[4937]-1001

M.Sc.

COMPUTER SCIENCE

CS - 101 : Principles of Programming Languages

(2013 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1) Attempt any five of the following questions.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

4) Assume suitable data if necessary.

5) All questions carry equal marks.

Q1) Attempt all of the following :   **[4+4+2 = 10]**

a) Explain how non-local objects in lexically surrounding subroutines can be accessed.

b) Explain why ordering within an expression is important.

c) "Compilers attempt to understand their source while preprocessors do not". Justify whether true or false.

Q2) Attempt all of the following: **[4+4+2 = 10]**

a) Explain the reference counter approach to garbage collection. What problems are faced with this approach?

b) Define the following:

   i) Object closure

   ii) Adhoc polymorphism

   iii) Referencing Environment

   iv) Restrict qualifier in C99.

c) What is source to source translation in C++.

Q3) Attempt all of the following: [4+4+2 = 10]

a) Define a lisp function pal to check whether given list is palindrome or not.

b) What is Union? "Unions in 'C' are free unions" Justify whether true or false with suitable example.

c) Define orthogonality in the context of programming language design.

Q4) Attempt all of the following: [4+4+2 = 10]

a) What is pass-by-result model of parameter passing? Explain an actual parameter collision with respect to pass-by-result.

b) How single inheritance is implemented in OOPL?

(Give suitable example and explain).

c) What is l-value and r-value.

Q5) Attempt all of the following: [4+4+2 = 10]

a) Explain the concept of initialization and firalization using a suitable code from C++/Java.

b) Describe the logical architecture of SIMD computer. What level of program concurrency is best supported by SIMD computers?

c) What is Unification in Prolog?

Q6) Attempt all of the following: [4+4+2 = 10]

a) What are monitors? List any two contemporary languages which support monitors.

b) Assume that class D is inherited from class A, B & C, none of which share a common ancestor. Show how data members and v.tables of D might be laid out in memory.

c) "C language does not support array operations". Justify whether true or false.

Q7) Attempt all of the following: **[5+5 = 10]**

    a)   If X is on top of Y, y supports X. If X is above Y and they are touching each other, X is on top of Y. A glass is above a table. A glass is touching a table. "Write a prolog program to prove that table supports glass. Show how it will be answered by your program.

    b)   Explain scope rules and binding rules with suitable example.

Q8) Attempt all of the following: **[5+5 = 10]**

    a)   Write lisp function to remove all occurrences of an atom from a list.

    b)   Explain various parameter passing modes with suitable examples.

✦ ✦ ✦

[4937]-1002

M.Sc.

COMPUTER SCIENCE

CS - 102 : Advanced Networking

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:
   1) *Solve any 5 out of 8 questions.*
   2) *Neat diagrams must be drawn wherever necessary.*
   3) *Figures to right indicate full marks.*

Q1) Attempt all of the following :

   a) "Ethernet has imposed restrictions on both the minimum and maximum length of a frame. Comment on the above statement. **[4]**

   b) By using playfair technique, convert the following plaintext message into cipher text. **[4]**

   Plain Text : YELLOW CHILLIES

   Key word : RESTAURANT

   c) Explain what is transient cink in OSPF terminology? **[2]**

Q2) Attempt all of the following:

   a) Write a note on fragmentation in IP datagram. Which fields are related to fragmentation is IPv4 datagram? **[4]**

   b) What is the basic principle of DES? Explain key transformation and expansion permutation steps of DES in brief. **[4]**

   c) What is biometric authentication? **[2]**

Q3) Attempt all of the following:

a) Explain three primary steps involved in the working of kerberos protocol. **[4]**

b) What is slow start algorithm that is used in TCP congestion control? How it is different from Internet congestion control algorithm? **[4]**

c) Explain in brief buffer overflow attack on SSL. **[2]**

Q4) Attempt all of the following:

a) How does firewall Performs Network Address Translation? **[4]**

b) What is digital certificate? Explain the steps involved in the creation of digital certificate. **[4]**

c) Explain how process server is helpful in initial connection protocol used in transport layer? **[2]**

Q5) Attempt all of the following:

a) Describe the following characteristics of real time audio - video communication. **[4]**

    i) Ordering

    ii) Multicasting

    iii) Translation

    iv) Mixing

b) Given the two prime numbers $P = 7$, $Q = 17$. Find out N, E & D in an RSA encryption process. **[4]**

c) What is strict source route option in an options part of IP datagram. **[2]**

Q6) Attempt all of the following:

a) Explain key principles of security. **[4]**

b) Consider the routing table for router R_1. **[4]**

Routing table for R_1

Mask	Network addr.	Next hop	interface
/28	140.6.12.240	-	M_2
/25	140.6.12.128	-	M_0
/24	201.8.32.0	-	M_3
/16	201.8.0.0	-	M_1
Default	Default	140.6.12.244	M_2

   i) Show the forwarding process if a packet arrives at R_1 with destination address 201.8.30.4.

   ii) Show the forwarding process if a packet arrives at R_1 with destination address 20.54.28.75.

c) What is shared secret authentication?   **[2]**

Q7) Attempt all of the following:

a) Explain the significance of link state update packet. Why it is called as heart of OSPF operation?   **[5]**

b) Write a note on key management in IPsec.   **[5]**

Q8) Attempt all of the following:

a) Explain the concept of electronic money. What is the classification of it based on involvement of bank in the transaction?   **[5]**

b) No matter how the client and server are programmed, there are always situations where transport layer fails to recover properly. Explain.   **[5]**

✦ ✦ ✦

[4937] - 1003

M.Sc.

COMPUTER SCIENCE

CS - 103 : Distributed Database Management Systems

(Semester - I) (2013 Pattern)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

1) *Attempt any 5 of the following.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *All questions carry equal marks.*

5) *Assume suitable data if necessary.*

Q1) Attempt all of the following: **[4+4+2=10]**

a) State the different types of transparencies provided by a DDBMS? Explain Network transparency.

b) Write a short note on 'Layers of query processing'

c) Draw a query graph for the following query:-

Select e.enama, p.pname from employee e, project p, assign a where e.eno = a.eno and a.pno = p. pno;

Q2) Attempt all of the following: **[4+4+2=10]**

a) Write a short note on 'Global directory management, in a DDBMS.

b) Define the following with an example for each.

   i) A primary Horizontal fragmentation.

   ii) A Hybrid fragmentation.

c) Identify a potential deadlock cycle, if any, in the following LWFG at site 1.
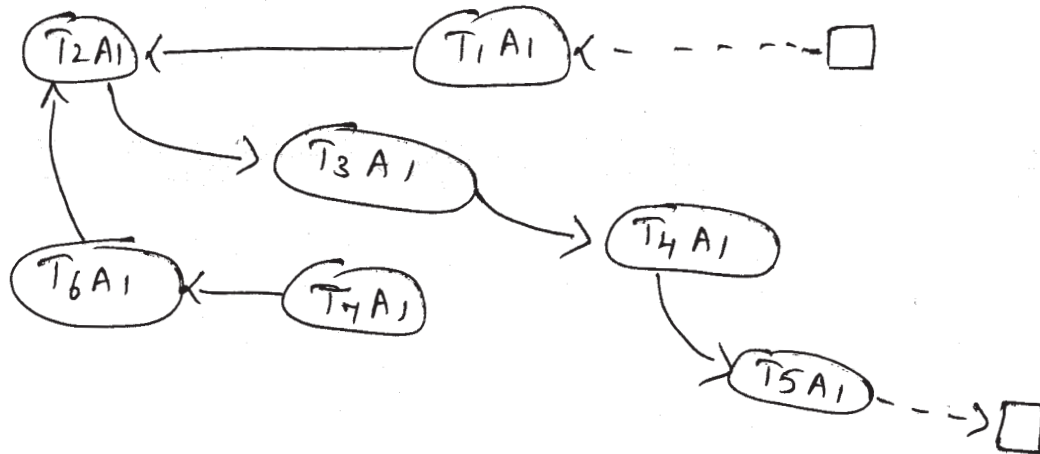
Q3) Attempt all of the following: **[4+4+2=10]**

a) Consider the following relation,

Class (class-id, cname, total - strength)

Let p_1: total - strength < 30

p_2: total - strength > 30

be two simple predicates defined on class. Perform a horizontal fragmentation of class, based on $\{p_1, p_2\}$. Test the fragments for its correctness.

Further consider the relation

Student (stud - id, name, class - id)

Perform a DHF of student with respect to the relation class. Draw the join graph of student ∞ class, on class - id.

b) "Using semijoins may increase the local processing time of queries". Comment, with an eg.

c) Define the following:

A localization program.

