INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
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4. Draw neat sketches wherever necessary.

Ⅴ-ⅠT. AMA
Ⅱ-SGSS 1/9/2014

Q.1 State true/false and justify.

    (a) In protected mode of 80386, restriction on starting address of memory segment with nibble 0 in real address mode is still present.   [2]

    (b) An instruction MOV CS:[1234],EAX will generate an exception in PM of 80386.   [2]

    (c) Parameters are pushed on the stack in the same order from the order they are written in the function call parentheses in 'C'.   [2]

    (d) The size of page directory table in paging mode is 16 Kbytes where as page table is 4Kbytes.   [2]

    (e) To enter into virtual 8086 mode the VM bit in EFLAGS is not directly switched to 1 by software.   [2]

    (f) There is no difference in gate structure of interrupt and trap gates. But there is a difference when the processor executes the interrupt or trap procedure in 80386 PM.   [2]

Q.2   [12]

    (a) If an interrupt comes on IR4 pin of 8259 and upper five bits of ICW2 contains 00000b and IDTR=00000000000Fh, will it generate any exception to load interrupt gate descriptor from IDT? If yes then modify the value of IDTR The following is the interrupt Gate descriptor whose content is as follows :   byte   [6]

000Fh		6
E2h	00h	4
0014h		2
0000h		0

State the validity of this interrupt gate descriptor. If it is not valid, modify the content at appropriate location. What will be the starting address of the Interrupt subroutine? Will this interrupt procedure be global or local ? Why ?

    (b) Explain how 48-bit far pointer (virtual logical address in program) of protected mode of 80386 is translated into physical address space if paging is also enabled.. Assuming PDBR=23455XXXh, the Page table address in the PDE5= 45345XXXh, The page Frame address in the PTE32=67345XXXh. Calculate The Physical address of the Linear address 014202CAh.   [6]

<div align="center">OR</div>

    (b) In multiuser / multitasking system, OS should be protected from user program and user program should be isolated from each other and they should be protected from each other. Explain in detail the support provided by 80386 in PM to implement the above requirements.   [6]

    (a) What is the lifetime and scope of "Automatic" variable in 'C'? Explain which memory segment allocated for them in the system and how this will help to achieve above characteristics.   [2]

    (b) Explain how semaphore helps to protect critical region code in "mutual exclusion" technique with the help of an assembly language code example.   [2]

    (c) G bit in descriptor defines the maximum size of the memory segment in protected mode of 80386. State true/false and justify.   [2]

    (d) In protected mode, task can not be recursive. This is the requirement of the Intel. How system software developer can take care of this requirement ?   [2]

    (e) What is the maximum value that should assign to LIMIT in the IDTR? What is the address range of last descriptor in descriptor table defined by IDTR= 000110000lFFh ?   [2]

    (f) To switch the task through interrupt, interrupt type must point to _____ in _____.   [2]

<div align="center">OR</div>

Q.3   (a) Specify from the following, which one is memory segment and which one is not a memory segment in the Intel 80x86 architecture with reason :   [2]
1. IDT 2. LDT 3. TSS 4. GDT

    (b) Assume that the base address of LDT is 00120000h and GDT base address is 00100000h. If value loaded into the CS register is 1007h, what is the RPL? Is the segment descriptor in the GDT or LDT? What is the starting address of the segment descriptor?   [2]

    (c) Explain how IOs are protected in protected mode of 80386. Also specify the mechanism which allows ports to be associated only with specific tasks.   [2]

    (d) Offset part of the far pointer of call/jmp instruction to point CALL GATE Descriptor is ignored. State true/false & justify in detail.   [2]

    (e) Explain the terms hardware interrupt, software interrupt, Trap and Fault in 80386 protected mode.   [4]

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4. Draw neat sketches wherever necessary.

Ⅴ - IT DAA
Ⅱ -SEM   2/9/2014

Q.1 Do as directed.

