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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
UNIX System Programming

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Discuss the differences between ANSI C and K & R C with example for each.   **(10 Marks)**
    b.   What are the API common characteristics? List any six values of the global variable errno along with their meanings whenever API's fail.   **(10 Marks)**

2   a.   Explain the commands to create different file types supported by UNIX.   **(06 Marks)**
    b.   Explain UNIX Kernel support for files with a neat diagram.   **(08 Marks)**
    c.   Differentiate symbolic links and hard links.   **(06 Marks)**

3   a.   Explain the following general file API's:
         i) open( )   ii) fcntl( )   iii) lseek( )   **(12 Marks)**
    b.   Explain Symbolic Link file API's.   **(08 Marks)**

4   a.   Draw and explain the summary of starting and terminating a C program.   **(06 Marks)**
    b.   With a neat sketch, explain the memory layout of a C-program.   **(06 Marks)**
    c.   Explain exit, _exit and atexit functions with their prototypes.   **(08 Marks)**

PART – B

5   a.   What is a race condition? Write a program for generating race condition.   **(08 Marks)**
    b.   Explain in detail the family of exec functions.   **(12 Marks)**

6   a.   What are signals? Write a program to setup signal handler for the SIGINT signal using sigaction API.   **(06 Marks)**
    b.   What is signal mask of a process? Explain sigprocmask function along with its prototype.   **(06 Marks)**
    c.   Define daemon process. Discuss the basic coding rules of the daemon process.   **(08 Marks)**

7   a.   Discuss the applications of FIFOs.   **(04 Marks)**
    b.   Explain Popen and Pclose functions.   **(06 Marks)**
    c.   Explain different API's used with message queues.   **(10 Marks)**

8   a.   Explain shmget, shmctl, shmat and shmdt functions.   **(12 Marks)**
    b.   Write short notes on client server properties.   **(08 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Compiler Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With the help of a diagram, explain the various phases of a compiler. **(10 Marks)**
   b. What is meant by input buffering? Write an algorithm for look ahead code with sentinels. **(04 Marks)**
   c. Construct transition diagram to recognize the tokens below
      i) identifier   ii) Relational operator   iii) unsigned number. **(06 Marks)**

2 a. With a neat diagram explain the role of a parser. **(05 Marks)**
   b. Explain different error recovery strategies. **(08 Marks)**
   c. Consider the context free grammar $S \rightarrow SS + |SS * | a$
      And the string aa + a*
         i) Give a left most derivation for the string
         ii) Give a right most derivation for the string
         iii) Give a parse tree for the string
         iv) Is the grammar ambiguous or unambiguous? Justify.
         v) Describe the language generated by this grammar
         vi) Remove the left recursion from the grammar?
         vii) Left factor this grammar. **(07 Marks)**

3 a. Given the grammar
      $S \rightarrow a \,|\, (L), \; L \rightarrow L, S \,|\, S$
         i) Do the necessary changes to make it suitable for LL(1) parser
         ii) Check the resultant grammar is LL (1) or not
         iii) Show the moves made by the predictive parser on the input (a, (a, a)). **(12 Marks)**
   b. What is meant by handle pruning? List the actions of a shift reduce parser. Consider the following grammar
      $S \rightarrow TL$;
      $T \rightarrow int \,|\, float$
      $L \rightarrow L, id \,|\, id$ parse the input string int id, id; using shift reduce parser. **(08 Marks)**

4 a. Given the grammar
      $S \rightarrow AA$
      $A \rightarrow Aa \,|\, b$
         i) Construct sets of LR(1) items
         ii) Construct canonical LR(1) parsing table **(12 Marks)**
   b. How LALR parsing table is constructed? Develop an algorithm for the same. **(08 Marks)**

PART – B

5 a. Give the syntax directed definition to process a sample variable declaration in C and construct dependency graph for the input float x, y, z.   **(10 Marks)**

   b. Write the grammar and syntax directed definitions for a simple desk calculator and show annotated parse tree for the expression 3*5 + 4n.   **(10 Marks)**

6 a. Draw the DAG for the arithmetic expression
      a + a * (b – c) + (b – c)*d. Show the steps for constructing the DAG.   **(10 Marks)**

   b. What are three address codes? Explain different ways of representing three address codes, with examples.   **(10 Marks)**

7 a. Distinguish between static scope and dynamic scope. Briefly explain access to non – local names in static scope.   **(10 Marks)**

   b. Explain in detail, the strategy for reducing fragmentation in heap memory.   **(10 Marks)**

8 a. Discuss the following terms :
      i) Basic blocks   ii) Next use information   iii) Flow graph.   **(10 Marks)**

   b. With example, explain common subexpression and dead code elimination methods.

