



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER V [I.T]

SUBJECT: (CT-506) DESIGN & ANALYSIS OF ALGORITHM

Examination : First Sessional **Seat No.** : _____
Date : 30/07/2013 **Day :** Tuesday
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) Define growth rate of a function. Arrange the following growth rates in increasing order. $O(\sqrt{n}), O(n^2), O(\log n), O(n \log n), O(n!), O(a^n)$ [2]
- (b) What is an Algorithm? Also describe various steps in the algorithmic life cycle? [2]
- (c) Differentiate between prior and posterior analysis [2]
- (d) Make a matrix multiplication using strassen's method. [3]
$$\begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 4 & 2 \\ 3 & 1 \end{bmatrix}$$
- (e) Find out recurrence relation for given pseudo code and find time complexity. [2]
int g (int n) {
 if (n == 1)
 return 2;
 else
 return 3 * g (n / 2) + g (n / 2) + 5;
}
- (f) Give the application of priority Queue. [1]

Q.2 Attempt Any Two from the following questions.

- (a) Find the recurrence relationship for following algorithm and find the complicity [12]
[6]
Hanoi (n, A, B, C) // Here n is no. of plates and A, B, C are three rods.
{
 if (n > 0) {
 "Move from A → B" }
 Else {
 Hanoi (n-1, A, C, B);
 "Move from A → B"
 Hanoi (n-1, C, B, A); }
}
- (b) Solve following recurrence using suitable method [6]
 $T(n) = T(n/3) + T(2n/3) + n c$
- (c) Solve $T(n) = 2T(n/2) + n(\log_2 n)$ using suitable method [6]

Q.3 (a) Sort the following elements using Merge Sort and Show step by step tracing. [6]
3, 5, 1, 8, 4, 10, 12, 11, 15, 2

- (b) Show the steps of Binary Search algorithm and make a time analysis on it.**

OR

- Q.3 (a) Sort the following elements using Quick Sort and Show step by step tracing.** [6]
4, 5, 1, 8, 3, 10, 12, 11, 2, 15
- (b) Show the steps of Max-Min algorithm and make a time analysis on it.** [6]

**Examination : First Sessional
Date : 31/07/2013
Time : 11:15 to 12:30**

**Seat No. :
Day : Wednesday
Max. Marks : 36**

INSTRUCTIONS:

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

I IT. I- sess. C.C.N

31/07/2013

Q.1 Do as directed.

- A Put the encapsulation steps in order: 1:User Input, 2:Frame, 3:Segment, 4:Packet, 5:bits [1]
- B End-to-End connectivity is provided from host-to-host in [1]
 - (A) Network Layer (B) Data link Layer (C) Transport Layer (D) Physical Layer
- C How many bits burst error can be detected using CRC method? [1]
- D What is time domain reflectometry? [1]
- E What addressing information is shipped with every network interface card? [1]
 - (A) IP Address (B) MAC Address (C) ARP Address (D) All of these
- F What are the responsibilities of presentation layer in OSI model? [1]
- G Stop and wait protocol equal to [1]
 - (A) SR protocol with SWS = 1 (B) GBN protocol with RWS = 1 (C) SR protocol with SWS = RWS (D) GBN protocol with SWS = RWS
- H Define: (1) peer entity (2) interface. [1]
- I if we run N simultaneous stop-n-wait ARQ processes parallelly over the transmission channel, then it is equal to [1]
 - (A) Go-back N protocol (B) SR Protocol (C) Stop-n-wait protocol (D) None of these
- J Which of the following devices translates dissimilar network protocols? [1]
 - (A) Router (B) Repeater (C) Switch (D) Gateway
- K What would happen if two machines on the same LAN have the same MAC address? [2]

Q.2 Attempt Any TWO of the following questions.

- a [I] Station A needs to send a message consisting of 9 packets to Station B using a sliding window (window size 3) and go-back-n error control strategy. All packets are ready and immediately available for transmission. If every 5th packet that A transmits gets lost (but no acks from B ever get lost), then what is the number of packets that A will transmit for sending the message to B? [4]
 - [II] Define: Hidden station and Exposed station problem. [2]
- b [I] Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D. [3]



- c [I] Define: Contention period, Transmission period and Idle period with respect to CSMA/CD [3]
 - [II] What is the remainder obtained by dividing x^7+x^5+1 by the generator polynomial x^3+1 ? Show the transmitted bit string. Suppose 4th bit from the left is inverted during the transmission. Show this error is detected at the receiver end. [6]

- Q.3(a)** [I] Explain Binary countdown protocol with example. [3]
- [II] Answer the following questions for frame arrives at bridge in LAN [3]

- (1) What if destination and source LAN are same? (2) What if destination and source LAN are different?
- (3) What if destination LAN is unknown?

