NEW

2016

BCA

5th Semester Examination (Supplementary)

ELECTIVE - I

PAPER—3104

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full 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 *four* from the rest.

1. Answer any *five* questions : 5×2

(a) What is dual graph ?

(b) Write down the properties of a graphs.

(c) What is Hamiltonian circuit ? Give an example.

(d) Define Bipartite graph.

(e) Define trial in a graph.

(f) What is minimally connected graph ?

(g) What is planar graph ?

(h) What is Digraph ?

2. (a) Prove that a tree with n vertices has n-1 edges.

   (b) Prove that a graph G has a dual G if and only if it is planar.

   (c) Show that every simple graph has two vertices of the same degree. 6+6+3

3. (a) Show that a simple graph with n vertics and K components can have almost (n–k) (n–k+1)/2 edges.

   (b) Show that if every component of a graph is bipartite, then the graph is bipartite.

   (c) Prove that the sum of the degrees of the vertics of any finite graph is always even. 6+6+3

4. (a) Prove that a simple graph G is a tree if and only if there is one path between every pair of vertices.

   (b) Prove that a tree has either one or two centre.

   (c) Explain the colouring problem in a graph. 6+5+4

5. (a) What is Euler graph ? Prove that a connected graph is an Euler graph if it can be decomposed into circuits.

   (b) Prove that for any connected planar graph be, $v - e + r = 2$, where v, e and r are the no. of vertices, no. of edges and regions of the graph respectively. (2+6)+7

6. (a) If T is any tree with n verticeo $(n \geq 2)$, then prove that T has at least two pendant vertices.

   (b) Prove that a finite graph is bipartite if and only if it contains no cycle of odd length.

(c) Explain Euler line with a suitable example. 6+6+3

7. (a) Show that vertices of a planar graph with less than 30 edges is 4-colourable.

(b) Prove that every circuit has an even no. of edges in common with any cutset.

(c) What is shortest spanning tree? Write down an algorithm for finding minimum spanning from a graph G. 6+4+5

(Web Design & Application)

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

1. Answer any *five* questions : 5×2

(a) What are the advantages of style sheets?

(b) What is CSSP?

(c) How to change the background colour of a web page?

(d) What is HTML?

(e) What do you mean by WAP?

(f) Write the function of Transport layer.

(g) What is the function of router?

2. (a) Explain the different phases of website design. 6

(b) How to add pictures into a front page? 2

(c) Define event bubbling. 2

3. (a) Write the different types of selectors in CSS. Explain with example. 5

   (b) Briefly explain the layers of Netscape. 5

4. (a) What is DHTML ? How it differs from HTML. 2+4

   (b) Write HTML Code to create a table with three rows & two columns. 4

5. (a) Describe different transmission modes in computer network based on data flow direction. 6

   (b) Write the advantages of star topology over bus topology. 2

   (c) What is Intranet ? 2

6. (a) What do you mean by Type Casting in Java Script ? Why it is required in programming ? 2+3

   (b) Write the merits and demerits of front page. 5

7. (a) How to design ordered and unordered list in HTML. 5

   (b) Create a CSS file applying which, it enables a web page to float in the centre of the screen. 5

8. (a) Write various font properties of CSS. 5

   (b) What do you mean by web services ? What technique do we have to communicate with these web-services. 2+3

9. Write short notes on (any *four*) : $4 \times 2\frac{1}{2}$

(a) IP-address ;

(b) www ;

(c) DNS ;

(d) E-mail ;

(e) HTML ;

(f) FTP.

(Fuzzy Logic & Neural Network)

Answer any *five* questions

1. (a) Define neural computing. Give some example of recurrent and non-recurrent ANN.

(b) Define adaptive system and Generalization.

(c) Compare physical and artificial neuron.

(2+4)+4+4

2. (a) State and prove Perception Convergence theorem.

(b) Write down the differences between single and multilayer perception. 8+6

3. (a) Explain indetails the various linear and non-linear activation functions used in ANN.

(b) Explain the architecture used in Hopfield. 8+6

4. (a) Discuss the features of competitive learning. 4

(b) Write short notes on : 2×5

(i) Delta rule ;

(ii) GDR.

5. (a) Determine whether the statement is tautology or not.

$(p \wedge \sim q) \rightarrow q$

(b) What is fuzzy approximation theorem.

(c) Explain fuzzy possibility and necessity theorem.

4+2+(4+4)

6. (a) Explain back propagation algorithm and derive the expression.