Q4) Attempt all of the following: **[4+4+2=10]**

a) Apply the Ingres optimization program and illustrate the successive detachments and substitutions, by giving the monorelation queries generated, for the following query.

Select M. mname

from movies M, Tapes T

Where M. mno = T. mno and

T. numrentals = 100 and

M.title <> "sholay";

b) Define the following approaches of interaction between a LRM and a Buffer Manager.

i) Fix / FLUSH

ii) No. fix/ FLUSH

iii) Fix / No. FLUSH

iv) No. Fix / No. FLUSH

c) Consider the following relation:

Project (pno, pname, budget, total - members)

The following queries are fired on project :-

q_1 : Select pname from project where pno = 5;

q_2 : Select pro, budget from project where total - members >10 and budget < 10,00,000;

q_3 : Select * from project where pno between 1 and 10;

Derive an attribute usage matrix for the relation project, based on the above queries.

Q5) Attempt all of the following: **[4+4+2=10]**

a) Given the following relations:-

Account (Ano, clientnumber, Balance)

Client (Clientnumber, Name, birthdate, branch)

i) Formulate a query in SQL that prints the names of account holders affliated with branches in Pune, Mumbai whose Balance is less than 5000. Further, extract the selection predicate and transform it into the CNF and DNF.

ii) The following in the fragmentation Schemes for Account & Client relations.

$A_1 : \sigma_{Balance < 5000} \, Account$

$A_2 : \sigma_{Balance \geq 5000} \, Account$

C_1 : Client ∞ A_1 on client number

C_2 : Client ∞ A_2 on client number

Draw an operator free for the above query. Transform the operator tree, to an operator tree on the fragments & simplify it to get reduced operator tree.

b) "2PC is resilient to failures that does not result in loss of log information" comment.

c) State the requirements of an autonomous system.
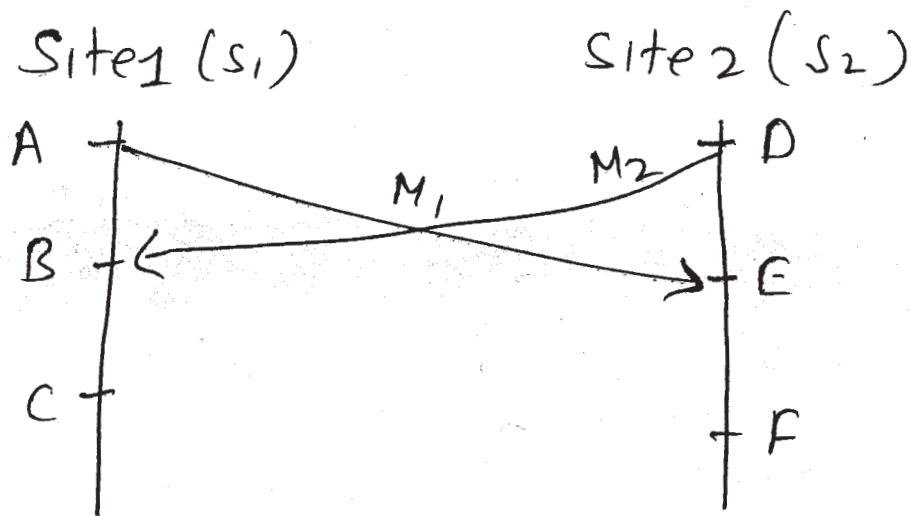
Q6) Attempt all of the following: **[4+4+2=10]**

a) Consider the following transactions.

$T_1 : \{R(x), R(y), W(x), R(z), W(z), W(y), commit\}$

$T_2 : \{R(y), W(y), W(x), R(x), R(z), commit\}$

i) Define the above transactions, T_1 & T_2, as a partial ordering on its operations and the termiantion condition.

ii) Draw the DAGs (directed Acyclic graph) for the above transactions T_1 & T_2.

b) Solve the following:

i) Given the following schedules, check whether they are serialization.
S_1 (S_1 to 1) : Ri (x) Wi (x) Rj (x) Wj (x)

S_2 (S_1 to 2) : Rj (y) Wj (x) Ri (x) Wi (x)

ii) Consider the following interactions between two sites S_1 & S_2. Initially, values of counters at S_1 & S_2 are 10 & 5 respectively. State the final values of counters at S_1 & S_2, after the events C & F respectively.
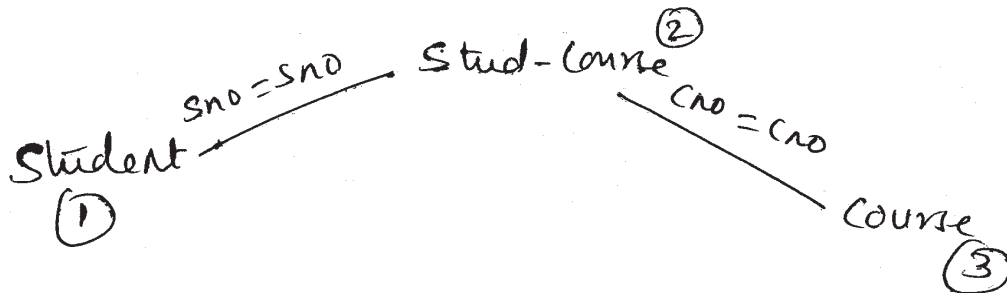

c) Define a semijoin program, for a join between two relations R & S, on attribute A.

Q7) Attempt all of the following: **[5+5=10]**

    a)   State the methods supported by R* for intersite data transfer.

        Consider the following join Graph

        and the following information

        size (student) = 100, size (stud - course) = 200, size (course) = 300

        size (student ∞ stud - course) = 300 and size (stud - course ∞ course) = 200.

        Describe an optimal join program that reduces the total transmission time (communication time)

    b)   State the basic Time stamp concurrency control algorithm with prewrites. Consider a data item x. Let RTM (x) = 21, & WTM (x) = 20. Let the pair $(P_i(x), Ts)$ denote a prewrite request of transaction Ti on the item X with timestamp Ts. Indicate the behavior of the timestamp method with 2PC if the following sequence of requests is received.

        $(P_1 (x), 26), (P_2 (x), 22) , (R_3 (x), 19),$

        $(R_4 (x), 22), (W_1 (x), 22), (R_5 (x), 24),$

        $(P_6 (x), 18), (R_7 (x), 30), (W_2 (x), 26).$

Q8) Attempt all of the following: [5+5=10]

a) State the different types of join graphs. Consider the following relation.

Course (Cid, Cname, Ctype)

Cduration (Ctype, duration)

The following is the fragmentation Schemes:-

$C1 : \sigma_{Ctype = 'Mathematics'} \text{Course}$

$C2 : \sigma_{Ctype = "Arts"} \text{Course}$

$C3 : \sigma_{Ctype = "design"} \text{Course}$

$cd1 : \sigma_{duration \leq 10} \text{Cduration}$

$cd2 : \sigma_{duration >10 \text{ and } < 20} \text{Cduration}$

$cd3 : \sigma_{duration \geq 20} \text{Cduration}$

Draw the join graph of course ∞ cduration. State its type. Modify the fragments of either course or cduration, so that the join graph of course ∞ cduration is simple.

b) State the Lazy Replication protocol. State the different parameters, based on which the lazy: Replication protocal can be characterized: Further explain the lazy master method of lazy replication protocol.

ಚಿತಾಚಿತಾ

[4937]-1004

M.Sc.

COMPUTER SCIENCE

CS - 104 : Design & Analysis of Algorithms

(2013 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

    1)   *Attempt any 5 questions.*

    2)   *All questions carry equal marks.*

    3)   *Figures to the right indicate full marks.*

    4)   *Neat diagrams must be drawn whenever necessary.*

Q1) Attempt the following:

    a)   What is control abstraction? Write control abstraction for divide and conquer. **[4]**

    b)   Write an algorithm to check whether given no. is prime or not also find step count. **[4]**

    c)   Justify true or false

$$n^n = O(2^n).$$ **[2]**

Q2) Attempt the following:

    a)   Use strassens algorithm to compute the matrix product of following matrices **[4]**

$$A = \begin{bmatrix} 4 & 3 \\ 5 & 6 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & -2 \\ -4 & 2 \end{bmatrix}$$

    b)   Using Job Sequencing find profit for given data **[4]**

        P = (20, 15, 10, 5, 1)
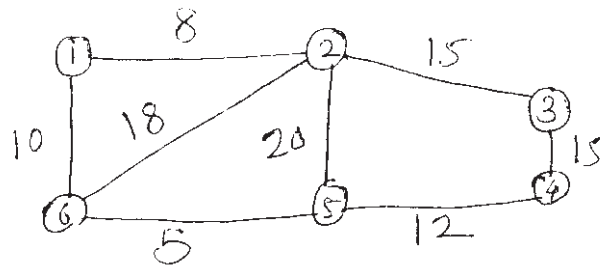
        W = (2, 2, 1, 3, 3)

c) Define **[2]**

    i)   Implicit Constraint.