- Q.3(b)** Two neighboring nodes (A and B) use the selective-repeat ARQ with a 3-bit sequence and a window size of 4 at the transmitter and receiver. Assuming A is transmitting and B is receiving, show the content of the window and the positions of the respective pointers at both nodes A and B for the following succession of events.
- (a) Before A sends any frames.
 - (b) After A sends frames 0, 1, and 2; B acknowledges 0 and 1, and both ACK's are received by A.
 - (c) After A sends frames 3, 4, and 5; B acknowledges 4, and the ACK is received by A.

-OR-

- Q.3(a)** Explain IEEE-802.5 LAN standard in detail. [6]
- Q.3(b)** Sixteen bit messages are transmitted using a hamming code. How many check bits are needed to ensure that receiver can detect and correct single bit error? Show the bit pattern transmitted for the message 1101001100110101. Assume that even parity is used in hamming code. Suppose the 7th bit position from right has been changed during the transmission. Show that this error is detected at the receiver's end. Take D1 from left. [6]



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
FIRST SESSIONAL
SUBJECT : (IT506) ADVANCED MICROPROCESSOR ARCHITECTURE

Examination : B.TECH - Semester - V Seat No. :
Date : 29/07/2013 Day : Monday
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.
5. Calculator is not allowed.

Q.1	(a) After reset, 8086 will fetch first instruction from _____ physical address. 02
	(b) If all segment registers are initialized with same value, 8086 can access maximum _____ Kbytes of physical memory at that instant of time. Justify your answer. 02
	(c) First 1 Kbytes memory in 8086 system must be non-volatile memory in 8086. State true/false and justify. 02
	(d) In which condition, two different logical addresses can point to the same physical address in 8086 ? Explain with example. 02
	(e) If DS=10000, SS=20000, BP=0001 and SI=FFFF, IF MOV AX,[BP+SI] is executed, from which physical memory locations, content will be transferred to AX register ? 02
	(f) MOV AX, 01FFH MOV BL,02H DIV BL When DIV BL instruction is executed, type 0 response will be generated. State True/false and justify. 02
Q.2	(a) The 8086 system requires following memory map : 06 EPROM FC000H TO FDFFFH EPROM device available is of size 4 Kbytes. Use 3625 bipolar PROM as decoder to map above devices using absolute decoding. Write down the truth table and draw the complete circuit diagram. State your assumptions, if any, very clearly. OR (b) The 8086 system requires following memory map : 06 EPROM to be mapped to last 32 Kbytes of processor address space. EPROM device available is of size 16 Kbytes. Use 3625 bipolar PROM as decoder to map above devices using absolute decoding. Write down the truth table and draw the complete circuit diagram. State your assumptions, if any, very clearly.
Q.2	(b) Write a program for TASM to add four 16-bit unsigned numbers which are stored in logical segment named NUMBER. Store the result in another logical segment named RESULT. Draw neat flow chart and state any assumptions if any clearly. OR (b) MOV AX,FFFFH PUSH AX CALL ADDITION POP AX Write near procedure ADDITION to add 2 8-bit numbers which were passed in the above program through stack and pass back the result on the stack to main line program. State your assumptions, if any, very clearly. 06
Q.3	(a) The BX register is typically used as a pointer for accessing 01 (i) extra segment (ii) code segment (iii) stack segment (iv) data segment (b) Define the pipelining concept in one sentence. 01 (c) Differentiate RET and IRET instruction. 02 (d) MOV AX,[1234H] and MOV AX,[1235H], which one will run faster and why ? 02 (e) JMP [BX] ; if this is a intersegment call instruction, re-write the instruction with proper assembler directive. 02 (f) NUMBER DW 1234H, 5678H ; show how these numbers are stored in the memory of 8086. 02 (g) If ICW2 is initialized with T7=0, T6=0, T5=0, T4=1 and T3=0 interrupt arrives on IR2 pin of 8259, what type number will be sent by 8259 during 2 nd INTA pulse ? 02

