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06EC71

Seventh Semester B.E. Degree Examination, December 2011
Computer Communication Networks

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the differences between OSI reference model and TCP /IP reference model. **(05 Marks)**

b. Match the following to one or more layers in OSI model :
i) Route determination
ii) Flow control
iii) Interface to transmission media
iv) Provides access for the end user
v) Format and code conversion services. **(05 Marks)**

c. What is DSL technology? What are the services provided by the telephone companies using DSL? Distinguish between DSL and DSLAM. **(10 Marks)**

2 a. In stop and wait ARQ system, the bandwidth of the line is 1Mbps and it takes 20 ms to make round trip. What is the bandwidth delay product? If the system data frames are of 1000 bit length, what is the utilization percentage of link? What is the channel utilization percentage of link if the protocol that can send up to 15 k rnes before stopping and worrying about the acknowledgement? Write the comment. **(05 Marks)**

b. Explain briefly the bit and charter stuffing. **(05 Marks)**

c. With a neat diagram, explain the HDLC frame form. **(10 Marks)**

3 a. Write the different physical topologies used in the logical ring method and explain briefly. **(10 Marks)**

b. In CSMA/ CD, the data rate is 10 Mbps, the distance between the stations 'A' and 'C' is 2000 m and propagation is 2×10^8 mts. Station A starts sending a long frame at time $t_1 = 0$; station C starts sending a long frame at t_2 =3 micro sec. The size of the frame is long enough to guarantee the detection of collision by the stations.
Find :
i) The time when station 'C' hears the collision (t_3)
ii) The time when station 'A' hears the collision (t_4)
iii) The number of bits station A has sent before detecting the collision
iv) The number of bits station C has sent before detecting the collision. **(10 Marks)**

4 a. Mention the four different types of Ethernet format. Explain the same briefly. **(10 Marks)**

b. List the different goals of giga bit Ethernet and explain the different implementation of same. **(10 Marks)**

PART – B

5 a. Why spanning tree algorithm is used? Explain the same, with a graphical representation. **(10 Marks)**

b. Mention the different characteristics of VLAN and explain briefly. **(10 Marks)**

6 a. Find the range of address in the following blocks
   i) 123.56.77.32/29
   ii) 200.17.21.128/27
   iii) 17.34.16.0/23
   iv) 180.34.64.64/30. **(10 Marks)**

   b. Explain the IPV4 datagram format. **(10 Marks)**

7 a. Explain the Dijkstra algorithm for the example shown in Fig. Q7(a). **(10 Marks)**

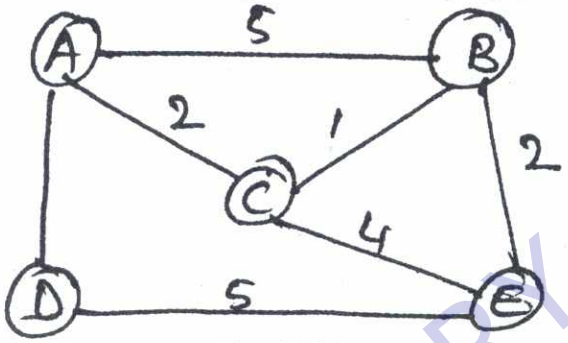

Fig. Q7(a)

   b. Explain the different forwarding techniques used to forward the packet from source to destination. **(10 Marks)**

8 a. Explain the user datagram format. **(05 Marks)**

   b. Explain the features of TCP. **(10 Marks)**

   c. Suppose a TCP connection is transferring a file of 5000 byes, the 1st byte is numbered 10,001. What are the sequence nos of each segment, if data are sent in 5 segments each carrying 1000 bytes? **(05 Marks)**

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06EC72

Seventh Semester B.E. Degree Examination, December 2011
Optical Fiber Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Enlist the advantages of optical fibers, compared to the usage of a copper cables in the communication. **(06 Marks)**

b. With relevant diagrams, explain the different types of optical fibers, considering the number of the modes and material composition of the core. **(08 Marks)**

c. Light traveling in air strikes a glass plate at an angle $\theta_1 = 33^\circ$, where θ_1 is measured between the incoming ray and glass surface. If the refracted and reflected beams make an angle of 90° with each other, what is the refractive index of the glass? What is the critical angle? **(06 Marks)**

