BCA 5th Semester Examination 2019

PAPER —3104

Full Marks : 100

Time : 3 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

*Illustrate the answers wherever necessary*

(*Applied Graph Theory*)

Answer **Q.No. 1** and any **five** questions from the rest

1. Answer any *five* questions :   2 × 5

   (*a*) Define Homomorphic graph with an example.

(b) What is meant by independent set and maximal independent set of a graph ?

(c) What is meant by regularization of a planar graph ? Give an example.

(d) Define walk, path and circuit in a graph.

(e) What is meant by eccentricity ?

(f) Define 1-isomorphic and 2-isomorphic.

(g) What are the application of planar graph ?

(h) Find the chromatic number of a complete graph of n vertices.

2. (i) Find the minimum spanning tree for the following graph using Prim's algorithm.

(*Continued*)
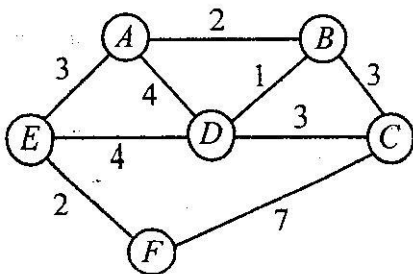
    (*ii*) Prove that the maximum flow in a network is equal to the minimum of capacities of all cut-sets.   6 + 6

3. (*i*) Show that a Hamiltonian path is a spanning tree.

    (*ii*) Prove that in a tree every vertex of degree greater than one is a cut-vertex.

    (*iii*) Prove that a connected Planar graph with n vertices and e edges has $e - n + 2$ regions.   4 + 4 + 4

4. (*i*) Prove that the number of vertices of odd degree in a graph is always even.

    (*ii*) Prove that a connected graph G is an Euler graph if and only if it can be decomposed into circuits.   5 + 7

5. (*i*) With example, explain various types of digraphs.

    (*ii*) How will you find all maximal independent sets ? Explain.   6 + 6

6. (i) Prove that a connected graph G is an Euler graph iff all vertices of G are of even degree.

(ii) Define the dual of a graph G. Prove that a graph G has a dual G if and only if it is planar. 6 + 6

7. (i) Show that starting from any spanning tree of a graph G, every other spanning tree of G can be obtained by successive cyclic inter-changes.

(ii) Prove that the ring sum of any two cut-sets in a graph is either a third cut-set or an edge disjoint union of cut-sets. 7 + 5

[*Internal Assessment* : 30 Marks]

(*Web Design and Application*)

Answer Q.No. 1 and any **four** questions from the rest

1. Answer any *five* questions : 2 × 5

(a) What is internet and WWW ?

(*Continued*)

(b) Give the basic hierarchy of HTML page.

(c) What is IDE ?

(d) Give some examples of deprecated tags.

(e) What is IPV.4 and IPV6 ?

(f) What do you mean by framework ?

(g) How DHTML differs with HTML ?

2. (a) Describe HTML heading levels.

(b) Why metadata is necessary to be described in a HTML web page ?

(c) State the difference between span, margin and padding.   5 + 4 + 6

3. (a) What do you mean by domain and domain name server ? Explain.

(b) What is IP ? How is it connected to internet and its services ?

(c) State the significance of https.

(*d*) Why 127.0.0.1 is called loopback address ?

5 + 4 + 3 +3

4. (*a*) Is there any difference between CSS and CSSP ? Discuss.

(*b*) Briefly explain the types of CSS.

(*c*) What is bootstrap ? State some advantages of using bootstrap. 4 + 6 + 5

5. (*a*) What is URL ? Explain the different parts present as components in the given URL http://www.example.com/blog/students html ? a = xyz.

(*b*) What is WYSIWYG ? Define the following web terminologies : CMS, Hosting, SEO and Blog. 7 + 8

6. (*a*) Enumerate the difference between Java and Java Script.

(*b*) List out the differences between session and cookie.

(*c*) What are Javascript types ? Give an example of each.

(*d*) What is a prompt box ?   3 + 4 + 6 + 2

7. Write short notes on (any *three*) :   5 × 3

(*i*) Web Server

(*ii*) Anchors and URLs

(*iii*)HTML Tags

(*iv*) Planning and Building web sites

(*v*) Search Engine Optimization.

[*Internal Assessment* : 30 Marks]

(*Fuzzy Logic and Neural Network*)

Answer any **five** questions

1. (*a*) Define the term "learning". What is Associative Memory ?

(b) Explain the back propagation training algorithm. $(2 + 2) + 10$

2. (a) What is meant by membership function ? Explain in detail various membership functions of fuzzy logic systems.

(b) Differentiate between classical sets and Fuzzy sets. $(2 + 8) + 4$

3. (a) Explain in detail the architecture of Mc Culloch-Pitts neuron model and also realize 3-input NAND gate and NOR gate using the above neuron model.