(b) Draw the flowchart of overall GDR procedure. 7+7

7. (a) What is fuzzy logic controller. How it works. 3

(b) Discuss architecture of ANN. 5

(c) Write short notes on : 2×3

(i) Activation function ;

(ii) Learning method.

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(Advanced UNIX and Shell Programming)

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

1. Answer any *five* questions : 5×2

(a) What is the function of $! Command ?

(b) How do you you hide a file in UNIX ?

(c) What do you mean by 'mounting a file system' ?

(d) What are the different kinds of threads ?

(e) If administrator wants to see the password of a user in which directory will he search for it ?

(f) What is GRUB ?

(g) What are block and character devices ?

2. (a) Briefly describe the different run levels in UNIX. 4

(b) Draw a neat block diagram of to represent the system kernal and describe the functions of various modules in it. 8

(c) What do you mean by PATH variable ? 3

3. (a) Describe the mechanism of process creation. 5

(b) How a shell is created ? 3

(c) Where are the security levels available in UNIX ? 3

(d) What are internal and external commands ? 4

4. (a) What are Piping operators ? What is redirection ? Describe different redirection operators. 2+2+3

(b) What is regular expression ? List out the components of it. 4

(c) Differentiate between a line editors and a screen editor. 4

5. (a) What are the main functions performed by UNIX System Administrator ? 5

(b) Why sticky bits are used ? Give an example. 3+2

(c) What do you mean by terminal emulation ? How does it differ with a dumb terminal ? 3+2

6. (a) Write a shell script which receives any year from keyboard and determines whether the year is leap year or not. If no argument is supplied, the current year should be assumed. 7

(b) Write a shell script which gets executed the moment a user logs in. It should display the message "Good Morning" or "Good Afternoon" or "Good Evening" depending upon the time at which the user logs in. 8

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

(a) C Shell ;

(b) IFS ;

(c) Standard input, standard output & standard error ;

(d) Process Control block ;

(e) Positional parameters in UNIX.

(Mobile Computing)

Answer any *seven* questions.

1. (a) What is Mobile computing ?

(b) State and explain the various application of mobile computing.

(c) Define wireless communication. 2+6+2

2. (a) What do you mean by GSM system ?

(b) Briefly explain the architecture of a GSM system.

(c) Define the application of MANET. 2+6+2

3. (a) What is FDMA and TDMA ?

(b) Briefly explain its working and at least one of its important application. 4+(4+2)

4. (a) What are the principle responsibilities of the MAC protocal ?

   (b) How do MAC protocal for wireless networks differ from those in wired network ?

   (c) How UMTs networks are different from 2G network ?

   3+4+3

5. (a) Define MSC ?

   (b) Describe the function of HLR and VLR.

   (c) Explain the need of IMEI number of mobile.

   2+5+3

6. (a) Explain the operation of mobile IP with the help of a suitable schematic diagram and by suitable examples ?

   (b) Describe the concept behind reverse tunneling.

   7+3

7. (a) Briefly explain the mobile TCP.

   (b) What do you mean by snooping ?

   (c) What is adhoc network ? 5+3+2

8. Briefly explain how the mobile cellular communication has evolved over different generation of technology. 10

9. Briefly explain the detailed steps that are being carried when a communication is made between mobile to mobile. 10

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

(a) Application layer ;

(b) WAP ;

(c) GPRS ;

(d) Modulation ;

(e) IEEE 802.11.

(Automata Theory)

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

1. Answer any *five* questions : 5×2

(a) Define NFA.

(b) What is Moore Machine ?

(c) State Anden's theorem.

(d) What is Null production ?

(e) Define content sensitive grammer.

(f) Explain ambiguous grammer with an example.

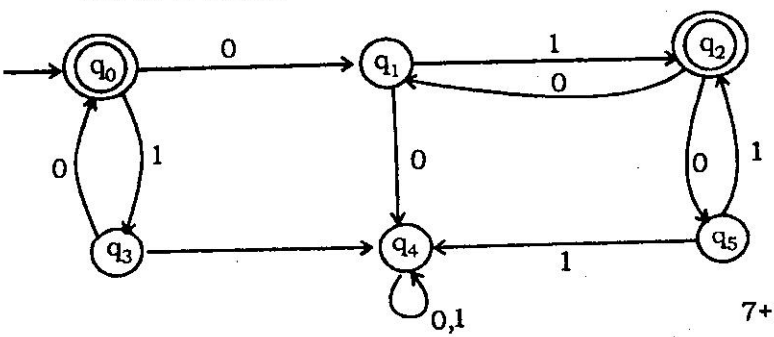
(g) What is recursive set ?

(h) Define GNF.