2 a. Explain the mechanisms which cause absorption in the optical fibers. Mention the measures which can reduce this type of signal degradation. **(06 Marks)**

b. Prove that, delay difference between the axial ray and extreme meridional ray is $\delta T_s \cong \frac{Ln_1\Delta}{c}$. **(08 Marks)**

c. A 6 Km optical link consists of multimode step–index fiber, with a core RI of 1.5 and relative index difference of 1%. Estimate, **(06 Marks)**

i) Delay difference between slowest and fastest modes at the fiber output
ii) rms pulse broadening due to intermodal dispersion on the link
iii) Maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion.

3 a. Draw and explain the cross – sectional view of a typical GaAlAs double heterostructure LED, along with the energy band diagrams and variations in RI profile. **(10 Marks)**

b. What is quantum efficiency? How are the 'responsivity' and 'quantum efficiency' related? **(04 Marks)**

c. A given silicon avalanche photodiode has a quantum efficiency of 65% at a wavelength of 900nm. Suppose 0.5μW of optical power produces a multiplied photocurrent of 10μA, find the primary photocurrent and the multiplication factor. **(06 Marks)**

4 a. List and sketch the different types of splicing techniques and connectors. **(08 Marks)**

b. What are the principal requirements of a good connector design? **(06 Marks)**

c. A single mode fiber has a normalized frequency V = 2.40, a core RI $n_1 = 1.47$, a cladding RI of $n_2 = 1.465$ and a core diameter of 9μm. Find the insertion loss of a fiber joint, if the lateral offset is 1μm. Also find the loss, if there is an angular misalignment of 1° at a 1300nm wavelength. **(06 Marks)**

PART – B

5 a. Explain with a neat diagram, the basic sections and operations of an optical receiver. **(06 Marks)**

b. Briefly explain the 'quantum limit'. **(04 Marks)**

c. Derive the equation for the performance fidelity of an analog receiver. Substantiate that for large optical signals, SNR represents the quantum limit for receiver sensitivity. **(10 Marks)**

6 a. With a relevant diagram, discuss the subcarrier multiplexing technique. **(06 Marks)**

b. Discuss the various parameters involved in optical link power budget, with the relevant equations. **(06 Marks)**

c. Write short notes on:
   i) Mode – partition noise
   ii) Chirping. **(08 Marks)**

7 a. Describe the operational principles of WDM, depicting the implementation of a typical WDM network containing various types of optical amplifiers. **(08 Marks)**

b. Explain briefly the working of thin – film resonant cavity filter. What is the application? **(06 Marks)**

c. What is MEMS technology? With an example, explain a MEMS actuation method. **(06 Marks)**

8 a. With relevant schematic diagrams, explain the three possible configurations of a EDFA. **(06 Marks)**

b. Discuss the physical layer aspects of SONET, explaining the basic structure of an STS–L SONET frame. **(06 Marks)**

c. What is the difference between fixed OADM and ROADM? List the features of ROADM. **(08 Marks)**

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06EC73

Seventh Semester B.E. Degree Examination, December 2011
Power Electronics

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the important applications of power electronics? **(06 Marks)**

b. Explain peripheral effects of power converter system. **(06 Marks)**

c. Explain different types of power electronic converter circuits. **(08 Marks)**

2 a. Draw the equivalent model of BJT and explain the switching characteristics of power transistor. **(08 Marks)**

b. Compare the BJT and MOSFET. **(05 Marks)**

c. Discuss the different methods of providing isolation of gate drive circuits from power circuit. **(07 Marks)**

3 a. Explain the two transistor analogy of an SCR. Derive an expression for anode current. Also explain the process of regeneration cycle. **(10 Marks)**

b. Write a short note on $\frac{dv}{dt}$ and $\frac{di}{dt}$ protection. **(05 Marks)**

c. A UJT is connected across a 20 V DC supply. A valley and peak point voltages are 1 V and 15 V. The period of relaxation oscillation is 20 ms. Find the value of charging capacitor, if a charging resistor of 100 kΩ is used. **(05 Marks)**

