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10CS62

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
UNIX Systems Programming

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain the major difference between ANSI 'C' and K and R 'C' with example. **(10 Marks)**
b. Write a C/C++ POSIX compliant program that prints the POSIX defined configuration options supported on any given system using feature test macros. **(08 Marks)**
c. Mention any 4 compile time limits with their values. **(02 Marks)**

2 a. Explain the different types of files in UNIX. **(10 Marks)**
b. Explain the UNIX Kernel support for files. **(10 Marks)**

3 a. Explain the working of the open function with prototype. **(10 Marks)**
b. Write a C++ program to implement following UNIX command i) *ln* ii) mv. **(10 Marks)**

4 a. Write a C/C++ program to demonstrate the use of outexit function. **(10 Marks)**
b. Explain briefly the memory layout of a C program. **(10 Marks)**

PART – B

5 a. What is fork and vfork? Explain with an example program for each. **(08 Marks)**
b. What is zombie process? Write a C program to avoid zombie process by forking twice. **(06 Marks)**
c. Explain the six different forms of exec API. **(06 Marks)**

6 a. What is signal? Explain with a program how to setup a signal handler. **(10 Marks)**
b. What is daemon process? Explain daemon characteristics and relation to session and process groups. **(10 Marks)**

7 a. What are pipes? Write a C/C++ program to send data from parent to child over a pipe. **(10 Marks)**
b. What are FIFO's? With a neat diagram explain the client server communicating FIFO's. **(10 Marks)**

8 a. Explain the following socket programming functions with their prototype:
i) Socket; ii) Connect; iii) Listen; iv) Accept. **(10 Marks)**
b. Explain the different client server connection functions, with example program. **(10 Marks)**

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10CS63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Compiler Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

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PART – A

1 a. Explain the various phases of a compiler with the help of neat diagram. **(08 Marks)**

b. Write the transition diagram along with program code to recognize the token below.
i) Relop (relational operator) ii) Unsigned number **(12 Marks)**

2 a. Give the rules for constructing FIRST and FOLLOW sets. **(08 Marks)**

b. Construct the predictive parsing table by making necessary changes to the grammar given below and show the parsing of string
id + id * id (LL parsing)
$E \rightarrow E + T \mid T$
$T \rightarrow T^* F \mid F$
$F \rightarrow (E) \mid id$ **(12 Marks)**

3 a. What is shift reduce parser? Explain its actions and conflicts by taking an example. **(10 Marks)**

b. Design SLR parser for the following grammar by computing LR(0) items and show the parsing of string ((a))
$A \rightarrow (A) \mid a$ **(10 Marks)**

4 a. Construct CLR parser by finding LR(1) items for the following grammar
$S \rightarrow AA$
$A \rightarrow aA \mid b$ **(12 Marks)**

b. Construct LALR parser for the grammar of Q4(a) using LR(1) items. **(08 Marks)**

PART – B

5 a. Define inherited and synthesized attributes. Give examples. **(06 Marks)**

b. Give the SDD for simple desk Calculator and draw Annotated parse Tree for expression (3+4) * (5+6). **(10 Marks)**

c. Define syntax directed definition for a simple type declaration. **(04 Marks)**

6 a. Construct DAG and three address code for the following expression :
a + a * (b – c) + (b – c) * d **(08 Marks)**

b. Explain the following with an example: i) Quadruples ii) Triples. **(08 Marks)**

c. Generate three address code to the following statement :

```
Switch (ch)
{
 case 1 : C = a + b ; break ;
 case 2 : C = a – b ; break ;
}
```

(04 Marks)

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7 a. With a neat diagram, describe the general structure of an activation record. **(06 Marks)**

b. Explain the strategies for reducing fragmentation in heap memory. **(08 Marks)**

c. Explain briefly the performance metrics to be considered while designing garbage collector. **(06 Marks)**

8 a. Discuss the various issues in the design of a code generator. **(10 Marks)**

b. For the following program segment :

```
for  i  = 1 to 10 do
for   j = 1 to 10 do
    a[i, j] = 0.0
for i = 1 to 10 to
a [ i, j] = 1.0
```