(a) State True or False: "Greedy algorithm always gives optimal solution." Justify your answer. **[2]**

(b) Give difference between Greedy algorithm and Dynamic Programming. **[2]**

(c) Consider a weighted complete graph G on the vertex set {v1,v2,v3...vn} such that the weight of edge $(V_i, V_j) = 2 * |i - j|$. Find the weight of minimum spanning Tree of graph G. **[2]**
   (A) n-1   (B) 2n -2   (C) Infinity   (D) None of the above

(d) What kind of problems can be solved using dynamic programming approach? **[2]**

(e) Discuss the space and time complexity of dynamic programming based algorithms **[2]**

(f) Explain principle of optimality with suitable example. **[2]**

Q.2 Attempt *Any TWO* of the following questions. **[12]**

(a) Discuss dynamic programming based solution to making change problem with suitable example

(b) Find all pair shortest path for directed graph shown in **Fig. 2** using Floyd's algorithm

(c) Find the optimum string edit distance between "aababb" and "babba"

Q.3 (a) Seven jobs are given below with their respective profits (Pi) and deadlines (D_i). Consider each job takes one time unit to complete. **[6]**

Jobs	1	2	3	4	5	6	7
Profits(P_i)	30	20	18	6	5	3	1
Deadlines(D_i)	2	4	3	1	3	1	2

Using Greedy approach, find out Schedule in which we get maximum profit and each jobs in that schedule must be completed within their respective deadlines. (Use Fast approach and Clearly show the algorithm steps).
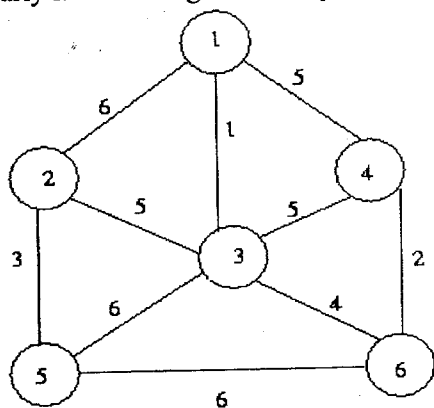
(b). **[6]**

Figure 1

Find Minimum spanning tree of above graph using Kruskal's and Prim's algorithm.
Also compare Kruskal's and Prim's algorithm.

OR

Q.3 (a) Solve following recurrence relation. **[6]**
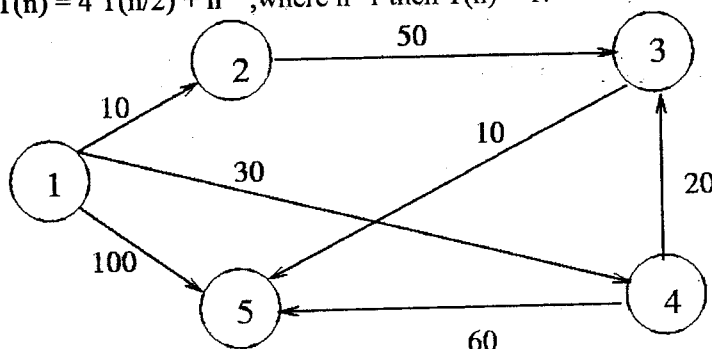$T(n) = 4 T(n/2) + n^2$,where n=1 then T(n) = 1.

(b) **[6]**

Figure 2

Find shortest distance of all nodes of above graph from Source node **1** using dijksra's greedy algorithm.

DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER V [Information Technology]
SUBJECT: (IT-505) Computer And Communication Network

|			
Examination	: Second Sessional	Seat No.	:
Date	: 3/09/2014	Day	:Wednesday
Time	: 11:15 to 12:30	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
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4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

A Consider the diagram shown below, an IP packet originates from sender S and traverses to destination D.The initial value of TTL is 32.Then what the maximum possible value of TTL field is when it arrives at D? **[2]**

S → R1 → R2 → R3 → R4 → D
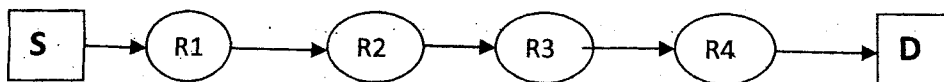
B Host A (on TCP/IP v4 network A) sends an IP datagram D to host B (also on TCP/IP v4 network B). Assume that no error occurred during the transmission of D. When D reaches B, which of the Following IP header field(s) may be different from that of the original datagram D? **[2]**
(i) TTL (ii) Checksum (iii) Fragment Offset
(A) (i) only (B) (i) and (ii) only (C) (ii) and (iii) only (D) (i), (ii) and (iii)