                                       (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Computer Networks – II

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Differentiate between connection oriented and connectionless services. **(04 Marks)**
     b.   Define routing and its goals. **(06 Marks)**
     c.   Explain Dijkstra's algorithm. Consider the network given below in Fig. 1(c). Use the Dijkstra's algorithm to find shortest paths from node 4 to other nodes. **(10 Marks)**
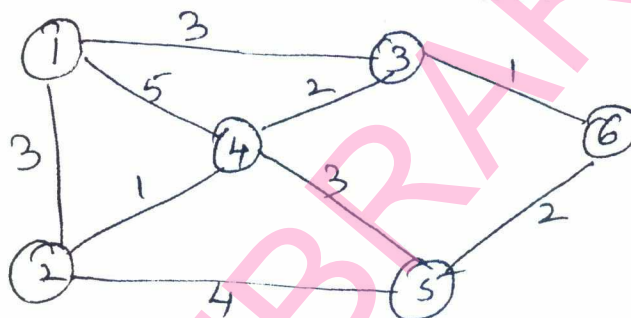

Fig.Q1(c)

2   a.   Explain the FIFO and priority queue scheduling for managing traffic at flow level. **(10 Marks)**
     b.   Define congestion control with graph. Explain the leaky bucket algorithm for policing the traffic at flow level. **(10 Marks)**

3   a.   Explain the IP address classification. Identify the following IP address to which class they belong to :
          i)   200·58·20·165
          ii) 128·167·23·20
          iii) 16·196·128·50
          iv) 150·156·10·10. **(07 Marks)**
     b.   A host in an organization has an IP address 150·32·64·34 and subnet mask 255·255·240·0. What is the address of this subnet? **(06 Marks)**
     c.   Give the format of IPv6 basic header. Compare IPv6 with IPv4. **(07 Marks)**

4   a.   Write a note on :
          i)   IGMP protocol
          ii) Mobile IP. **(10 Marks)**
     b.   Explain the three way handshake for establishing a TCP connection. **(06 Marks)**
     c.   Write a short note on routing information protocol. **(04 Marks)**

PART – B

5   a. Explain the routing table poisoning and denial –of –service attacks.   (08 Marks)
    b. Define network management and explain SNMP and SNMP messages.   (08 Marks)
    c. Differentiate between DES and RSA.   (04 Marks)

6   a. Define MPLS. Explain its operation.   (06 Marks)
    b. Explain the classification of resource allocation schemes.   (06 Marks)
    c. With a neat diagram, explain the differentiated services QoS.   (08 Marks)

7   a. Briefly explain MPEG standards and frame types for compression.   (06 Marks)
    b. With a neat diagram, explain the H·323 components and list the steps in signaling.
                                                                                    (06 Marks)
    c. Explain session initiation protocol (SIP) in detail.   (08 Marks)

8   a. Write short notes on :
        i) Zigbee technology
        ii) Clustering in sensor networks.   (08 Marks)
    b. Briefly explain the direct and multihop routing of intra-cluster routing protocol, with the help of relevant diagrams.   (06 Marks)
    c. Explain sensor node structure with relevant figure.   (06 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Computer Graphics and Visualization

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting*
at least TWO questions from each part.
2. *Support your answer with diagrams wherever necessary.*

PART – A

1   a.   With the aid of neat diagrams, explain the different Graphics architectures supported by graphics API. **(10 Marks)**
    b.   Explain the concept of a pinhole camera. Derive the expression for the angle of view. Also indicate the advantages and disadvantages of the pinhole camera. **(10 Marks)**

2   a.   Write an openGL recursive program for 2D sierpinski gasket with relevant comments. **(10 Marks)**
    b.   List the major groups of API functions in openGL. With examples explain any four of them. **(10 Marks)**

3   a.   What are the major characteristics that describe the logical behavior of an input device? Explain how openGL provides the functionality of each of the classes of logical input devices? **(10 Marks)**
    b.   Discuss the request mode, sample mode and event modes, with the figures wherever required. **(10 Marks)**

4   a.   Differentiate vector space, Euclidian space and affine space. List the geometric objects and associated operations in affine space. Mention the advantages of affine space transformation. **(10 Marks)**
    b.   Explain the different openGL frames embedded in pipeline architecture. **(10 Marks)**

