DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B. E. SEM V INFORMATION TECHNOLOGY
THIRD SESSIONAL EXAMINATION
SUBJECT: ADVANCE MICROPROCESSOR ARCHITECTURE
Date: 15/10/12   Seat No._____   Time: 11.15 to 12.30   Max. Marks: 36
Instruction: **No marks without justification.**
               Calculator is not allowed.

Q-1   Answer the following.
[A]   In data parallelism method, speedup is not directly proportional to the no. of processors. State True/False   [2]
      and justify.
[B]   Super scalar architecture uses both temporal and data parallelism. True/False and justify.   [2]
[C]   Difference between fine grained and coarse grained jobs.   [2]
[D]   If the percentage of unconditional branches is 10%, conditional branches is 18% and immediate   [1]
      instructions are 8% in programs executed in SMAC2P, calculate the average clock cycles required per
      instructions.
[E]   What is delay slot ? How it improves the delay due to control hazard ?   [2]
[F]   In one processor BTB size is 1024 and in other processor BTB size is 4096. Whose performance will be   [2]
      better ? Justify your answer (no marks without justification).
[G]   Pipelining increases the execution time of an individual instruction. State T/F and justify.   [1]

Q-2   Answer Any Two.   [12]
[A]   An examination paper has 4 questions. The answer to these questions does not take equal time to correct.   [6]
      Answer to question 1 takes 4 min. to correct, question 2 takes 6 minutes, question 3 takes 5 minutes, and
      question 4 takes 8 minutes. Due to this speed mismatch storage should be provided between teachers.
      Answer the following questions assuming 2000 papers are to be corrected by 4 teachers.
            (i)   What is the idle time of teachers?
            (ii)   What is the system efficiency?
            (iii)   How much tray space should be provided between teachers due to speed mismatch?
            (iv)   What will be efficiency if data parallel mode is given.
[B]   i)   In the pipeline mode of processing we assumed that there is no communication delay between   [4]
           stages of the pipeline . If there is a delay of y between pipeline stages derive a speed up
           formula. What condition should y satisfy to ensure a speedup of at least 0.8k where k is the no.
           of stages in the pipeline ?
      ii) Explain the differences between superscalar processors and multiscalar processors.   [2]
[C]   Draw the pipeline execution diagram for the following instructions of hypothetical processor SMAC2P :   [6]
      DIV R1, R5, R1
      ADD R2, R4, R3
      SUB R2, R5, R1
      Draw the space-time diagram for above instructions by stalling the instruction for various hazards.
      Specify very clearly the cause of the stall. State the types of data dependency present in the above
      instructions set. Assuming register forwarding available, redraw the space-time diagram again.

Q-3   Answer the following.   [12]
[A]   The following expressions are to be evaluated.   [6]
      $a = g(p) + e^{-xf(y)} + h(x^2) + f(y)^* g(p)$
      $b = f(u^2) + \sin(g(p)) + \cos^2 h(y^2)$
            1. Obtain task graph for calculating a and b.
            2. Assuming 4 processors are available. Obtain task assignment to processors   assuming the
               following timing for various operations.
                  - Squaring=1, add=1, multiplication=1,
                  - sin=cos=exponentiation=2 ,
                  - g(x)=h(x)=f(x)=2
[B]   (i) What is pipeline Hazards ? Explain various hazards due to non-ideal conditions present in pipelining   [3]
      processor.
      (ii) What is superscalar architecture ? Assuming ideal conditions. Draw the space-time diagram for 6   [3]
      instructions. How many clock is saved compared to normal pipeline architecture ?

                                          OR
Q-3   [12]
[A]   In the examination paper there are 4 questions and each will take on average 5 minutes to correct. 1000   [6]
      candidates write examination. 4 teachers are employed to correct paper using pipeline mode. Every
      question is not answered by all candidates. 10% of candidates do not answer question 1, 15% question 2,
      5% question 3, 25% question 4.
            i)   How much time is taken to complete grading?
            ii)   What is the efficiency of pipeline processing?
            iii) If data parallel method is used how much time will be taken to complete the grading?
[B]   Explain the terms Pipeline stall and pipeline locking with the help of space-time diagram. What is the   [6]
      main advantage of pipeline locking over pipeline stall ? Explain how this will help to avoid WAW
      hazard.