OR

Q.3	(a) PUSHF MOV BP,SP OR WORD PTR [BP+0],0100H POPF MOV AX,7FFFEH MOV BX,02H ADD AX,BX INTO Describe the response of 8086 for all instructions after POPF instruction. Assume single step interrupt subroutine saves all registers. 12
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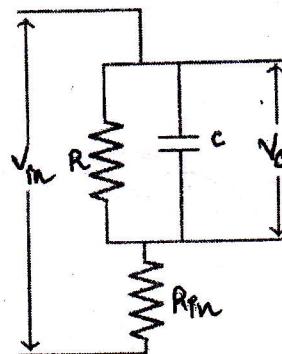
DIHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
FIRST SESSIONAL
SUBJECT: (IT 507) INDUSTRIAL INSTRUMENTATION

Examination	: B.TECH IT- Semester – V	Seat No.	:
Date	: 01/08/2013	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.** [2]
- (a) Define 1)Accuracy 2)Precision [2]
 - (b) Define 1)Repeatability 2)Sensitivity [2]
 - (c) State true or false [2]
 - i) SNR (Signal to noise ratio) in an instrument should ideally be high
 - ii) A linear indicating scale is one of the most desirable feature in an instrument
 - (d) What is a transducer? Give atleast two examples. [2]
 - (e) Explain instrument drift in brief. [2]
 - (f) State the working principle of piezoelectric crystal. Give examples of piezoelectric materials. [2]
- Q.2 Attempt *Any TWO* of the following questions.** [12]
- (a) State and explain applications of instrument systems.
 - (b) Explain pneumatic type of force meter with necessary diagram.
 - (c) What is calibration? Explain all calibration methods
- Q.3** [6]
- (a) Formulate the system equation for the given circuit:



- Q.3** [6]
- (b) What is noise? State various methods to reduce noise.
- OR**
- Q.3** [6]
- (a) State the working principle of piezoelectric crystal. A piezoelectric crystal has a charge sensitivity of 3pC/N. The dielectric constant is 4.5 and Young's modulus is 9000 MPa. Find the voltage sensitivity constant K.
 - (b) State the principle of the strain gauge. Derive the formula for gauge factor.



DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
FIRST SESSIONAL EXAM
DISCRETE MATHEMATICS (I.T.)

Examination : B.TECH - Semester - V
Date : 02/08/2013
Time : 1 hour 15 min.

Seat No. :
Day : Friday
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) In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions? [2]
- (b) Let $D_{24} = \{1, 2, 3, 4, 6, 8, 12, 24\}$ and relation "divides" be the partial ordering relation on D_{24} . Find lub and glb of 8 and 12 respectively. [2]
- (c) Determine the set $\Phi \oplus \{\alpha, \Phi, \{\Phi\}\}$ [2]
- (d) $A = \{1, 2, 3, 4, 5\}$ Let R be the relation on set A such that $R = \{(x, y) / x \leq y\}$. Is R equivalence relation or not? Justify your answer. [2]
- (e) Construct the truth table for the statement $(\bar{q} \rightarrow \bar{p}) \rightarrow (p \rightarrow q)$ [2]
- (f) Construct Language from the given grammar, Where S is the starting symbol. [2]
{ S → abS, S → aA, A → a }

Q.2 Attempt Any THREE of the following questions.

[12]

- (a) Show that for any integer $n \geq 1$, $(2^n \times 2^n) - 1$, is divisible by 3 by induction.
- (b) Ten men went to a party and checked their hats when they arrived. The hats were randomly returned to them when they departed. Find the probability that no man gets his own hat back.
- (c) Let R be binary relation from A to B and $R^{-1} = \{(b, a) / (a, b) \in R\}$ is a binary relation from B to A.
 - (a) Let R_1 and R_2 be a binary relation from A to B. Is it true that $(R_1 \cup R_2)^{-1} = R_1^{-1} \cup R_2^{-1}$.
 - (b) If R is transitive, is R^{-1} necessarily transitive?
 - (d) Give a grammar that specifies the language:
$$L = \{a^{2i}b^{2j} / i \geq 1, j \geq 1\}.$$

- Q.3** (a) Show that $\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \dots + \frac{1}{\sqrt{n}} > \sqrt{n}$ for all $n > 1$ by induction. [12]

- (b) Among integers 1 to 1000,
 - (a) How many of them are not divisible by 3 nor by 5 nor by 7?
 - (b) How many are not divisible by 5 or 7 but divisible by 3?
- (c) Let R be a binary relation on the set of all positive integers such that $R = \{(a, b) / a-b \text{ is an odd integer}\}$ Is R reflexive? Symmetric? Antisymmetric? Transitive? An equivalence relation? A partial ordering relation?