C What do you mean by loop back address? Give an example. **[2]**

D Name the techniques which are used for achieving good quality of service? **[2]**

E What do you mean by reverse path forwarding? **[2]**

F Define migratory host. **[2]**

Q.2 Attempt Any TWO of the following questions.

a (I)Let us consider a subnet mask 255.224.0.0. Find out class and number of sub networks. **[2]**
(II)You are given the following address 153.50.6.27/25. Determine the subnet mask; address class, subnet address and broadcast address. **[2]**
(III)Given the mask 255.255.254.0, how many host per subnet does this create? **[2]**

b A datagram of 4000B (including 20B of IP header) arrives at a router and must be forwarded to a link with MTU of 1500 byte.
(I)How many fragments are needed to allocate the data part of the original datagram? **[2]**
(II)What is the data size contained in the last fragment? **[1]**
(III)IF the original datagram is stamped with an identification number of 557 then what is the identification number of the last fragment? **[1]**
(IV)What will be the offset of the second segment? **[2]**

c A router has the following entries in the routing table: **[6]**

Address/mask	Next hop
135.46.56.0/22	interface 0
135.46.60.0/22	interface 1
192.53.40.0/23	router 1
Default	router 2

For each of the following ip addresses what does the router do if a packet with that address arrives?
(I) 135.46.63.10 (II) 135.46.52.2 (III) 192.53.40.7

Q.3(a) Consider a directed graph shown in fig.1 there are multiple shortest path between vertices S and T. Which one will be reported by Dijkstra's algorithm? Assume that, in any iteration, the shortest path to vertex v is updated only when strictly shorter path to v is discovered. **[6]**

Q.3(b) Explain congestion control policies in Virtual circuit and datagram subnet. **[6]**

-OR-

Q.3(a)   Assume the following hosts are present in the local network   **[6]**
Host A :IP-192.192.192.100, MAC-1A-23-F9-CD-06-9B   Host B :IP-192.192.192.101, MAC-88-B2-2F-54-
1A-0F
Host C:IP-192.192.192.102, MAC-48-BD-D2-C7-56-2A Host D:IP-192.192.192.103, MAC-5C-66-AB-90-
75-B1
(1)Suppose Host A send the ARP request to find the MAC address of the Host C and Host C sends back the
ARP reply. What is the destination MAC address in ARP request packet and reply packet?
(2) Suppose Host A send the ARP request to find who owns IP address 192.192.192.103.What is the
destination address in ARP request packet? Which host will give reply? What are the contents of ARP reply
packet?

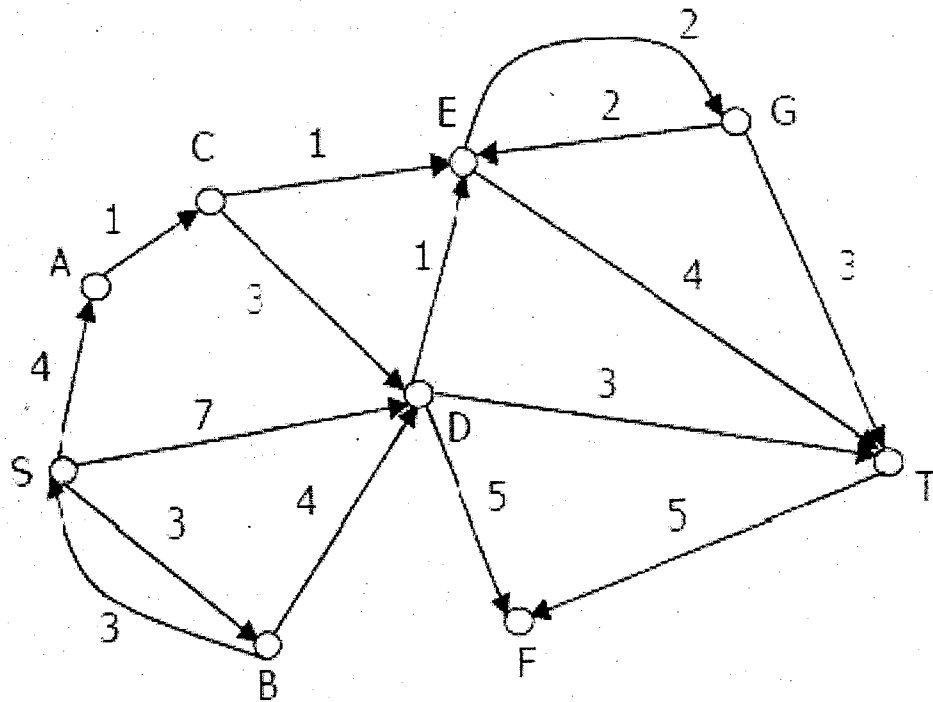**Q.3(b)**   Differentiate virtual circuit subnet and datagram subnet.   **[6]**

FIG 1.