DATE:16/10/2012
Time: 11.15 to 12.30

MAX MARKS:36
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Q1 Answer The following questions:

a) Compare backtracking with Branch and bound method. Give an example in which backtracking is more suitable than branch and bound. [2]

b) Give difference between FIFO branch and bound and LC search branch and bound. Is there any difference in efficiency if you choose one over the other for a specific problem. [2]

c) What is your justification for the question "Is P is a proper subset of NP" ? [2]

d) Compare Deterministic and Non Deterministic Algorithms. [2]

e) List out implicit and explicit constraints of 8-Queen problem and sum of subset problem. [2]

f) Define the terms : Live node, E node and Dead node. Also explain what is the difference in E node of backtracking and E node of Branch and bound. [2]

Q2 Answer any two.

a) Allocate the integers from 1 to 8 to the squares in following figure such that no two adjacent squares (vertical, diagonal and horizontal) contains consicutive integers. [6]
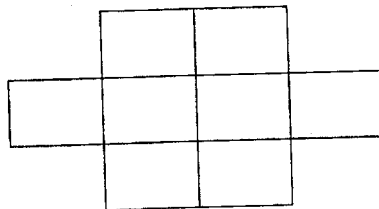
Write a suitable algorithm to findd adjacent squares of a square.

b) Color the given map with 3 colors using **backtracking** technique. Also explain the algorithm.Use Variable tupple size formulation. [6]
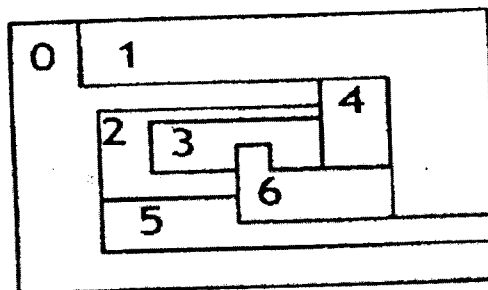
c) Let w= {5,7,10,12,15,18,20} and m= 35. Solve sum of subset problem using **backtracking** technique. Use fixed tupple size formulation. [6]
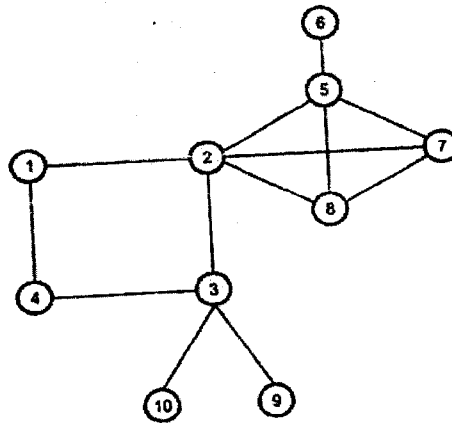
Q3 Answer the following questions

a) Use **branch and bound** to solve the assignment problem with the following cost matrix: [6]

	1	2	3	4
a	94	1	54	68
b	74	10	88	82
c	62	88	8	76
d	11	74	81	21

b) Decide the articulation points and bi- connected componants for the graph given below.   [6]

OR

Q3 Answer the following questions

a) Find the optimal tour for TSP for 5 cities using **branch and bound** method method. Cost   [6]
matrix is given below.

	a	b	c	d	e
a	∞	7	3	12	8
b	3	∞	6	14	9
c	5	8	∞	6	18
d	9	3	5	∞	11
e	18	14	9	8	∞

b) Solve the following problem using **branch and bound** method:"Given n objects and a   [6]
knapsack with capacity W=10 kg. Fill the knapsack with the objects such as to maximize the
total value."

i	1	2	3	4
v_i	10	40	30	50
w_i	5	.4	6	3

Date	: 17/10/2012	Day	:
Time	: 1 to 12:30	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed. [12]

(a) (I) MTU is specified by [2]
(A) IP Datagram size (B) Hardware technology(C) TCP Segment size
(D) None of the above.
(II) FTP does not use
(A) Two transfer mode. (B) Control connection to remote computer before file can be transferred. (C) User Datagram Protocol.
(D) Authorization of a user through login and password verification.

(b) If client and server are communicating using UDP protocol and the UDP segment contains only ACK then what is the size of packet for this segment at network layer? [2]

(c) During an FTP session the data connection is opened _____ and control connection is opened _____ (exactly once, exactly twice, as many time as necessary) [2]

(d) When web pages containing emails are sent out they are prefixed by MIME Header. Why? [1]

(e) Differentiate between http and https. [1]

(f) When a connection is idle for a long time then which timer of TCP is used to check other side is still there or not? [1]

(g) What is the use of urgent pointer in TCP segment? [1]

(i) The addressing especially used by Transport Layer is_____. [1]

(j) What is internet daemon? [1]

Q.2 Attempt Any Two from the following questions. [12]

(a) (I) What is trival file transfer protocol? Explain briefly. [2]
(II) How aliases are used in DNS? Explain. [2]
(III) Explain the meaning of following socket primitive: [2]
        BIND, LISTEN, ACCEPT and CONNECT.