4 a. Explain with the help of wave forms, 1-ϕ semi-converter (half bridge converter) with R-load. Derive an expression for V_0(avg) and V_0(rms). **(10 Marks)**

b. A single phase dual converter is operated from 120 V, 50 Hz supply and the load resistance R = 10 Ω the circulating inductance L_r = 40 mH delay angle are $\alpha_1 = 60°$ and $\alpha_2 = 120°$. Calculate the peak circulating current and peak current of converter. **(06 Marks)**

c. What is the use of free wheeling diode in a converter circuit? **(04 Marks)**

PART – B

5 a. Explain the self commutation with the help of neat sketch and obtain the expression for the capacitor voltage and current. **(10 Marks)**

b. Distinguish between the natural and forced commutation. **(05 Marks)**

c. In the parallel capacitor turn-off circuit shown in Fig. Q5 (c), the main SCRT, is to be reverse biased for at least 40 μs for proper commutation and holding current of auxiliary $SCRT_2$ is 2 mA. Determine the value of R and C. **(05 Marks)**

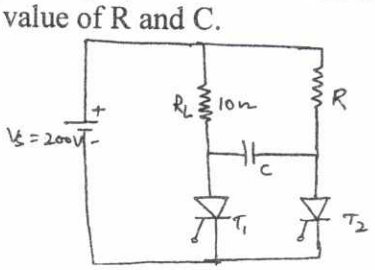

Fig. Q5 (c)

6 a. With the help of circuit diagram, explain the operation of single phase AC regulator using ON-OFF control. Derive the expression for rms value of load voltage. **(10 Marks)**

b. Explain the single phase bidirectional AC voltage controller with resistive load with waveform. **(10 Marks)**

7 a. With neat circuit diagram and explain the four quadrant chopper. **(08 Marks)**

b. With neat circuit diagram, explain the principle of operation of step up chopper. **(08 Marks)**

c. A chopper circuit is operating on Time Ration Control (TRC) at a frequency of 2 kHz on a 460 V supply of the load voltage of 350 V. Calculate the conduction period of the thyristors in each cycle. **(04 Marks)**

8 a. Explain the performance of inverters. **(06 Marks)**

b. With a neat circuit diagram, explain the principle of variable DC link. **(08 Marks)**

Write a short note on CSI (Current Source Inverter). **(06 Marks)**

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06EC74

Seventh Semester B.E. Degree Examination, December 2011

DSP Algorithms and Architecture

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the two methods of sampling rate conversions used in DSP system, with suitable block diagrams and examples. Draw the corresponding spectrum. **(08 Marks)**

b. List the major architectural features used in DSP system to achieve high speed program execution. **(06 Marks)**

c. Explain how to simulate the impulse responses of FIR and IIR filters. **(06 Marks)**

2 a. With a neat block diagram, explain arithmetic logic unit (ALU) of DSP system. **(06 Marks)**

b. Explain the operation of barrel shifter, with an example. **(05 Marks)**

c. Explain : i) Circular addressing mode ii) Parallelism iii) Guard bits. **(09 Marks)**

3 a. Explain functional architecture of TMS320C54XX processor, with a block diagram. **(10 Marks)**

b. Explain the addressing modes of TMS320C54XX processor. Give examples. **(10 Marks)**

4 a. Describe the pipelining operation of TMS320C54XX processor. **(08 Marks)**

b. Explain the operation of serial I/O ports and hardware timer of TMS320C54XX on chip peripherals. **(08 Marks)**

c. Describe the operations of the following instructions with respect to C54XX processor.
i) MAS *AR3–, *AR4+, B, A ii) MPY #01234, A **(04 Marks)**

PART – B

5 a. What do you mean by Q notation used in DSP algorithm implementation? What are the values represented by 16 bit number N = 4000 H in Q15, Q7 and Q9 notation? **(08 Marks)**

b. Briefly explain IIR filters. **(04 Marks)**

c. Write a TMS320C54XX program that illustrates the implementation of an interpolating FIR filter of length 15 and interpolating factor 5. **(08 Marks)**

6 a. Write a TMS320C54XX program that illustrates the implementation of 8 point DIT FFT algorithm. **(12 Marks)**

b. Briefly explain scaling and derive the expression for optimum scaling factor for DIT FFT Butterfly algorithm. **(08 Marks)**