Generate intermediate code and identify basic blocks. **(10 Marks)**

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10IS63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
File Structures

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. What are the three distinct operations that contribute to the total cost of access on disk? **(04 Marks)**

b. Implement UNIX command grep. Display output of your program on standard output. **(06 Marks)**

c. Explain the following functions:
i) Open a file
ii) Close a file. **(10 Marks)**

2 a. What is a record? Explain different methods for organizing records of a file with example. **(11 Marks)**

b. Explain the concept of Inheritance using the I/O buffer class hierarchy. **(06 Marks)**

c. Explain the tools available in UNIX for sequential processing of file. **(03 Marks)**

3 a. Briefly explain with example how spaces can be reclaimed dynamically in fixed length records. **(08 Marks)**

b. Explain the different operations required to maintain indexed file. **(12 Marks)**

4 a. Explain how co-sequential is implemented in a general ledger program. **(10 Marks)**

b. Explain with an example, the K-way merge algorithm. **(10 Marks)**

PART – B

5 a. In detail, discuss paged binary tree. What are its advantages and disadvantages? **(10 Marks)**

b. What is B-tree? Explain deletion, merging and redistribution of elements on B-tree. **(10 Marks)**

6 a. What is indexed sequential access? Explain the block splitting and merging due to insertion and deletion in sequence set with example. **(10 Marks)**

b. With a diagram, explain simple prefix B+ trees and its maintenance. **(10 Marks)**

7 a. Explain the linear probing algorithm with example. **(10 Marks)**

b. What is collision? Explain the process of collision resolution by progressive over flow technique. **(10 Marks)**

8 a. Explain the working of extendible hashing in detail. **(10 Marks)**

b. Write short notes on:
i) Pinned records
ii) Dynamic hashing. **(10 Marks)**

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10CS64

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Computer Networks – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. What is virtual–circuit packet switching? Explain. **(06 Marks)**
b. List and explain the goals of routing algorithms. **(06 Marks)**
c. Explain Bellman-Ford algorithm with example. **(08 Marks)**

2 a. Describe the FIFO and priority queues. **(06 Marks)**
b. What is weighted fair queuing? Explain. **(06 Marks)**
c. Explain Dijkstra's algorithm. Find the shortest path for the below network using Dijkstra's algorithm. **(08 Marks)**

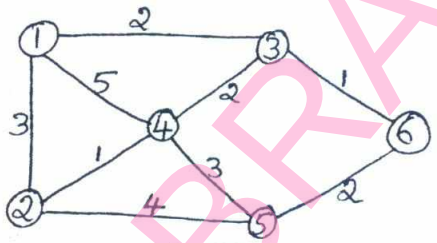

Fig. Q2(c)

3 a. Explain TCP/IP architecture with neat diagram. **(10 Marks)**
b. Describe the IPV6 header format with neat diagram. **(10 Marks)**

4 a. What is OSPF? Explain OSPF operations with aid of diagram. **(10 Marks)**
b. Explain multicast routing with example. **(10 Marks)**

PART – B

5 a. What is the purpose of network management? Explain the characterization of network management. **(06 Marks)**
b. Consider a plaintext message m = 9, get the cipher-text message by using RSA algorithm. Assume that a = 3, b = 11. Also find the public and private keys. **(06 Marks)**
c. What is DNS? Also explain the domain name space and DNS message format. **(08 Marks)**

6 a. Explain the queuing model of leaky – bucket traffic shaping algorithm. **(06 Marks)**
b. Give the significance of differentiated services of QoS. **(06 Marks)**
c. What are VPNs? Explain the types of VPNs and benefits of VPNs. **(08 Marks)**

7 a. What is signal sampling? Explain the sampling process with the types of signal samplings. **(06 Marks)**
b. Explain the SIP components with neat diagrams. **(06 Marks)**
c. Explain the different lossless compression methods with example. **(08 Marks)**

8 a. Explain the different table driven routing protocols used in Ad-hoc networks. **(10 Marks)**
b. Explain DEEP clustering protocol algorithm. **(10 Marks)**

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10CS65

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Computer Graphics & Visualization