    ii)   Explicit Constraint.
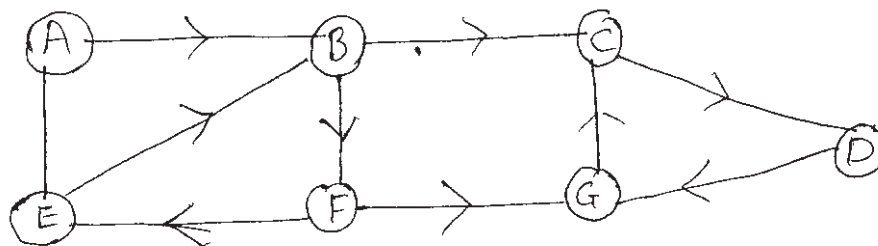
Q3) Attempt the following:

a) What is minimum spanning tree? Show step of Kruskal's algorithm to obtain spanning tree **[4]**

b) What is best way to multiply chain of matrices with dimensions that are 70×5, 5×10, 10×20, 20×5 using dynamic programming. **[4]**

c) Write an Iterative algorithm for Binary Search. **[2]**

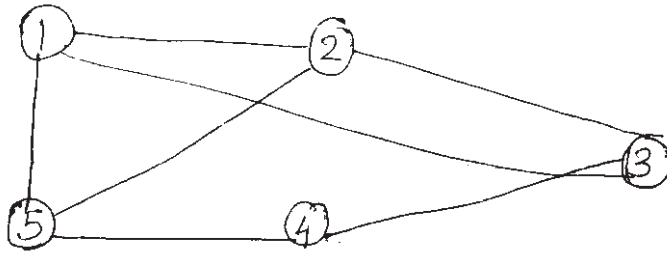*Q4)* Attempt the following:

a) Define DFS and BFS? Illustrate it on following graph. **[4]**

b) Solve the following 0/1 knapsack problem **[4]**

    $n = 4$ $M = 18$ $W = (3, 8, 6, 4)$

    $P = (9, 10, 12, 8)$

c) Explain Travelling sales person problem using Dynamic Programming. **[2]**

Q5) Attempt the following:

a) Find Hamiltoniam cycles present in graph [only two solutions]. **[4]**

b) Write a short note on Guassian Elimination. **[4]**

c) Define Horner's rule. **[2]**

Q6) Attempt the following:

a) Define the terms: **[4]**

i) NP - Hard and NP - Complete.

ii) Non deterministic Algorithm.

iii) Decision problem.

iv) Optimization problem.

b) Write non deterministic algorithm to knapsack problem. **[4]**

c) What are Applications of Breadth First tree. **[2]**

Q7) Attempt the following:

a) Find minimum cost to transform X into Y **[4]**

X = a,a,b,a,b

Y = b,a,b,b

b) Write an algorithm to find minimum and maximum element from given list. Also calculate stepcount and complexity. **[4]**

c) Define: i) Back edge **[2]**

ii) Forward edge

Q8) Attempt the following:

    a)   Sort the following no. using Quick sort   **[4]**

        65, 70, 75, 85, 60, 55, 50, 45.

    b)   Explain Branch & Bound strategy. Why least cost search method is prefered over LIFO and FIFO branch and bound method.   **[4]**

    c)   Solve recurrence relation for Merge Sort.   **[2]**

✦ ✦ ✦

[4937]-1005

M.Sc. - I

COMPUTER SCIENCE

CS - 105 : Network Programming

(2013 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

    1)   *Attempt any five of the following:*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

Q1) Attempt all of the following:

    a)   How wrapper functions are useful? Write a wrapper function for socket system call. **[4]**

    b)   What are Byte manipulation functions? **[4]**

    c)   List any two differences between exec function. **[2]**

Q2) Attempt all of the following:

    a)   Why should an application call shutdown with an argument of SHUT_RDWR, instead of just calling close? **[4]**

    b)   Discuss the termination of server process. **[4]**

    c)   Define protocol registration. **[2]**

Q3) Attempt all of the following:

    a)   Explain the generic socket address structure. **[4]**

    b)   What is resource records? Explain the types of resource records. **[4]**

    c)   Write the steps performed by echo server. **[2]**

Q4) Attempt all of the following:

    a)   Discuss the getservbyname & getservbyport functions. **[4]**

    b)   Explain the different function calls used for UDP client - server. **[4]**

    c)   Define inet _ ntop function. **[2]**

Q5) Attempt all of the following:

    a)   What will happen to UDP client if a client datagram is lost? **[4]**

    b)   Explain the str_cli function (Revisited again). **[4]**

    c)   Why in IPv6 CHECKSUM is required? **[2]**

Q6) Attempt all of the following:

    a)   Explain the normal termination of TCP client server. **[4]**

    b)   Explain the functions used by UDP to handle errors. **[4]**

    c)   Define signal driven & asynchronous I/O mode. **[2]**

Q7) Attempt all of the following:

    a)   Explain the working of BIND function. **[5]**

    b)   Differentiate in between stateful servers & stateless servers. **[5]**

Q8) Attempt all of the following:

    a)   What is the use of hostent structure? What information does it contain?**[5]**

    b)   Explain the uses of various TCP socket options. **[5]**

✦ ✦ ✦

[4937]-2001

M.Sc.

COMPUTER SCIENCE

CS - 201 : Digital Image Processing

(2013 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1) *Answer any FIVE questions.*
2) *All questions carry equal marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*

Q1) Attempt the following:

    a)   Define mixed adjacency. Explain how it eliminates ambiguity that often arises with 8 adjacency.   **[4]**

    b)   Given below is 'X' section of horizontal intensity profile from an image. Illustrate the first and second derivative of I-D digital functions represented by 'X'. Depict zero crossing if any.   **[4]**

        Scan Line X : | 6 | 6 | 6 | 6 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 6 | 6 |

    c)   State periodicity property of 2D DFT with equation.   **[2]**

Q2) Attempt the following:

    a)   Write a short note on MPP Algorithm.   **[4]**

    b)   Define morphological operations Opening and closing. State two properties of opening.   **[4]**

    c)   What is nearest neighbour interpolation?   **[2]**

Q3) Attempt the following:

a)   Write a short note on High Pass Filter in frequency domain.   **[4]**

b)   Write the equations of Geometric mean filter and Harmonic Mean Filter.**[4]**

c)   Find city block and chess board distance between points P (50, 50), Q(70, 80).   **[2]**

Q4) Attempt the following:

a)   Give three different ways of acquiring image and explain any one in detail.   **[4]**

b)   Write the steps for filtering in frequency domain.   **[4]**

c)   List and sketch different edge models.   **[2]**

Q5) Attempt the following:

a)   What is Gamma correction? How it is implemented using power law transformation?   **[4]**

b)   Write a short note on selective filtering in frequency domain.   **[4]**

c)   Explain Weber Ratio.   **[2]**

Q6) Attempt the following:

a)   Draw and explain the model of image degradation/restoration process.**[4]**

b)   Define : Shape Number. Explain it with examples of order 4, order 6 and order 8.   **[4]**

c)   Find the convolution of the following 1-D images.

   { −1, 4, 2, 2} and {0, 3, 2}.   **[2]**

Q7) Attempt the following:

   a)   Explain the working of a general purpose DIP system with a neat block diagram. **[5]**

   b)   Explain Hit-or-Miss transformation in morphological image processing. **[5]**

Q8) Attempt the following:

   a)   Given a 3 bit image of size 32×32 pixels having intensity distribution as shown in the table below, where intensity levels are in the range 0 - 7. Apply histogram equilization technique and find transfer function which relates input image intensity level r_k to output image intensity s_k. **[5]**

Intensity level	No.of Pixel
$r_0 = 0$	76
$r_1 = 1$	344
$r_2 = 2$	211
$r_3 = 3$	103
$r_4 = 4$	57
$r_5 = 5$	127
$r_6 = 6$	47
$r_7 = 7$	59

   b)   Write iterative algorithm used for global thresholding. **[5]**

✦   ✦   ✦

[4937]-2002

M.Sc.