PART – B

5   a.   Derive the 3D matrix representation for translation rotation scaling and shear. **(10 Marks)**
    b.   Derive an expression for the rotation of an object about an arbitrary axis. Give the matrix representation of the concatenated matrix. **(10 Marks)**

6   a.   With diagrams, explain the different projections in classical viewing. Give the advantages and disadvantages of each projection. **(10 Marks)**
    b.   Discuss the following openGL functions:
        i) gluLookAt   ii) gluPerspective   iii) glFrustum   iv) glortho. **(10 Marks)**

7   a.   Explain the Phong Lighting Model. Indicate the advantages and disadvantages of this model. **(10 Marks)**
    b.   Explain different shading models available for shading a polygonal mesh. **(10 Marks)**

8   a.   Explain the Cohen – Sutherland line clipping algorithm. Mention the drawbacks of this algorithm and also mention how it is overcome. **(10 Marks)**
    b.   Explain the following hidden surface removal methods
        i) z – buffer algorithm   ii) Painter's algorithm **(10 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Operations Research

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　　　　 Max. Marks:100

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

PART - A

1　a. Define Operation Research. List and briefly explain the phases of Operations Research.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(08 Marks)

　b. Solve the following LPP by graphical method.
　　Min $Z = 20x_1 + 10x_2$
　　Constraints $x_1 + 2x_2 \leq 40$
　　　　　　　$3x_1 + x_2 \geq 30$
　　　　　　　$4x_1 + 3x_2 \geq 60$
　　　　　　　$x_1, x_2 \geq 0$ 　　　　　　　　　　　　　　　　　　**(06 Marks)**

　c. A farmer has 100 acres of form. He can sell all tomatoes, lettuce or radishes and can raise the price to obtain Re 1.00 per kg for tomatoes, Rs 0.75 ahead for lettuce and Rs 2.00 per kg for radishes. The average yield per acre is 2000kg of tomatoes, 3000 heads of lettuce, and 1000 kgs of radishes. Fertilizers are available at Rs 0.50 per kg and the amount required per acre is 100 kgs each for tomatoes and lettuce and 50 kgs for radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man – days for tomatoes and radishes and 6 man – days for lettuce. A total of 400 man – days of labour are available at Rs 20.00 per man – day. Formulate this problem as a linear programming model to maximize the farmer's total profit. 　　　　　　　　　　　　　　　　　　　　　　　**(06 Marks)**

2　a. Explain 6 basic assumptions of Simplex method. 　　　　　　　　　　　**(06 Marks)**

　b. Solve the following LPP using Simplex method. 　　　　　　　　　　　　**(10 Marks)**
　　Max $Z = 3x_1 + 2x_2 + 5x_3$
　　Constraints $x_1 + 2x_2 + x_3 \leq 430$
　　　　　　　$3x_1 + 2x_3 \leq 460$
　　　　　　　$x_1 + 4x_2 \leq 420$
　　　　　　　$x_1, x_2, x_3 \geq 0.$

　c. Write a brief note on 'Unbounded solution' and 'Infeasible solution' of Simplex method.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(04 Marks)

3　a. Solve using 'Big – M' method.
　　Min $Z = 12x_1 + 20x_2$
　　Constraints $6x_1 + 8x_2 + \geq 100$
　　　　　　　$7x_1 + 12x_2 \geq 120$
　　　　　　　$x_1, x_2 \geq 0.$ 　　　　　　　　　　　　　　　　　　**(10 Marks)**

　b. Solve using '2 – Phase' method.
　　Max $Z = 5x_1 - 4x_2 + 3x_3$
　　Constraints $2x_1 + x_2 - 6x_3 = 20$
　　　　　　　$6x_1 + 5x_2 + 10x_3 \leq 76$
　　　　　　　$8x_1 - 3x_2 + 6x_3 \leq 50$
　　　　　　　$x_1, x_2, x_3 \geq 0.$ 　　　　　　　　　　　　　　　　**(10 Marks)**

4 a. List any 5 differences between Simplex (Primal) and Dual Simplex method. **(05 Marks)**

  b. Give the dual of the following problem

  Max $Z = x + 2y$

  Constraints $2x + 3y \geq 4$

  $\qquad 3x + 4y = 5$; $x \geq 0$, y is unrestricted. **(05 Marks)**

  c. Use 'Revised Simplex method' to solve the following LPP.