7 a. With a neat schematic diagram, design a data memory system with address range 000800h – 000FFFh for a C5416 processor. Use 2k × 8 SRAM memory chips. **(08 Marks)**

b. Explain how the interrupts are handled in TMS320C54XX processor, with the help of a flow chart. **(08 Marks)**

c. Explain briefly memory space organization in TMS320C54XX memory. **(04 Marks)**

8 Write short notes on :

a. 4 × 4 Braun multiplier b. Direct memory access

c. DSP based telemetry receiver d. Codec interface. **(20 Marks)**

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06EC751

Seventh Semester B.E. Degree Examination, December 2011
Operating Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define operating system. Explain the functions of an operating system. **(06 Marks)**

b. Differentiate sequential sharing and concurrent sharing devices, with examples. **(05 Marks)**

c. Briefly explain the different classes of operating systems, specifying the primary concern and key concepts used. **(09 Marks)**

2 a. The payroll program reads the monthly attendance details of 1000 employees and prints their payroll. Reading of a record from card and printing of a line consumes 100 msec, while a read or write operation on a disk consumes 10 mesc. The salary processing consumes 5 msec of CPU time per employee. Compute the program elapsed time and CPU idle time with and without spooling. **(08 Marks)**

b. Explain the concept of VMOS, with examples. **(06 Marks)**

c. Define the microkernel. Explain its advantages. **(06 Marks)**

3 a. With a neat diagram, explain the different states of a process in UNIX operating system. **(08 Marks)**

b. Explain the control synchronization and the data access synchronization, with examples. **(08 Marks)**

c. What is a thread? List its advantages. **(04 Marks)**

4 a. Compare the contiguous and noncontiguous memory allocation. **(04 Marks)**

b. Explain : i) Lazy buddy allocator ii) Merging free memory areas. **(10 Marks)**

c. Explain the internal fragmentation and external fragmentation, with examples. **(06 Marks)**

PART – B

5 a. With a neat diagram, explain the concept of demand paging. **(10 Marks)**

b. Find the number of page faults for following page reference string, using the FIFO and LRU page replacement policies.
Reference string: 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5 (Assume page frames = 3). **(10 Marks)**

6 a. With a neat diagram, explain the facilities provided by file system and IOCS layers. **(08 Marks)**

b. Explain the organization of sequential access and direct access files. **(08 Marks)**

c. Explain the different operations performed on files. **(04 Marks)**

7 a. What do you mean by non-preemptive and preemptive scheduling policies? Explain i) LCN and ii) STG policies. **(08 Marks)**

b. Explain the long term, short term and medium term schedulers. **(06 Marks)**

c. Compute mean turn around time and weighted turn around time for following set of processes, using FCFS scheduling. **(06 Marks)**

Processes	P_1	P_2	P_3	P_4	P_5
Arrival time	0	2	3	5	8
Service time	3	3	2	5	3

8 a. Explain: i) Symmetric and asymmetric naming ii) Blocking and non-blocking protocols. **(06 Marks)**

b. Write a short note on Mail box. **(08 Marks)**

c. Explain the pipes and message queues in Unix. **(06 Marks)**

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06EC756

Seventh Semester B.E. Degree Examination, December 2011
Image Processing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the fundamental steps in digital image processing. **(10 Marks)**

b. Explain the brightness adaptation, with the help of the related graph. **(04 Marks)**

c. Define spatial and gray level resolution. Briefly discuss the effects resulting from a reduction in number of pixels and gray levels. **(06 Marks)**

2 a. With a suitable diagram, explain how an image is acquired using a circular sensor strip. **(06 Marks)**

b. Explain the zooming. **(04 Marks)**

c. Define 4 – adjacency, 8 – adjacency and m – adjacency. **(04 Marks)**

d. Consider the image segment shown in Fig. Q2(d).
i) Let V = {0, 1}. Compute the lengths of shortest 4 –, 8 – and m – paths between p and q.
ii) Repeat for V = {1, 2}. **(06 Marks)**

	3	1	2	1 (q)
	2	2	0	2
	1	2	1	1
(p)	1	0	1	2

Fig. Q2(d)