(b) (I) Why Gateways are used during mail transfer? [2]
(II) Write a solution for sender & receiver given by Nagle and Clark. [2]
(III) What are the differences between TCP and UDP? [2]

(c) (I) Is TCP checksum necessary or could TCP allow IP to checksum the data? Explain [2]
(II) Define: (a) Encryption. (b) Socket [2]
(III)What are TSAP and NSAP? [2]

Q.3 (a) (I) Explain Three-Way Handshake Mechanism used by TCP to terminate a Session. [4]
(II) Write down the characteristic of TCP protocol. [2]

(b) (I) If TCP RTT is currently 30 msec & the following acknowledgements come in after 26, 32 and 24 msec respectively. What is the new RTT estimate? (use $\alpha = 0.9$) [3]
(II) What is delayed duplicate problem? Write various solution of it. [3]

OR

Q.3 (a) (I) Consider slow start algorithm of TCP congestion control with THRESHOLD is 10. Suppose initial segment size is 2 bytes then what is the size of segment during 6th transmission? [3]
(II) How can we achieve confidentiality and authentication in cryptography? [3]

(b) Write a short note on: [6]
    (A) DNS
    (B) Network Baseline
    (C) Firewall

Examination	: B.TECH IT- Semester - V	Seat No.	:
Date	: 18/10/2012	Day	: Thursday
Time	: 11:15am to 12:30pm	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.
(a) What is illumination? Also mention its unit. [2]
(b) Bulk type photoconductive cells have ____ power dissipation, ____ switching speeds. [2]
(c) Name any two types of photodiodes. [2]
(d) State True or False: [2]
   1) Orifice plates are restriction elements.
   2) Cylinder and Piston meter is a variable head flow meter.
(e) State True or False: [2]
   1) For the same diameter 'd', orifice plates offer more range than flow nozzles.
   2) For a differential flowmeter, $F \propto \sqrt{\Delta P}$ where F is flow rate and ΔP is differential pressure
(f) What are the two main purpose of flow measurement? [2]

Q.2 Attempt *Any TWO* of the following questions. [12]
(a) What are restriction elements? Explain Orifice plates and Venturi tubes with necessary diagrams.
(b) Match the following for each flowmeter to its relevant property.

Flowmeter	Relevant property
1) Variable head flowmeter	a) Pulses per unit time
2) Turbine flowmeter	b) Differential Pressure
3) Rotameter	c) Displacement of float
4) Heat transfer flowmeter	d) Time taken for wave to traverse
5) Ultrasonic flowmeter	e) *Force $\propto$ (Flow)^2*
6) Target flowmeter	f) Temperature difference between upstream and downstream flow

(c) Explain any two applications of Optoelectronic sensors in detail.

Q.3 (a) Explain principle, construction and working of a Turbine flowmeter. List out advantages and disadvantages of the same [6]
(b) Explain Magnetic flowmeter in detail with its advantages and disadvantages. [6]

OR

Q.3 (a) How are variable area flowmeters different from variable head flowmeters? Explain in brief variable area flowmeters viz. 1) Rotameter 2) Cylinder and Piston meter. [6]
(b) List out necessary steps/points for selection of a flowmeter. [6]

Examination	: Third Sessional	Seat No.	: _____
Date	: 19/10/2012	Day	: Friday
Time	: 11.15 to 12.30	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1   Do as directed.

(a) Let a and b be two elements in a lattice $(A, \le)$ show that $a \vee b = a$ if and only if $a \wedge b = b$ **[2]**

(b) Give an example of semigroup which is not monoid and an example of Integral domain **[2]** which is not field.

(c) Let **a** be a numeric function such that a_r is equal to the remainder when the integer is **[2]** divided by 17. Let **b** be a numeric function such that b_r is equal to 0 if the integer r is divisible by 3 and is equal to 1 other wise. Let $c_r = a_r + b_r$. For what value of r is $c_r = 1$?