OR

- Q.3** (a) How many ways to place $2t+1$ indistinguishable marbles in three distinct boxes so that any two boxes together will contain more balls than the other one? [12]
- (b) Define an equivalence relation. Prove that the relation "congruence modulo 5" given by $R = \{(x, y) / x-y \text{ is divisible by } 5\}$ over the positive integer is an equivalence relation.
- (c) Give a grammar that specifies the language:
"Every sentence in the language is a string of a's and b's with the number of b's being a multiple of 2"

- Figures to the right indicate maximum marks for that question.
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- Draw neat sketches wherever necessary.

V. I.T. Sess. I DBMS
3/08/2013

Q.1 Do as directed.

- (a) Why would you choose database system instead of simply storing data in operating system files? When would it make sense not to use database system? [2]
- (b) What is referential integrity? Explain with appropriate example. [2]
- (c) Match the following. [2]
- | | |
|-------------------------|---|
| 1. Strong Entity | A. Collection of entities that have similar attributes. |
| 2. Entity Set | B. Degree of RSS |
| 3. Ternary Relationship | C. Discriminator |
| 4. Weak Entity | D. Primary Key |
- (d) Let R be a relation of degree n. How many different projections on R are possible? [1]
- (A) n (B) n-1 (C) n+1 (D) $2^n - 1$
- (e) The ability to modify the internal schema without causing any change to external schema is, [1]
- (A) Physical data Independence (B) Logical data Independence
- (C) External data Independence (D) Conceptual data Independence
- (f) What should be the condition for total participation of the entity in a relationship? [1]
- (A) Maximum cardinality should be one (B) Minimum cardinality should be zero
- (C) Minimum cardinality should be one (D) None of the above
- (g) Define unsafe expression in TRC with example. [1]
- (h) What is view? List two reasons why we may choose to define a view. [2]

Q.2 Attempt Any Two from the following questions.

- (a) Draw an E-R diagram for HR Management System. (Min. 4 Entity Sets) [12]
- (b) Define Specialization, Generalization and Aggregation with appropriate Examples. [6]
- (c) A. What is the purpose of assertions? Explain with appropriate example.
B. Explain granting of Authorization & privileges in DBMS. [3]

Q.3 (a) Answer the following questions.

Consider the following relations with key in *Italics*.

Person(*driver_id*, name, address)

Car(*license*, model, year)

Accident(*report_no*, date, location)

Owns(*driver_id*, *license*)

Participated(*driver_id*, *license*, *report_no*, damage_amount)

Write the following queries in SQL:

- (i) Remove the Audi belonging to 'John Smith'. [1]
- (ii) Retrieve all the information from participated where damage_amount is not specified. [1]
- (iii) Retrieve the car name which met with an accident near 'Express Highway'. [1]
- (iv) Change Model no of car having license_no 'AABB2000' to 'CCDD5000'. [1]
- (v) Update accident relation which also shows time at which accident occurred. [1]
- (vi) Retrieve location of accident where it contains 'ey' as a substring. [1]

(b) Write the Tuple Relational Calculus for the following queries: [6]

- (i) Retrieve the car name which met with an accident near 'Express Highway' [2]
- (ii) Find Person name and address whose car participated in an accident. [2]
- (iii) Retrieve model of car whose damage_amount is above 20000. [2]

OR

Q.3 (a) Answer the following questions.

(Consider above relation schema)

Write the Relation Algebra for following queries:

- (i) Remove the Audi belonging to 'John Smith' [3]
- (ii) Count the no. of accidents occurred at location 'Express Highway'. [1]
- (iii) Retrieve car which met with an accident after year 2010. [2]

(b) Write Domain Relational Calculus for the following queries: [6]

- (i) Retrieve the car name which met with an accident near 'Express Highway' [2]
- (ii) Find Person name and address whose car participated in an accident. [2]
- (iii) Retrieve model of car whose damage_amount is above 20000. [2]