m + n, 2) = 56,\ P(m - n, 2) = 12$.

(Turn over)

(d) (i) In how many ways can a student choose 5 courses out of 9 courses if 2 courses are compulsory ?

(ii) A bag contains 4 Black and 5 White balls out of which 6 balls are drawn arbitrarily. Find the number of ways such that at least 3 black balls can be drawn.

3. (a) If H is a non-empty finite set of a group G and H is closed under multiplication, then Prove that H is a subgroup of G.

(b) If H is a subgroup of the Group G, then prove that for $a, b \in G$, the relation $a \equiv b \mod H$ is an equivalence relation.

Or

(c) Prove that a Subgroup N of G is a normal subgroup of G if and onluy if the product of two rights cosets of N in G is also a right coset of N in G.

(d) Prove that every permutation is the product of 2 – cycles and give an example.

4. (a) Let $B = (S, +, ., ', 0, 1)$ be a Bolean algebra, then prove that (i) $(x + y)^1 = x^1 y^1$ and (ii) $(xy)^1 = x^1 + y^1$

(b) Define the following :

(i) Graph (ii) Simple graph (iii) Loop (iv) Directed graph

Or

(c) Find the dual of the given Boolean expressions :

(i) $(x + y)(x + 1) = x + xy + y$

(ii) $(x^1 + y^1)^1 = xy$

(d) If a graph G contains a cycle from v to v, then prove that G contains a simple cycle from v to v.

FBCS—(1.3)

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(INFORMATION TECHNOLOGY APPLICATION)

1. (*a*) Explain the use of different input and output devices.

   (*b*) Briefly discuss the history of computer.

   Or

   (*c*) Describe the basic anatomy of a digital computer with a block diagram.

   (*d*) Explain the working principle of a digital computer.

2. (*a*) Explain the use of following codes :

(*i*) BCD

(*ii*) EBCDI.

(*b*) Multiply (+13) with (+8) using booth algorithm.

Or

(*c*) What is 1's complement ? Perform the following subtraction using 1's complement :

(*i*) 1010 – 1000

(*ii*) 101 – 100

(*d*) How data are represented using hexadecimal number system ? Convert the hexadecimal number (*AB – CD*) to its equivalent octal and binary representation.

3. (*a*) What is an operating system ? Outline the main function of the operating system.

(*b*) Differentiate between multiprogramming and multiprocessing with suitable example.

Or

(*c*) What are library and utility programs ? Write their usage with examples.

(*d*) What is time sharing operating system ? Write its advantage over batch processing.

4. (*a*) Discuss some features of powerpoint to prepare an attractive presentation.

(*b*) Write the steps to create an university database using MS-Access.

Or

(*c*) What is editing ? Discuss different options available for paragraph formatting.

(*d*) How you will handle spreadsheet to use formula and functions ?