(b) Explain Fuzzy composition operations. $(6 + 4) + 4$

4. (a) Explain the following components of Fuzzy logic system :

(i) Fuzzification
(ii) Rule base
(iii) Defuzzification

(b) What is XOR problem ? $(4 \times 3) + 2$

(*Continued*)

5. (*a*) Consider two fuzzy sets *A* and *B* with their membership functions.

$$\mu A(x) = \{0.2, 0.4, 0.8, 0.5, 0.1\} \text{ and}$$
$$\mu B(x) = \{0.1, 0.3, 0.6, 0.3, 0.2\}. \text{ Then}$$

compute

(*i*) $A \cup B$

(*ii*) $A \cap B$

(*iii*) $\overline{A} - B$

(*iv*) $A \cap \overline{B}$

(*b*) Use max-min composition and max-product composition to find the relation $R(x, y)$ given as

$$R(x, y) = \begin{bmatrix} 0.8 & 0.6 & 1 \\ 0.2 & 0.2 & 1 \\ 0.6 & 0.2 & 0.9 \end{bmatrix}$$

$$R(y, z) = \begin{bmatrix} 1 & 0.7 \\ 0.2 & 1 \\ 0.2 & 1 \end{bmatrix}$$

$(2 \times 4) + 6$

6. Write short notes on (any *two*) : 7 × 2

   (*i*) Greg-Viot Fuzzy Cruise controller

   (*ii*) ADALINE Model

   (*iii*) BAM

   (*iv*) Hetro-associate network.

7. (*a*) Differentiate between (any *two*) :

   (*i*) Supervised and unsupervised learning

   (*ii*) Artificial Neural Network and Biological Network

   (*iii*) Feed forward network and Feedback network.

   (*b*) What is tautology ? Explain with the help of example. (5 × 2) + 4

   [*Internal Assessment* : 30 Marks]

   (*Advanced Unix and Shell Programming*)

   Answer **Q.No. 1** and any **four** from the rest

1. Answer any *five* questions :   2 × 5

   (*a*) Which command puts a script to sleep until a signal is received ?

   (*b*) What is the purpose of 'logout' built in command ?

   (*c*) Differentiate line editor and screen editor.

   (*d*) What is the difference between cd and cd.. ?

   (*e*) What is the use of PS command ?

   (*f*) What is wild card ? Mention any one purpose of wild card ?

   (*g*) What is the use of echo command ?

   (*h*) What is the function of TR filter ?

2. (*a*) What are the different ways of using chmod ?

   (*b*) What do you understand by PATH variable ? What is the difference between relative and absolute path ?

(c) What is i-node ? What does it contain ?
$$5 + (2 + 2) + (2 + 4)$$

3. (a) Explain different states of process with a diagram.

(b) Compare kernel mode versus user mode. How does kernel access file ?

(c) Explain mounting and unmounting of a file. $5 + (2 + 3) + 5$

4. (a) Explain UNIX architecture with diagram.

(b) Explain the salient feature of UNIX operating system.

(c) Describe different modes of vi editor.
$$5 + 5 + 5$$

5. (a) Explain the use of grep command.

(b) Write a shell script to display all the file types and file permissions.

(c) What are the similarities between a thread and a process ? $4 + 7 + 4$

(*Continued*)

6. (a) What is filter ? Describe the function of any two filters ?

   (b) Write a shell program to find prime number between x to y (where $x < y$).

   (c) Explain loop control structure available in UNIX. $(2 + 3) + 6 + 4$

7. Write short notes on(any *three*) : 5×3

   (i) Pipe

   (ii) Soft link and hard link

   (iii) IFS

   (iv) LS command.

[*Internal Assessment* : 30 Marks]

(*Mobile Computing*)

Answer any **seven** questions

1. (a) Enlist the applications of Mobile computing.

(b) Show with diagram the steps in a mobile transmitted call in GSM. 5 + 5

2. (a) List out advantages of Snooping TCP.

(b) Write about different Broadcast models.

(c) Compare SDMA, FDMA, TDMA and CDMA. 3 + 3 + 4

3. With a neat diagram, explain the architectural layers of mobile computing. Explain each layer. 6 + 4

4. How the handover decision takes place in GSM depending on receiver signal strength ? Explain. 7 + 3

5. (a) Give the main reason for implementing specialized MAC in wireless networks.

(b) Describe domain dependent specific rules for data synchronization. 5 + 5

6. (a) Explain about the Code Division Multiple Access technique.

(b) Discuss about MANETS.   5 + 5

7. (a) Explain in detail about various ways of performing IP-in-IP encapsulation.

   (b) Explain in detail about Wireless Application protocol with its architecture.   5 + 5

8. (a) How a packet is delivered in Indirect TCP ? Explain. Also discuss the advantages and disadvantages of I-TCP.

   (b) Explain DHCP in details.   5 + 5

9. (a) Discuss the protocol architecture of IEEE 802.11.

   (b) Describe the Bluetooth protocol stack with diagram.   5 + 5

10. Write short notes on (any *two*) :   5 × 2

   (i) IPV6

   (ii) UDP

(*iii*) DAB and DVB

(*iv*) SIM.

[*Internal Assessment* : 30 Marks]

(*Automata*)

Answer any **five** questions

1. (*a*) Convert the Moore Machine into Mealy Machine :

Present State	Next State		Output
	$a = 0$	$a = 1$	
$\rightarrow q_1$	q_1	q_2	0
q_2	q_1	q_3	0
q_3	q_1	q_3	1

(*b*) Construct a DFA accepting all strings w over $\{0, 1\}$ such that the number of 1's in w is 3 mod 4.