Examination	: B.TECH IT- Semester –V	Seat No.	:
Date	: 04/09/2013	Day	: Thursday
Time	: 11:15am to 12:30pm	Max. Marks	: 36

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
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4. Draw neat sketches wherever necessary.

Q.1 Do as directed.
    (a) State the composition and range of R type Thermocouple. [2]
    (b) What is the difference between bonded strain gauge and unbonded strain gauge? [2]
    (c) What is triple point? Convert -233 deg C into Rankine. [2]
    (d) Explain capillary effect in manometers. What is its remedy? [2]
    (e) What is the range of radiation wavelength that carries radiant energy? [2]
    (f) What happens when a gas pressure falls below 1 mm Hg? [2]

Q.2 Attempt *Any TWO* of the following questions. [12]
    (a) State three laws of thermoelectric circuits and explain in brief
    (b) Explain Lens type of radiation pyrometer with its advantages and disadvantages? What care should be taken while placement of target and receiver?
    (c) Explain Principle, construction & working of LVDT. State its advantages and disadvantages.

Q.3
    (a) Explain different types of resistance thermometer bulbs in detail. State the points to be considered in construction of a wire wound type resistance thermometer bulb. [6]
    (b) Explain McLeod gauge in detail with neat diagram [6]

OR

Q.3
    (a) Explain how different transducers (working on different principles) can be used in conjunction with elastic pressure transducers to convert the pressure signal to electrical signal. [6]
    (b) Explain Pirani Gauge in detail. [6]

Examination	: Second Sessional	Seat No.	: _____
Date	: 05/09/2014	Day	: Friday
Time	: 11.15 to 12.30 pm	Max. Marks	: 36

INSTRUCTIONS:
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Q.1 · Do as directed.

   (a) Prove that there is a unique path between every two vertices in a tree. **[2]**

   (b) Let G be a graph with 4 vertices and 6 edges. Calculate how many fundamental circuits lies **[2]** in the system of fundamental circuit? Also calculate how many fundamental cut sets belongs to system of fundamental cut set?

   (c) Can we sketch a graph with 5 vertices of odd degree? Justify your answer. **[2]**

   (d) (i) Give an example of graph which is neither Hamiltonian nor Eulerian graph. **[2]**
      (ii) Define lower bound of time complexity of problem.

   (e) Design a three state machine which has {0,1} as its input and output alphabets , given the **[2]** input and the corresponding sequence.
      Input sequence   00010101
      Output sequence   011001110

   (f) Let T be a tree with 30 edges. Removal of a certain edge from T yields two disjoint trees T_1 **[2]** and T_2 . Given that the number of vertices in T_1 equals the number of edges in T_2, determine the number of vertices and edges in T_1 and T_2.

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

   (a) Prove that every circuit has an even number of edges in common with every cut-set.

   (b) Find a deterministic machine that recognizes the set of all strings of 0s and 1s in each of which the number of 1s is not a multiple of 4.

   (c) Explain LARGESMALL algorithm for calculating time complexity using an example.

   (d) State and prove Euler's condition for connected planar graph.

Q.3   (a) Show that the language L = $\{a^k b^k \mid k \geq 1\}$ is not a finite state language. **[4]**

     (b) Prove that $K_{3,3}$ and K_5 are non planar graphs. **[4]**

     (c) Prove that lower bound of the time complexity of the problem of finding largest among n **[4]** numbers is proportional to n-1.