COMPUTER SCIENCE

CS - 202 : Advanced Operating System

(2013 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:
    1)   *Answer any five questions.*
    2)   *Neat diagrams must be drawn wherever necessary.*
    3)   *Figures to right indicate full marks.*

Q1) a)   Differentiate named & unnamed pipe.   **[4]**

    b)   Write a short note on context of a process.   **[4]**

    c)   What is broken link?   **[2]**

Q2) a)   Explain with syntax and example alarm ( ) & pause ( ).   **[4]**

    b)   Write a 'C' program to print all environmental variables.   **[4]**

    c)   What is orphan & zombie process?   **[2]**

Q3) a)   Write a 'C' program to create a child process. Both processes shares an unnamed pipe. Parent process should write a string "Hello" in it 10 times. Child process reads this data & prints on console.   **[4]**

    b)   Write down the contents of u-area.   **[4]**

    c)   What is hard link?   **[2]**

Q4) a) Explain the structure of regular file with suitable diagram. **[4]**

b) Explain context switching with respect to threads in windows O.S. **[4]**

c) Explain wait ( ) with example & syntax. **[2]**

Q5) a) Write a 'C' program which demonstrates how many processes (maximum no.of processes) can be created. **[4]**

b) Explain strdupa( ) and strdupna( ) with syntax & example. **[4]**

c) Waht is Kernel Processor Control Region (KPCR)? **[2]**

Q6) a) Write a 'C' program which prints type of the file where the filename is accepted through command - line. **[4]**

b) Explain waitid ( ) and waitpid( ) with syntax and example. **[4]**

c) What is unreliable signal? **[2]**

Q7) a) Explain setuid( ), seteuid( ), getuid( ), geteuid( ), setreuid( ) with syntax and example. **[5]**

b) Explain read( ), write( ), readv( ) and writev ( ) with syntax and example. **[5]**

Q8) a) Explain the concept of blocking the signals & retrieving pending signals.**[5]**

b) What are the advantages and disadvantages of mmap ( )? **[5]**

✦ ✦ ✦

[4937]-2003

M.Sc.

COMPUTER SCIENCE

CS - 203 : Data Mining and Data Warehousing

(2013 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1)   *Answer any five questions.*

2)   *Neat diagrams must be drawn wherever necessary.*

3)   *Figures to the right indicate full marks.*

Q1) a)   "In association rule mining FP tree algorithm is more efficient than Apriori" Comment.   **[4]**

    b)   What is Web Mining? Write short note on web taxonomy.   **[4]**

    c)   What is summerization?   **[2]**

Q2) a)   What are social implications of data mining?   **[4]**

    b)   What are issues in decision tree classification?   **[4]**

    c)   Write any two applications of Graph Mining.   **[2]**

Q3) a)   Perform Apriori algorithm to find frequent patterns with minimum support = 2   **[4]**

Tid	Items
1	A,B,C D
2	A,B,D
3	A,D
4	A,C
5	B,C
6	B,D
7	A,C,D

b) Write note on linear classifiers. **[4]**

c) What is pattern matching? **[2]**

Q4) a) Suppose a data warehouse for Big University Consists of following dimensions

- Student

- Course

- Semester

- Instructor

The measures considered are score and average grade.

Draw star schema diagram for the data ware house. **[4]**

b) Explain tree pruning with suitable example. **[4]**

c) Write formulas to calculate sensitivity and specificity. **[2]**

Q5) a) What are advantages of having data warehouse? Draw suitable diagram of architecture of data warehouse. **[4]**

b) Write note on K means clustering. **[4]**

c) What is use of dimentionality reduction? **[2]**

Q6) a) What are issues considered during data integration? Explain binning with suitable example. **[4]**

b) Explain following terms **[4]**

- Confusion Matrix

- F measure

c) What is divisive clustering. **[2]**

Q7) a) Explain text mining and its applications. **[5]**

b) Consider the database given below: **[5]**

Patient AGE	Disease	Sugar level	Survival chances
Small	serious	high	yes
Medium	normal	low	yes
Senior	life time	normal	yes
Small	life time	high	no
Small	normal	high	yes
Senior	serious	normal	no
Medium	serious	low	yes
Senior	normal	low	no
Medium	life time	normal	yes
Medium	Serious	high	No
Senior	normal	low	no

Find out class lable of the given tuple using Baysian Classification.

⟨age : Senior, Disease, normal, Sugar level - normal⟩.

Q8) a) Explain support vector machine for linearly inseparable data. **[5]**

b) Explain the terms: **[5]**

i) Tree Mining

ii) Sequence Mining.

Write applications of frequent subgraph mining.

✦ ✦ ✦

[4937]-2004

M.Sc.

COMPUTER SCIENCE

CS - 205 : Programming with DOT NET

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:
 1) *Answer any five questions.*
 2) *Neat diagrams must be drawn if necessary.*
 3) *Assume suitable data if necessary.*

Q1) a) What is a delegate? Explain multicast delegate with suitable example. **[4]**

b) Explain xml validating techniques in brief: **[4]**

   i) DTD's and

   ii) Schemas

c) What is managed code and unmanaged code in DOTNET? **[2]**

Q2) a) Explain briefly the ASP.NET architecture. **[4]**

b) Explain exception handling in C#. **[4]**

c) Give the use of 'Anchor' and 'Dock' properties while designing a windows Form. **[2]**

Q3) a) Write a static method to accept 'param' array of integers. The method should find the sum of all the integers passed and display the result. **[4]**

b) What is a socket? Explain its types. **[4]**

c) What is absolute path and relative path? Give example. **[2]**

Q4) a) Explain Brushes in the advanced graphical design interface (GDI+) of C#. **[4]**

b) Explain SOAP and its message format. **[4]**

c) What are the access specifiers in C#? **[2]**

Q5) a) Explain the phase PostBack event handling in ASP.NET. **[4]**

b) What is an assembly? Explain components of assembly. **[4]**

c) What are cookies? **[2]**

Q6) a) Explain the ADO.NET architecture. **[4]**

b) What is webpage and web form? **[4]**

c) What is serialization? **[2]**

Q7) a) Explain the generic collection classes. **[5]**

b) Explain Indexers and properties with suitable example. **[5]**

Q8) a) Write a console based program to create a linked list of employee objects using the generic class LinkedList <>. Perform following operations on the list: **[5]**

i) Add a new employee.

ii) Display the list of employee.

iii) Total number of employee in a list.

b) Explain polymorphism in C# with suitable examples. **[5]**

✦ ✦ ✦

[4937]-2005

M.Sc.

COMPUTER SCIENCE

CS -206: Artificial Intelligence

(2013 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

   1)   *Solve any 5 questions out of 8.*

   2)   *Figures to the right show full marks.*

   3)   *Assume suitable data, if necessary.*

   4)   *Neat diagrams must be drawn wherever necessary.*

Q1) a)   State limitations of semantic networks.   **[4]**

    b)   Explain means ends algorithm with example.   **[4]**

    c)   Distingwish between knowledge & data.   **[2]**

Q2) a)   Write short note on Rote learning.   **[4]**

    b)   Explain the MINIMAX search procedure.   **[4]**
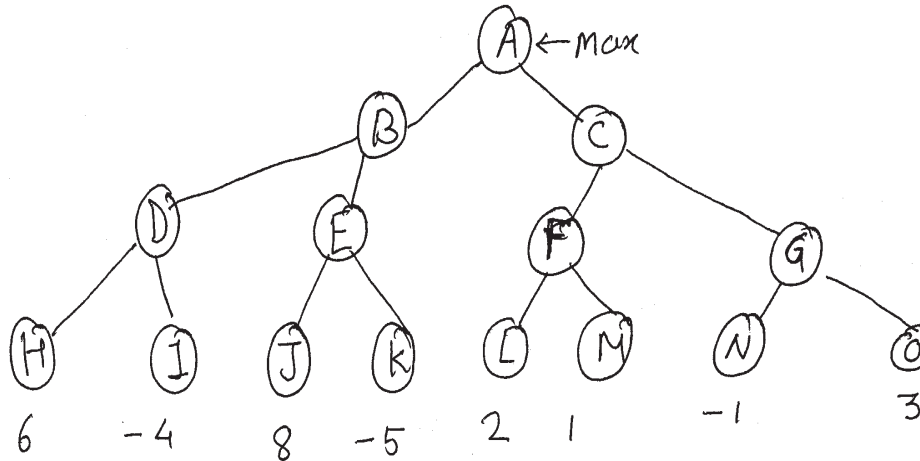
    c)   Define search strategy.   **[2]**

Q3) a)   Explain the algorithm to convert WFF to CNF.   **[4]**

    b)   Write short note on CD.   **[4]**

    c)   State any two applications of AI.   **[2]**

Q4) a) Apply alpha- beta pruning algorithm to following search tree. **[4]**

Show final search tree after applying algorithm & show alpha-beta values.

b) Give state space representation of "water jug problem" **[4]**

Where there are 2 jugs of 4L & 2L resp. We want 2*l* water in 4*l* jug.

c) Give CD representation of the statement. **[2]**

"John took the book from Mary"

Q5) a) Convert following statements into WFFs. **[4]**

i) Marcus was a man.

ii) Marcus was a pompeian.

iii) All pompeians were Roman.

iv) Caesar was a ruler.

v) All romans were either loyal to caesar or heat him.

vi) Every one is loyal to someone.

vii) People only try to assassinate rulers they are not loyal to.

viii) Marcus tried to assassinate caesar.

b) Write short note on learning from examples. **[4]**

c) Discuss the problems in MINIMAX algorithm using alpha-beta cutoffs. **[2]**

Q6) a) State 4 components using which problem can be well formulated. **[4]**

b) Write short note on frames. **[4]**

c) Describe characteristics of an A1 technique giving example. **[2]**

Q7) a) Discuss in brief the various issues in knowledge representation. **[5]**

b) Consider following 8- puzzle problem. This is a simple sliding tile puzzle on a 3*3 grid ; where you can move tiles into gap until you get the goal position.