  Max $Z = x_1 + 2x_2$

  Constraints $x_1 + x_2 \leq 3$

  $\qquad x_1 + 2x_2 \leq 5$

  $\qquad 3x_1 + x_2 \leq 6$; $x_1, x_2 \geq 0$. **(10 Marks)**

PART - B

5 a. Use 'Dual Simplex method' to solve the following LPP

  Min $Z = 5x_1 + 6x_2$

  Constraints $x_1 + x_2 \geq 2$

  $\qquad 4x_1 + x_2 \geq 4$

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

  b. Solve the following LPP using 'Branch and Bound' technique.

  Max $Z = 7x_1 + 9x_2$

  Constraints $-x_1 + 3x_2 \leq 6$

  $\qquad 7x_1 + x_2 \leq 35$

  $\qquad x_2 \leq 7$

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

6 a. Find an optimal solution after obtaining the IBFS using 'Vogels Approximation method'. **(10 Marks)**

|	W_1	W_2	W_3	W_4	Capacity
F_1	19	30	50	10	07
F_2	70	30	40	60	09
F_3	40	08	70	20	18
Demand	05	08	07	14	34

  b. Solve the given Assignment problem, so that the total cost is minimized. **(10 Marks)**

	M_1	M_2	M_3	M_4
J_1	05	07	11	06
J_2	08	05	09	06
J_3	04	07	10	07
J_4	10	04	08	03

7 a. Use graphical method to solve the following game **(10 Marks)**

$$A\begin{bmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{bmatrix}$$

with B across the top.

  b. A firm owner is seriously considering of drilling a farm well in the past, only 70% of wells drilled were successful at 200 Feet of depth. Moreover on finding no water at 200 Ft., some persons drilled it further upto 250 Ft but only 20% struck water at 250 Ft. The prevailing cost of drilling is Rs 50/Foot. The farm owner estimated that in case he does not get his own wells he will have to pay Rs 15,000 over the next 10 years in PV term, to buy water from the neighbor. The following decisions can be optimal : i) Do not drill any well ii) Drill upto 200 Ft and iii) If no water is found at 200 Ft, drill further upto 250 Ft.

  Draw an appropriate decision tree and determine the farm owner's strategy under Expected Monetary Value (EMV) approach. **(10 Marks)**

8 a. Use Tabu search algorithm to find an optimal solution of the following illustration.
Constraint 1 : Link AD can be included only if link DE also included.
Constraint 2 : At most one of the three links AD, CD and AB can be included. Charge a penalty of Rs 100 if Constraint 1 is violated. Charge a penalty of Rs 100 if two of the three links specified in constraints 2 are included. Increase this penalty to Rs 200 if all the three of links are included. **(10 Marks)**
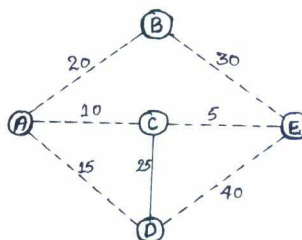
b. Write a brief note on :
   i) Simuted Annealing
   ii) Genetic Algorithm. **(10 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Complier Design

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PART – A

1 a. With a neat diagram, explain the various phases of compiler with example. **(10 Marks)**
   b. Explain the input buffering strategy used in lexical analysis phase. **(05 Marks)**
   c. Write the regular definition for an unsigned number, also write the transition diagram. **(05 Marks)**

2 a. Define left recursion and left factoring? Consider the Grammar :
      $E \rightarrow E + T \mid T$
      $T \rightarrow id \mid id [ ] \mid id [X]$
      $X \rightarrow E, E \mid E$
       i) Eliminate left recursion
       ii) For the obtained result of i) do the left factoring. **(10 Marks)**
   b. Construct LL(1) parsing table for the grammar
      $S \rightarrow aB \mid aC \mid Sd \mid Se$
      $B \rightarrow bBc \mid f$
      $C \rightarrow g$
      and verify the above grammar is LL (1) or not. **(10 Marks)**

3 a. Define Handle and Handle pruning. Consider the grammar :
      $E \rightarrow E + T \mid T$
      $T \rightarrow T * F \mid F$
      $F \rightarrow (E) \mid id$
      Indicate the handle for the following right sentential form $id_1 * id_2$. **(06 Marks)**
   b. With a neat diagram, explain the general structure of LR parser. **(06 Marks)**
   c. Consider the grammar :
      $S \rightarrow L = R \mid R$
      $L \rightarrow *R \mid id$
      $R \rightarrow L$
      Verify the grammar is SLR (1) or not. **(08 Marks)**