(c) Construct a DFA accepting all strings over $\{a, b\}$ ending in ab. $\quad 5+4+5$

2. (a) Show that G is an LR(0) grammar where G be the grammar S → aA, A → Abb|b.

(b) Write the closure properties of languages.

(c) Show that

S → aAb,

A → cAc|c

is not LR(k) for any natural number K.
$$4+6+4$$

3. (a) Prove that the grammar

({s}, {a}, {s → s + s|s * s|a}, s)

is ambiguous.

(b) Design an FA which accepts all strings having 010 or 110 as substring over $\Sigma = \{0, 1\}$.

(c) Show that

$L = \{a^p | p \text{ is prime}\}$ is not regular
$$4+3+7$$

4. (a) Construct a regular grammar accepting $L = \{w \in \{a, b\}^* | w$ is a string over $\{a, b\}$ such that the number of b's is 3 mod 4}.

   (b) Let L be the set of all palindromes over $\{a, b\}$. Construct a grammar G generating L.

   (c) Construct a grammar G generating

   $$\{a^n b^n c^n \mid x \geq 1\}. \qquad 3 + 4 + 7$$

5. (a) Construct an equivalent PDA for the following CFG

   $$S \rightarrow aAB \mid bBA$$
   $$A \rightarrow bS|a$$
   $$B \rightarrow aS|b$$

   Check if the string abbaaabbbab is accepted by the PDA or not.

   (b) Construct a Turing machine that can perform recursion. $\qquad 7 + 7$

6. (a) Show that

   $$L = \{a^p | p \text{ is a prime}\}$$

   is not a context free language.

(b) If G consists of the production

$$S \rightarrow aSa|bSb|aSb|bSa|\Lambda,$$

show that $L(G)$ is a regular set.

(c) Reduce the following grammar to CNF :

$$S \rightarrow ASA|bA,$$
$$A \rightarrow B|S,$$
$$B \rightarrow C$$

$3 + 4 + 7$

7. (a) Write a short note on Universal Turing Machine.

(b) What are the limitations of Mealy machine and Moore machine ?

(c) Distinguish between Deterministic and Non-deterministic FSM's. $6 + 4 + 4$

8. Write short notes on (any *two*) : 7×2

(i) Chomsky's classification of grammar

(ii) Turing Machine

(*iii*) Push-down stack and memory machine

(*iv*) Context free grammar.

[*Internal Assessment* : 30 Marks]

(*Compiler Design*)

Answer **Q.No. 1** and any **four** questions from the rest

1. Answer any *five* questions : 2×5

   (*a*) What is cross-compiler ?

   (*b*) Write down the purpose of code optimization phase in compiler.

   (*c*) What is grammar ?

   (*d*) What is token and pattern ?

   (*e*) What are the function of handler ?

   (*f*) What is Finite Automata ?

   (*g*) What are the functional activity of lexical analyser ?

(*h*) What is ambiguous grammar ?

(*i*) Draw a transition diagram for $(a + b)^*$.

2. (*a*) What is compiler ? What are the important role of compiler ?

(*b*) Write down the phase of compiler. Discuss each phases with suitable example.

$$2 + 3 + 2 + 8$$

3. (*a*) Compute FIRST and FOLLOW set of the following grammar

$$S \rightarrow ACB|CbB|Ba$$
$$A \rightarrow da|BC$$
$$B \rightarrow g|\in$$
$$C \rightarrow h|\in$$

(*b*) Test whether the grammar is LL(1) or not ?

$$S \rightarrow AaAb \mid BbBa$$
$$A \rightarrow \in$$
$$B \rightarrow \in$$

$$(3 + 3) + 9$$

4. (*a*) *What is left Recursive* grammar ? How

eliminate left recursion ? Eliminate left recursion from the following grammar

$$L \rightarrow SA$$
$$A \rightarrow SA | \in$$

(b) What is three address code ? Discuss with a suitable example. $3 + 3 + 4 + 2 + 3$

5. (a) Construct the SLR parser for the grammar

$$E \rightarrow E + T | T$$
$$T \rightarrow T*F | F$$
$$F \rightarrow Id.$$

(b) Write the rules for checking a grammar is LL(1) or not ? $10 + 5$

6. (a) Show that the following grammar is LR(1) but not LALR(1) :

$$S \rightarrow Aa | bAc | Bc | bBa$$
$$A \rightarrow d$$
$$B \rightarrow d$$

(*b*) Consider the following grammar

$$S \to A| \wedge |(T)$$
$$T \to T, S \mid S$$

Can $(a(a, \wedge, (a, a), \wedge))$ be generated from the above grammar ? $\qquad$ 7 + 8

7. Write short notes (any *three*) : $\qquad$ 5 × 3

   (*i*) Parse Tree

   (*ii*) DAG

   (*iii*) Quadruples

   (*iv*) Symbol Table

   (*v*) Left-factoring.

[*Internal Assessment* : 30 Marks]

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