Start state:	Blank	A	C
	H	B	D
	G	F	E
Goal state:	A	B	C
	H	Blank	D
	G	F	E

Draw entire search tree for this problem using A* algorithm showing solution from initial to goal state. Show OPEN LIST, CLOSED LIST, BEST NODE & CLOSED OLD for each step in tabular format. **[5]**

Q8) a) Construct semantic net representation for **[5]**

   i)   pompion (marcus), Black Smith (marcus)

   ii) Meena gave the green flowered vase to her cousine.

   b) Consider following statement & convert to predicate logic and Prove that "Ramu knows Hindi", using backword chaining **[5]**

   i)   Ramu is soldier.

   ii) Ramu is recident of pune.

   iii) Pune is in India.

   iv) All indian soldiers know Hindi.

✗   ✗   ✗

[4937]-2006

M.Sc.

COMPUTER SCIENCE

CS -207: Advance Design & Analysis of Algorithms

(2013 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

   1)   *Answer any 5 questions.*

   2)   *All questions carry equal marks.*

   3)   *Figures to the right indicate full marks.*

Q1) a)   Write a note on group steiner tree problem.   **[4]**

    b)   Explain how two Fibonacci heaps are united-with the help of algorithm.**[4]**

    c)   Explain k median problem in short.   **[2]**

Q2) a)   Illustrate how TSP can be solved using primal-dual method.   **[4]**

    b)   What are dynamic trees? Explain their significance.   **[4]**

    c)   Compare & contrast decision problems & optimization problem.   **[2]**

Q3) a)   Write a note on simplex method.   **[4]**

    b)   Explain the use of B trees in memory management.   **[4]**

    c)   What is heuristic optimization?   **[2]**

Q4) a)   What are universal steiner trees? What is their use?   **[4]**

    b)   Illustrate with example how suffix trees are used.   **[4]**

   c)   Define descrete optimization.   **[2]**

P.T.O.

Q5) a) Explain Implicit & Explicit enumeration with example. **[4]**

b) Formulate 0/1 knapsack problem as integer linear programming problem. **[4]**

c) Define splay trees. **[2]**

Q6) a) Write a note on convex optimization. **[4]**

b) Explain the concept of steiner forest. **[4]**

c) Explain in brief- the cutting plain method. **[2]**

Q7) a) Write properties of flow networks. **[5]**

b) What is the principle of KMP algorithm? **[5]**

Explain 'compute-prefix' function.

Q8) a) What is topological sort? Apply it to following graph. **[5]**
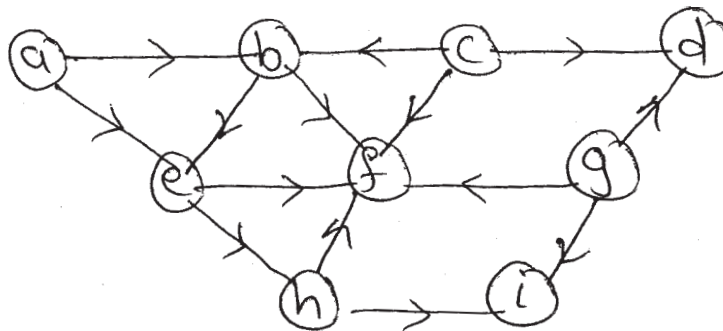
b) What is priciple behind Rabin-krap algorithm explain its working (algorithm not necessary) **[5]**

✘ ✘ ✘

[4937]-3001

M.Sc. (Computer Science)
CS -301: Software Metrics and Project Management
(2013 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

    1)   Attempt any five Questions.

    2)   All questions carry same marks.

    3)   Neat diagrams must be drawn wherever necessary.

    4)   Figures to the right indicate full marks.

Q1) Attempt the following.

    a)   Explain the levels of process maturity model. **[4]**

    b)   Explain characteristics of good data. **[4]**

    c)   Define Faults and Failures. **[2]**

Q2) Attempt the following.

    a)   Explain Performance Reporting in Project Communication Management. **[4]**

    b)   Write a note on GQM. **[4]**

    c)   Define productivity. **[2]**

Q3) Attempt the following.

    a)   Explain Bohems Quality Model. **[4]**

    b)   What do you mean by CCB and explain configuration management. **[4]**

    c)   List the qualities required for project manager. **[2]**
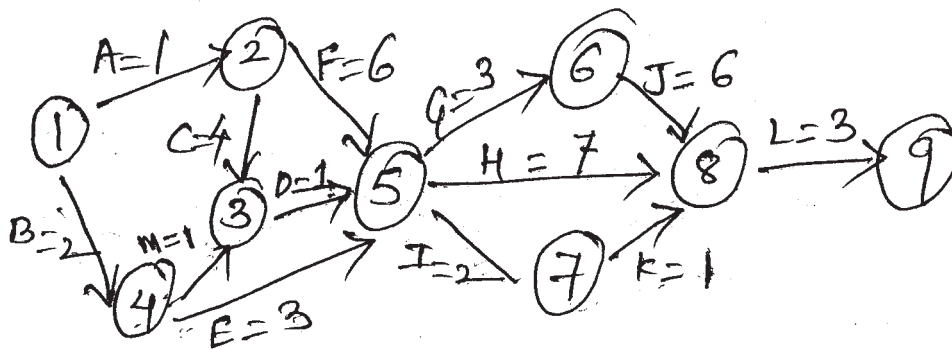
Q4) Attempt the following.

    a)   Describe Scope Verification and Control in Project Scope Management.**[4]**

    b)   Write a Note on Metric plan.   **[4]**

    c)   List the types of constraints of project.   **[2]**

Q5) Attempt the following.

    a)   Explain basic four Response Strategies for Negative Risk.   **[4]**

    b)   What do you mean by Productivity and how team structure affects on productivity.   **[4]**

    c)   Define RoI and NPV.   **[2]**

Q6) Attempt the following.

    a)   Find critical path for following.   **[4]**

    b)   Describe any two project selection methods.   **[4]**

    c)   Define cash flow Analysis.   **[2]**

Q7) Attempt the following.

    a)   Solve for following given values.   **[5]**

        BCWS = 30000

        BCWP = 26000

        ACWP = 32000

        find CPI and SPI

b) Explain tools and techniques used for planning Purchases and acquisition and Give types of contracts. **[5]**

Q8) Attempt the following.

a) Create WBS for website design system. **[5]**

b) Explain the Role of Data Collection in Software Measurement. **[5]**

✗   ✗   ✗

[4937]-3002

M.Sc.

(Computer Science)

CS -302: Mobile Computing

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :50

Instructions to the candidates:

    1)   *Attempt any five of the following.*

    2)   *Neat diagrams must be drawn whenever necessary.*

    3)   *Figures to the right indicate full marks.*

Q1) Attempt all of the following.

    a)   Explain any five tragments of Android UI with example.   **[4]**

    b)   Describe mobile & wireless devices with e.g.   **[4]**

    c)   What is Ad-hoc network?   **[2]**

Q2) Attempt all of the following.

    a)   Explain FDMA in detail.   **[4]**

    b)   Draw & describe system Architecture of GSM system.   **[4]**

    c)   Explain tunneling in mobile communication.   **[2]**

Q3) Attempt all of the following.

    a)   What is CSMA/CA? How does it prevent collision?   **[4]**

    b)   Explain in brief wirless session protocol.   **[4]**

    c)   what is core network.   **[2]**

Q4) Attempt all of the following.

    a)   What are the advantages & disadvantages of CDMA? **[4]**

    b)   Explain UMTS Architecture with diagram. **[4]**

    c)   Define short term fadding. **[2]**

Q5) Attempt all of the following.

    a)   Explain functions of RNC. **[4]**

    b)   Explain WAP gateway in details. **[4]**

    c)   What is the purpose of AUC in GSM. **[2]**

Q6) Attempt all of the following.

    a)   Discuss the working of mobile TCP. **[5]**

    b)   Explain value added services through sms. **[3]**

    c)   What is OVSF? **[2]**

Q7) Attempt all of the following.

    a)   What advantages does the use of IPV6 offer for mobility? **[5]**

    b)   Differentiate between GPS & GPRS. **[5]**

Q8) Attempt all of the following.

    a)   What is reverse tunneling? Why it is needed in mobile IP? **[5]**

    b)   What are the advantages & disadvantages of snooping TCP. **[5]**

✗ ✗ ✗

[4937]-3003

M.Sc.