(d) What is the general form of particular solution of the difference equation   **[2]**

$$a_r - 4a_{r-1} + 4a_{r-2} = (r+1)2^r$$

(e) Let $G = (Z_5, \oplus_5)$ be a group. Is this cyclic? Why?   **[2]**

(f) What is the numeric function of the generating function $\dfrac{z^4}{1-2z}$ **[2]**

Q.2   Attempt *Any Three* from the following questions.   **[12]**

(a) Prove that ker(f) is a ideal of ring $(G, +, \cdot)$

(b) For any a, b, c, d in a lattice $(A, \le)$ if $a \le b$ and $c \le d$ then $a \vee c \le b \vee d$ and $a \wedge c \le b \wedge d$

(c) If $A(z) = \dfrac{7z^2}{(1-2z)(1+3z)}$ then what is $a_r = ?$

(d) Solve: $a_r - 5a_{r-1} + 6a_{r-2} = r + 2^r$

Q.3 (a) Let $(A, \vee, \wedge, -)$ be a finite Boolean algebra. Let b be any non zero element in A, and **[4]** $a_1, a_2, \ldots.a_k$ be all the atoms of A such that $a_i \le b$, then prove that
$$b = a_1 \vee a_2 \vee \ldots.. \vee a_k$$

(b) Let a*H and b*H be two cosets of H. Then prove that either a*H and b*H are   **[4]** disjoint or they are Identical.

(c) Evaluate the sum: $1^2 + 2^2 + 3^2 + \ldots.. + r^2$ using generating function method.   **[4]**

OR

Q.3 (a) Solve recurrence relation of tower of Hanoi problem by generating function method.   **[4]**

(b) Prove that in a distributive lattice, if an element has a complement   **[4]** Then this complement is unique.

(c) Prove that finite integral domain is a field.   **[4]**

SUBJECT: (IT502) DATABASE MANAGEMENT SYSTEM

Examination	: Third Sessional	Seat No.	: _____
Date	: 20/10/2012	Day	: Saturday
Time	: 11:15 to 12:30	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

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20/10/2012

Q.1 Do as directed.   [12]
    (a) Checkpoints are a part of (A) Recovery measures. (B) Security measures.   [1]
       (C) Concurrency measures. (D) Authorization measures.
    (b) Precedence graphs help to find a (A) Serializable schedule. (B) Recoverable schedule. (C) [1]
       Deadlock free schedule. (D) Cascadeless schedule.
    (c) Shadow paging has (A) no redo (B) no undo (C) redo but no undo (D) neither redo nor undo   [1]
    (d) In multiple granularity of locks SIX lock is compatible with (A) IX (B) IS (C) S (D) SIX   [1]
    (e) Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock [1]
       on R. (A) It will result in a deadlock situation. (B) It will immediately be rejected.
       (C) It will immediately be granted. (D) It will be granted as soon as it is released by A.
    (f) For correct behavior during recovery, undo and redo operation must be   [1]
       (A) Commutative (B) Associative (C) idempotent (D) distributive
    (g) Cascading rollback is avoided in all protocol except   [1]
       (A) Strict two-phase locking protocol. (B) tree locking protocol
       (C) Two-phase locking protocol (D) Validation based protocol.
    (h) Which of the following is not a recovery technique?   [1]
       (A) Deferred update (B) Immediate update (C) Two-phase commit (D) Shadow paging
    (i) Advantages of Replication is/are (A) Transparency (B) Availability   [1]
       (C) Improved performance (D) Centralized processing
    (k) Validation scheme is known as _____ scheme. Why?   [1]
    (l) Blind writes appears in _____ schedule.   [1]
    (h) Every conflict serializable schedule is view serializable. State True or False.   [1]

Q.2 Attempt *any two* from the following.   [12]
    (a) What are deferred modification and immediate modification technique for recovery?   [6]
       How recovery does take place in case of failures in these techniques?
    (b) Explain the two-phase commit protocol with how it handling failures of distributed database [6]
       system.
    (c) What is deadlock? And How to handle deadlock detection and recovery?   [6]

Q.3   (a) Consider three transactions: T1, T2 and T3. Draw the precedence graph for the   [6]
       following schedule consisting of these three transactions and determine whether it is
       Serializable OR not. If so, give its serial order(s).

Time	T1	T2	T3
t1 :			read(Y)
t2 :			read(Z)
t3 :	read(X)		
t4 :	write(X)		
t5 :			write(Y)
t6 :			write(Z)
t7 :		read(Z)	
t8 :	read(Y)		
t9 :	write(Y)		
t10 :		read(Y)	
t11 :		write(Y)	
t12 :		read(X)	
t13 :		write(X)	

       And also state what is serial schedule and serializable schedule.
    (b) Explain Two-phase locking protocol with example. Differentiate between strict two-phase   [6]
       and rigorous two-phase with conversion protocol.

OR

Q.3 (a) Explain Multiple Granularity protocol.   [6]
    (b) Compare wait-die deadlock prevention scheme with wait-wound scheme.   [4]
    (c) Compare the shadow paging with the log-based techniques.   [2]