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. Discuss the applications of computer graphics. **(04 Marks)**

b. Describe the working of a pen plotter model. Write a code fragment of a simple program in pen plotter that would generate the output shown in Fig. Q1 (b). **(06 Marks)**

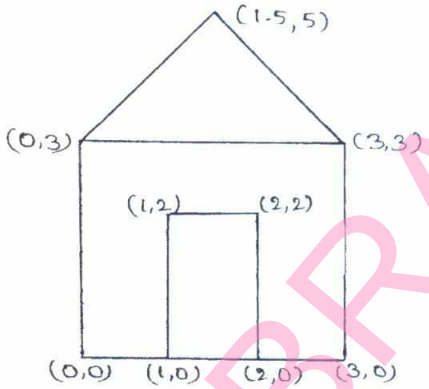

Fig. Q1 (b)

c. Explain the elements of a graphics system, with a neat diagram. **(10 Marks)**

2 a. Write an OpenGL recursive program for 3D Sierpinski Gasket by subdivision of a tetrahedron. **(10 Marks)**

b. Write the different OpenGL primitives, explain each primitive with an example. **(10 Marks)**

3 a. List the three input modes and discuss them with the figures where ever required. **(10 Marks)**

b. Write an OpenGL program to draw a small box at each location on the screen where the mouse cursor is located at the time, that the left button is pressed and right button to terminate the program. **(10 Marks)**

4 a. Explain the procedure of converting a world object frame into camera or eye frame using model view matrix. **(10 Marks)**

b. Explain the following:
i) Affine space.
ii) Vector-vector addition. **(04 Marks)**

c. Given a 2D object with the vertices {(1, 1), (3, 1), (2, 3)}. Rotate this object about the origin by 90°. Calculate the new values by using 2D rotation matrix. Draw the original and the rotated object. **(06 Marks)**

PART – B

5 a. Define and represent the following 3D transformations in homogeneous co-ordinate system:
i) Translation ii) Scaling **(10 Marks)**

b. What is concatenation of transformation? Explain 3D rotation about a fixed point. **(10 Marks)**

6 a. Bringout the differences between perspective and parallel projections. **(06 Marks)**
b. Explain the z-buffer algorithm. **(04 Marks)**
c. Derive the simple perspective projection matrix. **(10 Marks)**

7 a. List and explain different classification of light material interactions. **(10 Marks)**
b. Explain the Phong lighting model. Indicate the advantages and disadvantages of this model. **(10 Marks)**

8 a. Explain Cohen-Sutherland line clipping algorithm with an example. **(10 Marks)**
b. Discuss the Bresenham's rasterization algorithm. **(06 Marks)**
c. Explain antialiasing. **(04 Marks)**

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10IS65

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Software Testing

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

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PART – A

1 a. What are Test cases? Explain approaches used to identify test cases. **(06 Marks)**

b. Explain:
i) Currency converter
ii) Saturn wind shield wiper controller. **(08 Marks)**

c. Briefly explain testing using Venn Diagram. **(06 Marks)**

2 a. Explain Decision table testing and generate test cases for triangle problem using decision table. **(08 Marks)**

b. Develops test cases for commission problem using Boundary value testing. **(06 Marks)**

c. Give the Guidelines and observations for equivalence class testing. **(06 Marks)**

3 a. Explain in detail Basis path testing with respect to triangle problem. **(10 Marks)**

b. Define def/use pair and identify def/use paths for commission problem. **(10 Marks)**

4 a. Explain why it is essential to separate integration and system testing. **(08 Marks)**

b. Define MM path graph. Draw MM paths in SATM system. **(12 Marks)**

PART – B

5 a. Briefly explain process of generating system level SATM test Threads. **(10 Marks)**

b. Explain four basic types of interactions. **(10 Marks)**

6 a. Explain validation and verification. **(06 Marks)**

b. Explain : i) Visibility ii) Feedback iii) Dependability
iv) MTBF v) Availability. **(10 Marks)**

c. Write a short note on Software quality goals. **(04 Marks)**

7 a. What is fault based testing? What are assumptions in fault base testing? **(06 Marks)**

b. Explain : i) scaffolding ii) Test oracles
iii) Capture and Replay iv) Test case specification. **(10 Marks)**

c. Write a note on mock. **(04 Marks)**

8 a. Briefly explain test and Analysis strategies. **(10 Marks)**

b. Explain root cause analysis technique for improving the process. **(10 Marks)**