COMPUTER SCIENCE

CS - 303 : Soft Computing

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) *Attempt any five questions from given eight questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of simple calculator is allowed.*

Q1) Attempt the following:

a) Explain properties and applications of neural networks. **[4]**

b) Consider the following fuzzy sets **[4]**

$$\underset{\sim}{A} = \left\{ \frac{0.15}{\text{winter}} + \frac{0.33}{\text{spring}} + \frac{0.52}{\text{summer}} + \frac{0.25}{\text{fall}} \right\}$$

$$\underset{\sim}{B} = \left\{ \frac{0.1}{\text{winter}} + \frac{0.55}{\text{spring}} + \frac{0.9}{\text{summer}} + \frac{0.2}{\text{fall}} \right\}$$

Find union and intersection of the fuzzy sets $\underset{\sim}{A}$ and $\underset{\sim}{B}$

c) What is genetic algorithm. **[2]**

Q2) Attempt the following:

a) Explain neuron signal functions. **[4]**

b) Using Genetic Algorithms Maximize $f(x) = x^2$ over $\{0,1,2,....31\}$ with initial x values of (13,24,8,16). Show one crossover and mutation operation. **[4]**

c) What is dilation in linguistic hedges. **[2]**

P.T.O.

Q3) Attempt the following:

a) Explain pattern space and weight space. **[4]**

b) Consider the two fuzzy sets. **[4]**

$$\text{Low Hazard} = \left\{ \frac{1}{1} + \frac{0.8}{2} + \frac{0.5}{3} + \frac{0.1}{4} + \frac{0}{5} \right\}$$

$$\text{High Hazard} = \left\{ \frac{0}{1} + \frac{0.2}{2} + \frac{0.4}{3} + \frac{0.9}{4} + \frac{1}{5} \right\}$$

Find the membership function for the following linguistic expressions

i) Low hazard and not high hazard

ii) Very high hazard and not low hazard

c) Define bias and threshold. **[2]**

Q4) Attempt the following:

a) Explain in brief any four components of neural networks. **[4]**

b) Consider the following fuzzy sets **[4]**

$$\underset{\sim}{A} = \left\{ \frac{0.6}{2} + \frac{1}{3} + \frac{0.2}{4} \right\}$$

$$\underset{\sim}{B} = \left\{ \frac{0.4}{2} + \frac{1}{3} + \frac{0.8}{4} + \frac{0.3}{5} \right\}$$

$$\underset{\sim}{C} = \left\{ \frac{0.3}{1} + \frac{0.5}{2} + \frac{0.6}{3} + \frac{0.6}{4} + \frac{0.5}{5} + \frac{0.3}{6} \right\}$$

Determine the implication relation

IF $\underset{\sim}{A}$ THEN $\underset{\sim}{B}$ ELSE $\underset{\sim}{C}$

c) Define fuzzy relations. **[2]**

Q5) Attempt the following:

a) Write a note on α-least mean square learning. **[4]**

b) Given the following fuzzy members A and B, using zadeh's extension principle calculate fuzzy number "approximately 12" **[4]**

$$\underset{\sim}{A} = \text{"approximately 2"} = \left\{ \frac{0.6}{1} + \frac{1}{2} + \frac{0.8}{3} \right\}$$

$$\underset{\sim}{B} = \text{"approximately 6"} = \left\{ \frac{0.8}{5} + \frac{1}{6} + \frac{0.7}{7} \right\}$$

c) What is search space in genetic algorithm. **[2]**

Q6) Attempt the following:

a) Consider the following two fuzzy sets **[5]**

$$\underset{\sim}{A} = \frac{0.2}{p_1} + \frac{0.6}{p_2} + \frac{0.5}{p_3} + \frac{0.9}{p_4}$$

$$\underset{\sim}{B} = \frac{0.4}{g_1} + \frac{0.7}{g_2} + \frac{0.8}{g_3}$$

Find Cartesian product $\underset{\sim}{C} = \underset{\sim}{A} \times \underset{\sim}{B}$

Further, consider the fuzzy relation $\underset{\sim}{D}$

$$\underset{\sim}{D} = \begin{array}{c} g_1 \\ g_2 \\ g_3 \end{array} \begin{bmatrix} 0.3 & 0.6 & 0.5 & 0.2 & 0.1 \\ 0.4 & 0.7 & 0.5 & 0.3 & 0.3 \\ 0.2 & 0.6 & 0.8 & 0.9 & 0.8 \end{bmatrix}$$

Find the max - min composition of $\underset{\sim}{C}$ and $\underset{\sim}{D}$ i.e $\underset{\sim}{E} = \underset{\sim}{C} \text{ o } \underset{\sim}{D}$

b) Write a note on properties of Genetic Algorithms. **[5]**

Q7) Attempt the following:

    a)   Explain intuition, inference and rank ordering membership value assignments. **[5]**

    b)   Simulate the execution of perceptron learning algorithm for each epoch on the following inputs (1,0,0) (1,0,1) (1,1,0) (1,1,1). Target vector (1,1,1,-1). Assume initial weight to be 0 i.eZero. **[5]**

Q8) Attempt the following:

    a)   Explain back propagation algorithm. **[5]**

    b)   For the following fuzzy relation matrix

$$\underset{\sim}{R} = \begin{bmatrix} 0.2 & 0.7 & 0.4 & 1 \\ 1 & 0.9 & 0.5 & 0.1 \\ 0 & 0.8 & 1 & 0.6 \\ 0.2 & 0.5 & 1 & 0.3 \end{bmatrix}$$ **[5]**

Determine λ-cut relations for the following

λ-values on R. λ_1, $\lambda_{0.7}$, $\lambda_{0.5}$, $\lambda_{0.2}$, $\lambda_{0.9}$.

✗   ✗   ✗

[4937]-3004

M.Sc.

COMPUTER SCIENCE

CS - 305 : Web Services

(2013 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1) *Answer any five questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

Q1) a) Write down WSDL document for obtaining factorial of an integer number if number is inputted. **[4]**

   b) "Interoperability is primary goal of web services", Explain. **[4]**

   c) State T/F with justification. "cloud computing eliminates the need for large capital outlays." **[2]**

Q2) a) Draw the structure of SOAP with attachment message, give an example and explain it. **[4]**

   b) What are web services? State and describe core building blocks of web services. **[4]**

   c) QOS is selling and differentiating point between web service providers, comment on it. **[2]**

Q3) a) Enlist and give explanation about potential risks of cloud computing.**[4]**

   b) Write the anatomy of SOAP message and describe each element. **[4]**

   c) Define UDDI. Give the two operating modes of UDDI registry. **[2]**

Q4) a) Define i) Web service interface

ii) Web service implementation

Give the description of implementation approach with figure. **[4]**

b) What are UDDI data structures? Show the relationship of UDDI data structures with the help of neat labeled diagram. **[4]**

c) Differentiate between web services versus web based applications. **[2]**

Q5) a) Write a note on cloud specific security risks. **[4]**

b) A client want to invoke web service for requesting price of a book "Developing Java web services", write down the RPC request and response code for the same. **[4]**

c) Give the use of SOAP must understand attribute. **[2]**

Q6) a) Write down the web service logic for addition and subtraction of two integer numbers using JAVA coding syntax. **[4]**

b) What is the role of Hypervisor in virtualization? Write about xen, vm ware Hypervisor. **[4]**

c) Explain in short Apache Axis environment. **[2]**

Q7) a) Define virtualization. Explain the types of virtualization. **[5]**

b) Write in brief on web services life cycle with neat labeled diagram. **[5]**

Q8) a) Give the description of any five UDDI publisher API messages. **[5]**

b) What are <definitions> and <port Type> elements in WSDL, Write an example for each. **[5]**

✗ ✗ ✗

[4937]-3005

M.Sc. - II

COMPUTER SCIENCE

CS - 306 : Database and System Administrator

(2013 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1) Attempt any five questions from given eight questions.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right side indicate full marks.