OR

Q.3   (a) Use labeling procedure to find a maximum flow in the transport network in figure below. **[4]** Determine the corresponding minimum cut.
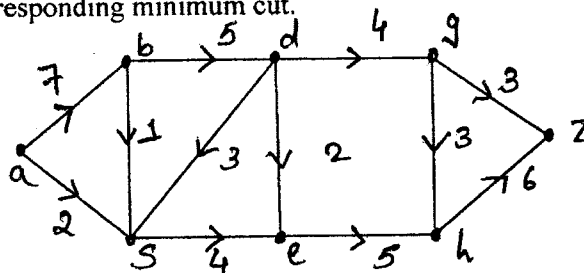
     (b) Find the deterministic finite state machine that recognizes L =$\{ 0^i 10^j \mid i \geq 1 , j \geq 1\}$ **[4]**

     (c) Define the following with an example: **[4]**
       (i) Connected graph (ii) Branch node in tree

Examination	: Second Sessional	Seat No.	: _____
Date	: 06/09/2014	Day	: Saturday
Time	: 11:15 to 12:30	Max. Marks	: 36

INSTRUCTIONS:
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Q.1 Do as directed. [12]

(a) Every FD is a MVD but there exists MVDies that are not FDies. Justify with appropriate example. [2]

(b) BCNF is stronger than 3NF. Justify with appropriate example. [2]

(c) What is the desirable properties of a decomposition [1]
 (A) Partition constraint. (B) Dependency preservation.
 (C) Redundancy. (D) Security.

(d) Maximum height of a B+ tree of order m with n key values is [1]
 (A) $\log_m(n)$ (B) (m+n)/2
 (C) $\log_m(m+n)$ (D) None of these

(e) In SQL, testing whether a sub query is empty is done using [1]
 (A) DISTINCT (B) EXISTS
 (C) NULL (D) UNIQUE

(f) Which normal form is considered adequate for normal relational database design? [1]
 (A) 2NF (B) BCNF
 (C) 3NF (D) 4NF

(g) How many candidate keys are possible for the given relation R.? [1]
 R={A,B,C,D,E} F={A$\rightarrow$B, BC$\rightarrow$E, ED$\rightarrow$A}
 (A) 1 (B) 2
 (C) 3 (D) 4

(h) The maximum number of Superkeys for the relation schema R(E,F,G,H) with E as the key is [1]
 (A) 5 (B) 6
 (C) 7 (D) 8

(i) Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH -> G, A -> BC, B -> CFH, E -> A, F -> EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R. The relation R is [1]
 (A) in 1NF, but not in 2NF (B) in 2NF, but not in 3NF
 (C) in 3NF, but not in BCNF (D) in BCNF

(k) Order of B+ tree is 100 and total search key value are 1000000 then at most how many blocks from disk need to access for lookup? [1]

Q.2 Answer the following questions. Any two [12]

(a) Consider the universal relation R={A,B,C, D, E, F, G, H,I,J} and the set of functional dependencies F={A,B}$\rightarrow${C},{A}$\rightarrow${D,E}, {B}$\rightarrow${F}, {F}$\rightarrow${G, H},{D}$\rightarrow${I}. What is the key for R? Decompose R up to highest normal form. [6]

(b) (I) Find whether the given set F and G are equivalent or not. [3]
 F={A$\rightarrow$BC, CD$\rightarrow$E, B$\rightarrow$D} G={A$\rightarrow$B, BC$\rightarrow$E, ED$\rightarrow$A}

 (II) Find the Irreducible set of following set of functional dependency. [3]
 F={A$\rightarrow$BC, ABE$\rightarrow$CDGH, C$\rightarrow$GD, D$\rightarrow$G, E$\rightarrow$F}

(c) Explain Fixed length representation for variable length record. [6]

Q.3 (a) Draw the B+ tree for the following search key values [6]
 B, E, Z, A, N, F, S, T, D, O, L, Q, U, W, R, X, P where n=3.

(b) Create an Extendable Hash structure for the following key values: [6]
 x={12, 03, 52,45, 68, 75, 19, 26, 83, 64, 57, 37, 72, 46}
 Assume that one bucket can store maximum 3 keys at a time where the hash function is H(x) = x mod 3.

OR

Q.3 (a) Draw the B+ tree for the following search key values [6]
 4,9,15,18,8,22,12,20,30,21,35,40,29,33,45,39 where fan-out=3.

(b) (I) Explain Data Dictionary storage. [3]
 (II) Give difference between sparse and dense index. [3]