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10CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operations Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

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PART – A

1 a. What are different phases of operation research? Briefly explain phases of operations research study. **(08 Marks)**

b. Old hens can be brought at ₹50/each but young ones cost ₹100/- each. The old hens lay 3 eggs/week and young ones lay 5 eggs/week. Each egg sold at ₹2/-. A hen costs ₹5/week to feed. If a person has only ₹3000/- to spend for hens. Formulate the problem to decide how many of each kind of hen should he buy? Assume that he cannot house more than 50 hens. **(06 Marks)**

c. Define the following with respect to a LPP. Give example for each :
(i) Feasible solution
(ii) Feasible region
(iii) Infeasible solution **(06 Marks)**

2 a. Solve the following LPP by using graphical method:
Maximize $Z = 5x_1 + 4x_2$
Subject to $6x_1 + 4x_2 \le 24$
$x_1 + 2x_2 \le 6$
$-x_1 + x_2 \le 1$
$x_2 \le 2$
where $x_1, x_2 \ge 0$ **(08 Marks)**

b. What are methods of post optimality analysis of LPP? **(02 Marks)**

c. Solve the following LPP by using Simplex method.
Maximize $Z = 5x_1 + 3x_2$
Subject to $x_1 + x_2 \le 2$
$5x_1 + 2x_2 \le 10$
$3x_1 + 8x_2 \le 12$
where $x_1, x_2 \ge 0$ **(10 Marks)**

3 a. Solve the following by using Big-M method.
Maximize $Z = 6x_1 + 4x_2$
Subject to $2x_1 + 3x_2 \le 30$
$3x_1 + 2x_2 \le 24$
$x_1 + x_2 \ge 3$
where $x_1, x_2 \ge 0$ **(10 Marks)**

b. Solve the following LPP by using Two-phase Simplex method.
Maximize $Z = 5x_1 + 3x_2$
Subject to $2x_1 + x_2 \le 1$
$x_1 + 4x_2 \ge 6$
where $x_1, x_2 \ge 0$ **(08 Marks)**

c. Mention software packages used to solve LPP. **(02 Marks)**

4 a. Solve the following LPP by using revised Simplex method.

Maximize $Z = 2x_1 + x_2$

Subject to $3x_1 + 4x_2 \leq 6$

$6x_1 + x_2 \leq 3$

where $x_1, x_2 \geq 0$ **(10 Marks)**

b. Explain the following terms :

(i) Weak duality property (ii) Strong duality property (iii) Complimentary solution property. **(06 Marks)**

c. Write the dual of the following :

(i) Maximize $Z = 4x_1 + 10x_2 + 25x_3$

Subject to $2x_1 + 4x_2 + 8x_3 \leq 25$

$4x_1 + 9x_2 + 8x_3 \leq 30$

$6x_1 + 2x_3 \leq 40$

where $x_1, x_2, x_3 \geq 0$

(ii) Minimize $Z = 20x_1 + 40x_2$

Subject to $2x_1 + 20x_2 \geq 40$

$20x_1 + 3x_2 \geq 20$

$4x_1 + 20x_2 \geq 30$

where $x_1, x_2 \geq 0$ **(04 Marks)**

PART – B

5 a. Briefly explain about sensitivity analysis. **(05 Marks)**

b. Explain primal-dual relationship with an example. **(05 Marks)**

c. Solve the following by using dual simplex method.

Minimize $Z = 2x_1 + 2x_2 + 4x_3$

Subject to $2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 \leq 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

where $x_1, x_2, x_3 \geq 0$ **(10 Marks)**

6 a. Solve the following transportation problem by using (i) North-West corner method (ii) Vogel's approximation method.

		Destination 1	2	3	4	Supply
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	

(10 Marks)

b. Solve the following assignment problem.