Q1) a) Write short note on I/O redirection. **[4]**

b) Explain all the communication protocols of MySQL. **[4]**

c) What is NIS & NFS in Linux OS. **[2]**

Q2) a) What are all disk checking commands in Linux OS. **[4]**

b) What is client program? Explain any 4. **[4]**

c) What is multiversioning & concurrent insert. **[2]**

Q3) a) Explain storage engine InnoDB. **[4]**

b) Explain advisory locks & its functions. **[4]**

c) How to change ownership of the directory in Linux OS. **[2]**

Q4) a) Write down commands for copy, move, rename & delete files in Linux OS. **[4]**

b) What is System Administration? What are daily tasks and responsibilities of System Administrator? **[4]**

c) What are blackhole & Example storage engine? **[2]**

Q5) a) How MySQL uses memory? **[4]**

b) Explain Replication as an AID to back up. **[4]**

c) What is read lock & write lock in MySQL? **[2]**

Q6) a) What is MySQL tier system? **[4]**

b) What is cluster storage engine. **[4]**

c) What are user & group in Linux OS. **[2]**

Q7) a) Explain Samba Server usage & configuration. **[5]**

b) What is storage engine? Explain any 5. **[5]**

Q8) a) What are log files? Explain different types of log files in Linux OS. **[5]**

b) Explain Data Recovery in MySQL. **[5]**

✖   ✖   ✖

[4937]-3007

M.Sc. - II

COMPUTER SCIENCE

CS - 308 : Business Intelligence

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

    1)   *Answer any five questions.*

    2)   *Figures to the right indicate full marks.*

Q1) a) List the steps of intelligence creation and use of cyclical process in Business Intelligence. **[4]**

    b) Describe the need for BI integration. **[4]**

    c) List the major Business Performance Management Processes. **[2]**

Q2) a) Explain: operational planning and define the goal with respect to project plan. **[4]**

    b) Explain: the Taxonomy of Data in Data Mining. **[4]**

    c) Define: Strategy Gap. **[2]**

Q3) a) Give the benefits of text mining and the most popular application areas of text mining in BI. **[4]**

    b) What are the major benefits of collaborative Decision Making? **[4]**

    c) List the benefits of Data warehouse. **[2]**

Q4) a) What are the major differences between a traditional data warehouse and a real- time data warehouse? **[4]**

b) Explain: SEMMA data mining process and how does it apply exploratory method in data model. **[4]**

c) Define: web structure mining. **[2]**

Q5) a) Give the challenges for efficient application of knowledge discovery in detail. **[4]**

b) How does a KPI (Key Performance Indicator) differ from an operational metric? **[4]**

c) Give the Blend and inclusions of multiple disciplines in data mining. **[2]**

Q6) a) What is OLAP and how does it differ from OLTP? **[4]**

b) What are the key differences between the data mining methods: Prediction, Association and clustering? **[4]**

c) Give any 2 factors that influence BI implementation. **[2]**

Q7) a) Consider the following case study to combine Data marts into a single enterprise Data warehouse. In December 2005, H-P company planned to consolidate its 762 data marts around the world into a single EDW. HP took this approach to gain a superior sense of its own business and to determine how best to serve its customer. There was a thirst of analytical data inside the company that had unfortunately led to the creation of many dates marts. HP started to consolidate the data in the datamart into a new data warehouse and all the disparate data marts are eliminated.

    i) What are the efforts need to be applied in EDW approach so that the above case can be achieved?

    ii) How EDW can provide internal and customer information in effective analytical approach? **[5]**

b) Explain the benefits of BI/ ERP integration in detail. **[5]**

Q8) a) Describe how data integration can lead to higher levels of data quality, using functional integration. **[5]**

b) Consider the following casestudy and apply score carding system to improve the overall goal and performances

ABC company is a leading travel company that provides travel products and services to leisure and corporate travellers. The company travel offers consists of airline flights, hotel stays, car rentals and other services. Customer satisfaction is key to overall mission, strategy and success, but unfortunately the company has no uniform ways of measuring satisfaction of analyzing the drivers of satisfaction, on of determining the impact of satisfaction on the company's profitability or overall business objectives. Apply scorecarding system and mention the reports to be generated. **[5]**

✘   ✘   ✘

Total No. of Questions : 8]

P2366

SEAT No. :

[Total No. of Pages : 3

[4937]-4001

M.Sc.

COMPUTER SCIENCE

CS - 402 : Parallel Computing

(2013 Pattern) (Semester - IV)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:
1) *Attempt any <u>five</u> questions out of eight.*
2) *All questions carry equal marks.*
3) *Figures to the right indicate full marks.*
4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Explain Amdahl's law in parallel processing. **[2]**

b) Explain in brief data parallel model (partitioned global address space model). **[4]**

c) Explain what is meant by deadlock, and blocking & non- blocking communications. **[4]**

Q2) a) Define speedup and efficiency of a parallel program. **[2]**

b) What is scalability of parallel program? What is super - linear speedup?**[4]**

c) Explain UMA and NUMA computer architectures. Draw block diagram of each architecture. **[4]**

Q3) a) Draw a schematic of a mesh-connected parallel computer. **[2]**

b) Define total network bandwidth and bisection bandwidth of an interconnection network. **[4]**

What are the values of these parameters for a ring of n computing elements (processors with own memory)? Assume B to be the bandwidth of an individual link.

c) Explain in brief MPI_Comm_size, MPI_Comm_rank and MPI_COMM_WORLD. **[4]**

Q4) a)   Explain in brief MPI_Init and MPT_Finalize.   **[2]**

b)   The pipeline given below consists of four stages and it is synchronous, i.e., each cell finishes its operation in one clock cycle and the (input/output) data advances one step forward   **[3]**
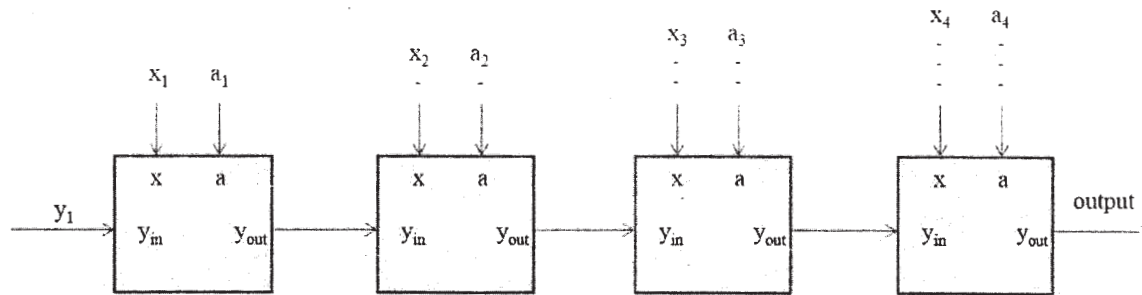
If each stage performs the operation

$$y_{out} = y_{in} + a.x$$

What will be the final output after four clock cycles?

c)   Describe packet switching, virtual cut through routing, and wormhole routing in direct interconnection networks.   **[5]**

Q5) a)   Explain single and master directives in OpenMP.   **[2]**

b)   Does the following code snippet lead to a deadlock? Is so, give at least two methods that you can use to avoid this deadlock.   **[3]**

```
if (myrank == 0){

    MPI_Send (in,  10,  MPI_INT,  1, 1, MPI_COMM_WORLD);

    MPI_Send (out, 10, MPI_INT, 1,  2, MPI_COMM_WORLD);

}

else if (myrank == 1){

    MPI_Recv (out, 10, MPI_INT, 0, 2, MPI_COMM_WORLD);

    MPI_Recv (in,  10, MPI_INT, 0, 1, MPI_COMM_WORLD);

}
```

Note: The parameters in the above functions represent: buffer, count of data type to be sent/received, data-type, destination/source process-id, message-tag, and communicator, respectively.

c) What is shared memory parallel programming paradigm? Describe with schematic the OpenMP shared parallel programming model. **[5]**

Q6) a) Distinguish between MPI_Bcast and MPI_Send. **[2]**

b) What is a thread? Why are the advantages of using threads? Describe different methods in Open MP to create threads. **[4]**

c) What is a critical section in parallel program? Which OpenMP directive can be used to implement a critical section? **[4]**

Q7) a) Explain any two scheduling strategies of a for directive in OpenMP. **[5]**

b) Explain task parallelism using spawn and sync keywords in Cilk++ with an example. **[5]**

Q8) a) Explain the concepts of grids, thread blocks, threads, and warps in CUDA programming. **[5]**

b) What is the purpose of GPU and how does it differ form CPU? **[5]**

✗   ✗   ✗

[4937]-4002

M.Sc.