2. (a) Construct a DFA equivalent to an NDFA whose transition table is defined in the following table :

State	*a*	*b*
q_0	q_1, q_3	q_2, q_3
q_1	q_1	q_3
q_2	q_3	q_2
q_3	—	—

(b) Construct a minimum state automation equivalent to the DFA described in the following diagram :



7+8

3. (a) Find a grammer generating $\{a^j b^n c^n \mid n \geq 1, j \geq 0\}$.

(b) Construct a grammer G accepting all string over {a, b} containing an unequal number at a's and b's.

8+7

(Continued)

4. (a) Construct DFA equivalent to regular expression :

$$(0+1)^* \ (00 + 11) \ (0 + 1)^*.$$

(b) Show that $L = \{0^i \ 1^i \mid i \geq 1\}$ is not regular. 8+7

5. (a) Find a reduced grammer equivalent to the grammer or whose productions are

$S \rightarrow AB / CA$, $B \rightarrow BC / AB$, $A \rightarrow a$ and $C \rightarrow a\ B / b$.

(b) Criven a content free grammer with production $S \rightarrow AB$, $A \rightarrow a$, $B \rightarrow C$, $C \rightarrow D$ $D \rightarrow b$. Eliminate the unit production of obtain an equivalent grammer. 8+7

6. (a) Reduce the following grammer G into CNF where productions of G are $S \rightarrow aAD$, $A \rightarrow aB / bAB$, $B \rightarrow b$, $D \rightarrow d$.

(b) Design a turning machine that accepts $\{0^n \ 1^n \mid n \geq 1\}$. 7+8

7. (a) Construct a grammer a generating L where L is a set of all palindromes over {a, b}.

(b) Construct the finite automata that accepts the following expression :

$$R = a.\ (a + b)^*.\ ab.$$

8+7

(Compiler Design)

Answer any *seven* questions.

1. (a) Explain with an example, the phases of a Compiler.

   (b) What is the basic difference between Compiler and Interpreter ?

   (c) What is source to source compiler ? 7+2+1

2. (a) What is tokens, patterns and lexemes ?

   (b) Differentiate NFA and DFA.

   (c) Construct NFA, equivalent DFA and minimize the DFA for the regular express $(a^*/b^*)^*$. 2+2+6

3. (a) What is ambiguity in grammar ? Explain with an example.

   (b) Check whether the grammer G with production rules : $P \rightarrow PP^* / PP+ / a$ is ambigious or not.

   (c) What is left recursive grammar ? Explain with example. Eliminate left recursion from the grammar :

$S \rightarrow aB \mid aC \mid Sd \mid Sc$

$B \rightarrow bBc \mid f$

$e \rightarrow g$ 2+3+(2+3)

4. Explain in detail the process of compilation. Illustrate the output of each phase of compilation for the input "a = $(b + c)^*$ $(b + c)^*$ $(b + c)^*2$". 10

5. Consider the following grammar.

$S \rightarrow AS \mid b$

$A \rightarrow SA \mid a$

Construct the SLR parse table for the grammar. 10

6. Find the item I_0 for the following grammar using CLR parsing method.

G : $S \rightarrow AS$

$S \rightarrow b$

$A \rightarrow SA$

$A \rightarrow a$ 10

7. Given grammar :

$S \rightarrow (L) \mid a$

$L \rightarrow L, S \mid S.$

(i) Make it suitable for LL (1) parsing.

(ii) Construct FIRST and FOLLOW Sets.

(iii) Construct predictive parsing table.

(iv) Show steps made by the predictive parser on the input (a, (a, a)). 2+3+2+3

8. (a) Explain Concept of syntax directed definition (SDD).

(b) $S \rightarrow EN.$
$E \rightarrow E + T \mid E - T \mid T.$
$T \rightarrow T * F \mid T / F \mid F.$
$F \rightarrow (E) \mid \text{digit}.$
$N \rightarrow ;$

(i) Obtain SDD for the above grammar.

(ii) Construct the parse tree, syntax tree, Annoted parse tree for the input string 5 * 6 + 7. 2+(5+3)

9. Given grammar :

$S \rightarrow AA$
$A \rightarrow Aa \mid b.$

(i) Construct a set of LR (1) items.

(ii) Construct Canonical LR (1) parsing table. 5+5

10. (a) What is parsing? Explain different types of parsing approach.

(b) What is handle pruning? Explain with the help of the grammar :

$S \rightarrow SS+ \mid SS* \mid a$ and input string 'aaa* a++'.

Give a bottom-up parse of the given input string. 3+7

[Internal Assessment : 30 Marks]