4 a. Given the grammar :
      $A \rightarrow (A) \mid a$
      Construct LR(1) set of items, parsing table and also parse the input string ((a)) using canonical LR parsing method. **(12 Marks)**
   b. Write the procedure used to compute LR(1) items using LALR parser. **(04 Marks)**
   c. Write a note on the parser generator - Yacc. **(04 Marks)**

PART – B

5 a. Define synthesized and inherited attributes with examples.   (04 Marks)

   b. Consider the grammar that is used for simple desk calculator. Obtain the semantic action and also the annotated parse tree for the string. $(3 + 4) * (5 + 6)$n

   L → En
   E → E + T
   E → T
   T → T *F
   T → F
   F → (E)
   F → digit.   (10 Marks)

   c. Consider the grammar :

   $T → F T^1$
   $T^1 → * F T^1$
   $T^1 → E$
   F → digit

   Write the semantic action and obtain the dependency graph and the order of execution for the input string $3 * 5$.   (06 Marks)

6 a. Define DAG? Develop SDD to produce DAG for the expression :

   E → E + T
   E → E – T
   E → T
   T → (E)
   T → id
   T → num

   and show the steps for constructing DAG for the expression $a + a * (b – c) + (b – c) * c$.
                                                                                    (12 Marks)

   b. Explain the quadruples, triples and indirect triples for the example $a : = b * – c + b * c$.
                                                                                    (08 Marks)

7 a. Describe the general structure of a activation record. Explain the purpose of each field in the activation record and construct activation tree for Quicksort.   (10 Marks)

   b. Explain Heap management in detail.   (10 Marks)

8 a. Briefly explain the main issues in code generation.   (10 Marks)

   b. Briefly explain any five kinds of code optimization with an example each.   (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Software Testing

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Why do we test software? Discuss what a typical test case information should include. **(07 Marks)**
    b.   Differentiate between black box testing and white box testing. **(05 Marks)**
    c.   Explain the levels of abstraction and testing in the waterfall model. **(08 Marks)**

2   a.   What is boundary value analysis? Write the test cases using boundary value analysis testing for triangle problem. **(07 Marks)**
    b.   Define equivalence class testing. Write weak robust equivalence class testing for commission problem. **(06 Marks)**
    c.   Write the decision table for triangle problem and discuss how well decision table testing deals with multiple fault assumption. **(07 Marks)**

3   a.   Explain metric based testing. **(08 Marks)**
    b.   Using Mc-Cabe's strongly connected graph, write the path/edge traversal. **(09 Marks)**
    c.   Draw the lattice on sales and communication. (Hint slices on sales and commission). **(03 Marks)**

4   a.   Define regression and progression testing. **(04 Marks)**
    b.   Draw the context diagram of the SATM system and explain the same. **(08 Marks)**
    c.   Draw the PIN entry finite machine, explain with corresponding screens. **(08 Marks)**

PART – B

5   a.   What is decomposition–based integration? Explain any one of them with an example. **(07 Marks)**
    b.   Define thread. How do we test them? **(05 Marks)**
    c.   Explain atomic system function testing by taking an example of next date. **(06 Marks)**
    d   What is interaction testing? **(02 Marks)**

6   a.   Validation activities check work product against actual user requirement while verification activities check consistency of work product – justify your answer with suitable diagram and explanation. **(07 Marks)**
    b.   Write six principles which constitute the core of software testing. **(06 Marks)**
    c.   List the goals of quality process. **(04 Marks)**
    d.   Can a system be correct and yet unsafe? **(03 Marks)**

7   a.   Write the fault based testing terminology and assumptions. **(06 Marks)**
    b.   What is scaffolding? What purposes it serves, explain with an example. **(06 Marks)**
    c.   What are test oracles? Explain comparison based oracle. **(05 Marks)**
    d.   Write about a paragraph on any one :
         i) Self-checks on oracles   ii) Capture and replay. **(03 Marks)**

8   a.   Based on test and analysis strategies explain any one :
         i)   Clean room
         ii) Software reliability engineered testing
         iii) Extreme programming. **(07 Marks)**
    b.   Explain risk management in the quality plan. **(10 Marks)**
    c.   What is test and analysis report. **(03 Marks)**

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