COMPUTER SCIENCE

CS - 403 : Embedded System

(2013 Pattern) (Semester - IV)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1)   Answer any five questions.

2)   Neat diagram must be drawn wherever necessary.

3)   Figures to right indicates full marks.

Q1) a)   List and define the characteristics of embedded system.   **[4]**

b)   How do functions differ from ISRs, tansk, threads and processes? **[4]**

c)   List main features of ARM.   **[2]**

Q2) a)   How does use of a counting semaphore differ from mutex? How is a counting semaphore used?   **[4]**

b)   Explain different steps in creating alternative library.   **[4]**

c)   List different methods of optimizing the memory space.   **[2]**

Q3) a)   What is a buffer? Explain basic buffer structure.   **[4]**

b)   Define Emulation? Explain symbolic debugger.   **[4]**

c)   Give alternative functions of port 0 and port 2 in 8051.   **[2]**

Q4) a) Explain high level language simulation. **[4]**

b) When do you use cooperative scheduling and preemptive? **[4]**

c) Give the function of config.h. **[2]**

Q5) a) Explain cyclic scheduling to schedule various tasks in RTOS. **[4]**

b) How real time performance can be derived from non-real time system? **[4]**

c) Give at least two examples at RISC microcontroller. **[2]**

Q6) a) Explain the structure of internal RAM of 8051. **[4]**

b) What are problems in designing a real time system without RTOS? How hard disk saving problem can be handle? **[4]**

c) Give an example of deadlock situation during multitasking execution.**[2]**

Q7) a) Explain interrupt service handling in RTOS. **[5]**

b) Define following terms:

i) Simulation   ii) Emulator   iii) IDE

iv) Host system   v) Target system   **[5]**

Q8) a) Explain how joystick can be used as external switch for a embedded system? **[5]**

b) What are the situations which are lead to priority inversion problem? How does an OS solves this problem by a priority inheritence mechanism? **[5]**

✗   ✗   ✗

[4937]-4003

M.Sc.

COMPUTER SCIENCE

CS - 404 :Software Quality Assurance

(2013 Pattern) (Semester-IV)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

1) Attempt any five questions.

2) Neat diagrams must be drawn wherever necessary.

3) Figures to the right side indicates full marks.

Q1) Answer the following:

     a)   Write a note on nature of errors.   **[4]**

     b)   What are the guidelines for formal technical reviews? Explain it.   **[4]**

     c)   Define the term quality assurance.   **[2]**

Q2) Answer the following:

     a)   Explain the basic steps to strategic quality planning.   **[5]**

     b)   Explain the five major processes relating to software ISO-12207 standard.   **[5]**

Q3) Answer the following:

     a)   What is the contribution of Templates? List out sources for updating templates.   **[4]**

     b)   Which Mc' Call's Quality factors focus on operational characteristics? Explain it.   **[4]**

     c)   Explain the use of cause-effect Diagram.   **[2]**

Q4) Attempt the following:

a) What are the categories of cost of quality? Explain in detail. **[4]**

b) Write a note on process metrics. **[4]**

c) Define the term version control. **[2]**

Q5) Attempt the following:

a) Write a note on software configuration management process. **[5]**

b) Write a note on Run Charts. **[5]**

Q6) Attempt the following:

a) Write a note on unit Testing. **[4]**

b) Write a note on Documentation control. **[4]**

c) list out the elements of Quality assurance plan. **[2]**

Q7) Attempt the following:

a) Explain with example how quality cost is used for decision making. **[4]**

b) Explain the Test Characteristics. **[4]**

c) List out issues resolved by the procedures. **[2]**

Q8) Attempt the following:

a) Write a note on verification and validation. **[4]**

b) What are the contents of procedure? which factors are affecting the contents of the SOA procedure manual? **[4]**

c) List out the clauses of ISO-9001 requirements. **[2]**

◀▶ ◀▶ ◀▶

[4937]-4004

M.Sc.

COMPUTER SCIENCE

CS - 405 : Modeling&Simulation

(2013 Pattern) (Semester-IV)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

  1) *Attempt any five questions.*
  2) *Neat diagrams must be drawn wherever necessary.*
  3) *Figures to the right side indicate full marks.*
  4) *Assume suitable data if necessary.*

Q1) Attempt the following:

   a) Discuss steady state behavior of stochastic systems.   **[4]**

   b) List the entities of Framework for Modeling & Simulation.   **[2]**

   c) Write a note on probability distributions and estimation   **[4]**

Q2) Attempt the following:

   a) Give the advantages and disadvantages of Simulation.   **[4]**

   b) Discuss the characteristics of a good random number generator. **[3]**

   c) Explain the process of verification and validation of a model. **[3]**

Q3) Attempt the following:

   a) What is a random variable and a distribution function.   **[4]**

   b) Write a note on Report Generation after Simulation.   **[4]**

   c) What is the importance of timing routine.   **[2]**

Q4) Attempt the following:

   a) Write a note on 'Need for Modeling and Simulation'.   **[4]**

   b) Explain sensitivity analysis   **[4]**

   c) Which are the different Types of validity   **[2]**

Q5) Attempt the following:

a) Explain Switching Automata **[4]**

b) Discuss Qualitative and Quantitative comparison of Model and Source system behavior. **[4]**

c) Give two point of comparison between static and Dynamic simulation models. **[2]**

Q6) Attempt the following:

a) Discuss the concept of cellular automata, explain fitness of a cell. **[5]**

b) How is testing of hypothesis done **[3]**

c) What is logical time. **[2]**

Q7) Write a note on the following:

a) Transient and steady state behavior of stochastic systems. **[5]**

b) Experimenting with actual system and a model of the system. **[5]**

Q8) Attempt the case study and answer the following questions

Single-Server Queuing system

OR

A moving artificial satellite

Questions.

a) Define Discrete and Continuous system. Identify whether the system is Discrete or continuous system and justify your answer **[5]**

b) Draw flowcharts for depicting various phases in Modeling and Simulation of the problem with correct symbols and flow of execution. **[5]**

◄► ◄► ◄►

[4937]-3006

M.Sc. - II

COMPUTER SCIENCE

CS - 307 : Functional Programming

(2013 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

   1)   Answer any five questions.

   2)   Neat diagrams must be drawn whenever necessary.

   3)   Figures to the right indicate full marks.

Q1) a)   Write a function using imperative and functional paradigm to calculate and print GCD of two numbers.   **[4]**

   b)   Reduce following λ expressions

      i) $(\lambda x.xxx)\urcorner$

      ii) $(\lambda x.(\lambda y.yx)z)\vee$ **[4]**

   c)   What are exceptions in python? Give example.   **[2]**

Q2) a)   What are functional forms? Explain construction & apply-to-all with example.   **[4]**

   b)   Explain principles of functional programming.   **[4]**

   c)   Write a regular expression that validates email. (eg. abc @ xyz.com) assume that space and other special characters are allowed in email. **[2]**

Q3) a) What will be the output of following program

i) i=1

while i<=3;

```
j = 1

while j<=i;

    print j,

    j=j+1

print

i=i+1;
```

ii) i=5

while i >=0;

```
for j in range (1,i)

    print j;

print

i = i–1
```
[4]

b) What are different types of function arguments supported by python? Define each one of them. **[4]**

c) Write the output of following code

A = {10:1000,20:2000,30:3000,40:4000}

print A . items ( )

print A . keys ( ) **[2]**

Q4) a) Explain the scenarios in which you would use type safe language and scenarios in which you would use dynamic language. **[4]**

b) i) Compute factorial of 5 using reduce.

ii) Using map function in python generate cube of numbers for the list [2,3,4,5,6] **[4]**

c) Give the output of following statement

>>str = "Honesty is the best policy" >> str. replace ('0', '*') **[2]**

Q5) a) Explain the grammar of lambda calculus. **[4]**

b) Write a python program to copy content of one file to another. **[4]**

c) What is frozen set. **[2]**

Q6) a) Reduce following expression using Applicative order and normal order

$$\left(\left(\lambda x \cdot (\lambda y \cdot \lambda z \cdot zy)x\right) \ (\lambda x \cdot x)\right)$$ **[4]**

b) Explain α - conversion & β reduction with example. **[4]**

c) Define free & bound variables. **[2]**

Q7) a) Write a python script that defines a class 'Time' with attributes hh,mm,sec Define a member function that takes two 'Time' objects as parameter & add the two times returning the result. **[5]**

b) Explain call by value and call by name reduction strategies. **[5]**

Q8) a) What is lazy evaluation? How python supports lazy evaluation explain with example. **[5]**

b) Define redex & normal form. Explain graph reduction with example. **[5]**