		Subject S_1	S_2	S_3	S_4
Professor	P_1	2	10	9	7
	P_2	15	4	14	8
	P_3	13	14	16	11
	P_4	3	15	13	8

Find the schedule so as to minimize the total subject preparation time for all subjects. **(10 Marks)**

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7 a. Explain following terms with example :
(i) Saddle point (ii) Value of the game (iii) Payoff matrix **(06 Marks)**

b. Solve the following game by dominance principle :

		Player B				
		1	2	3	4	5
Player A	1	2	5	10	7	2
	2	3	3	6	6	4
	3	4	4	8	12	1

(07 Marks)

c. Solve optimally using graphical method by considering the payoff matrix of player A as shown below:

		Player B				
		1	2	3	4	5
Player A	1	3	6	8	4	4
	2	-7	4	2	10	2

(07 Marks)

8 Explain the following terms:
a. Metaheuristics, advantages and disadvantages
b. Tabu search algorithm
c. Genetic algorithm
d. Simulated annealing **(20 Marks)**

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10IS662

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Compiler Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

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PART – A

1 a. Differentiate between computer and Interpreter. List and explain the various phases of a compiler and show the output of each phase for the expression a : = b + c * 25. **(10 Marks)**

b. Explain the technique of input buffering used by the lexical analyser. **(06 Marks)**

c. Construct transition diagram for the following :
   i) Unsigned numbers
   ii) Relational operators. **(04 Marks)**

2 a. Write the algorithm used of eliminating left recursion. Use this algorithm and eliminate left recursion on the given grammar
$S \rightarrow C \mid a$
$C \rightarrow Dd \mid c$
$D \rightarrow Cc \mid d$ **(07 Marks)**

b. Write the "dangling else" grammar and show that it is ambiguous. Rewrite the grammar incorporating the rule "Match each else with the closest unmathed then". **(08 Marks)**

c. List and explain the various error recovery strategies. **(05 Marks)**

3 a. Construct the predictive parsing table for the given grammar
$E \rightarrow TE'$
$E' \rightarrow + E \mid \varepsilon$
$T \rightarrow FT'$
$T' \rightarrow T \mid \varepsilon$
$F \rightarrow PF'$
$F' \rightarrow *F' \mid \varepsilon$
$P \rightarrow (E) \mid a \mid b \mid ep$ **(10 Marks)**

b. Discuss the conflicts that can arise during shift reduce parsing giving one example for each type. Do shift reduce parse for the string (a, (a, a)) and indicate the presence of conflicts if any. Use the given grammar
$S \rightarrow (L) \mid a$
$L \rightarrow L, S \mid S$ **(10 Marks)**

4 a. Show that the following grammar is LR(1).
$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$
$A \rightarrow d$
$B \rightarrow d$ **(10 Marks)**

b. Explain the procedure for the construction of an LA LR parser. **(10 Marks)**

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PART – B

5 a. Define :
   i) Inherited attribute
   ii) Synthesized attribute. **(02 Marks)**

b. Develop the grammar and SDD for a simple desk calculator and show the annotated parse tree for the expression 1 * 2 * 3* (4+5) n. **(10 Marks)**

c. Rewrite the actions of desk calculator SDD so that they manipulate the parser stack explicitly. Illustrate the parser stack implementation. **(08 Marks)**

6 a. Construct a DAG for the arithmetic expression 2* x+y * (2*x – y). Show the steps for constructing the DAG. **(08 Marks)**

b. Generate intermediate code for the statement "if (x < 100 || x > 200 && xi = y) x = 0", along with the required syntax directed translation scheme. Avoid redundant Gotos. **(12 Marks)**

7 a. Show the structure of activation record. Explain the purpose of each item on the activation record. **(08 Marks)**

b. Explain the strategy for reducing fragmentation in heap memory. **(08 Marks)**

c. List and explain the performance metrics to be considered when designing a garbage collector. **(04 Marks)**

8 a. Generate the code for the expression
   X = (a – b) + (a + c) **(04 Marks)**

b. What are basic blocks? Explain the DAG representation of basic blocks. **(08 Marks)**

c. Describe the next use information. Write an algorithm to determine the liveness and next use information for each statement in a basic block. **(08 Marks)**

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