3 a. Define two – dimensional DFT. Explain the following properties of 2 – DFT.
i) Translation ii) Rotation iii) Distributivity and scaling iv) Separability **(10 Marks)**

b. What are basis vectors? **(04 Marks)**

c. For the given orthogonal matrix A and image u, obtain the transformed image and basis images.

$$A = \frac{1}{\sqrt{2}}\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}, u = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}.$$ **(06 Marks)**

4 a. Define discrete cosine transform and its inverse transformation. Discuss any three properties of discrete cosine transform. **(10 Marks)**

b. Develop Hadamard transform for n = 3. Discuss the properties of the Hadamard transform. (any two). **(10 Marks)**

PART – B

5 a. Explain the following image enhancement techniques, highlighting their area of application.
i) Intensity level slicing
ii) Power – law transformation
iii) Bit – plane slicing. **(10 Marks)**

b. What is histogram matching? Explain the development and implementation of the method. **(10 Marks)**

6 a. Explain the smoothing of images in frequency domain using :
   i) Ideal lowpass filter
   ii) Butterworth lowpass filter. **(10 Marks)**

   b. With a block diagram and equations, explain the homomorphic filtering. How dynamic range compression and contrast enhancement is simultaneously achieved? **(10 Marks)**

7 a. With a block diagram, briefly explain the image model of degradation – restoration process. **(06 Marks)**

   b. Explain the notch reject filters. How can we obtain the notch filter that pass rather than suppressing the frequency in the notch area? **(08 Marks)**

   c. Explain the Weiner – filtering method of restoring images. **(06 Marks)**

8 a. Explain the following order – statistics filters, indicating their uses.
   i) median filter
   ii) max filter
   iii) min filter. **(06 Marks)**

   b. Explain the RGB color model. **(06 Marks)**

   c. Write a note on the following pseudo image processing techniques :
   i) Intensity slicing
   ii) Graylevel to color transformations. **(08 Marks)**

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06EC761

Seventh Semester B.E. Degree Examination, December 2011

Data Structures Using C++

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain recursive function using definitions of mathematical functions and proofs by induction. Write C++ non-recursive and recursive function to compute Fibonacci number. **(06 Marks)**

b. Explain testing and debugging of C++ code and the methods. **(06 Marks)**

c. Define C++ class for 'Linear List' using formula based representation. Define 'Insert' and 'Sort' member function for the same. Write required constructor and destructor. **(08 Marks)**

2 a. Explain the concept of indirect addressing. Provide an implementation of the 'Indirect List' member function 'Output'. Then use this member function to overload the operator '<<'. Test your code. **(08 Marks)**

b. Give ADT specification for 'Array 2D'. Write a C++ code for :
i) Array 2D multiplication ii) Overloading [ ] for array 2D. **(06 Marks)**

c. Develop C++ class that maps 'symmetric matrix' of order n × n into single dimensional array. Write C++ member function 'Store'. **(06 Marks)**

3 a. Explain stack as data structure. Give ADT specification for stack. Develop a C++ class Stack using formula based representation. Write member function 'add' or 'push' operation. **(08 Marks)**

b. Develop C++ program to fix switch box routing problem. **(06 Marks)**

c. Compare formula based representation and linked representation. **(06 Marks)**

4 a. A 'Dequeue' is an ordered list to/from with we can make additions and deletions at/from either end. Therefore, we can call it a double ended queue.
i) Define the 'ADT Dequeue'. Include the operations : Create, Isempty, Isfull, Left, Right, Addleft, Addright, Deleteleft, Deleteright.
ii) Develop C++ class 'Dequeue' that corresponds to the 'ADT Dequeue' and write code for all class member. **(12 Marks)**

b. Explain how queue is used for Railrood car rearrangement problem, with the help of a C++ program. **(08 Marks)**

PART – B

5 a. Give 'ADT specification' for dictionary. Develop the C++ class sorted list that uses a formula based representation to perform following operations :
i) To Search an element with a key
ii) DistinctInsert ensure that all elements in dictionary have distinct key.
Write required constructor and destructor. **(08 Marks)**

b. What is 'Hash function'? Describe the collision and overflow processing using linear open addressing technique. Write C++ class implementation of 'chained hash table'. **(12 Marks)**

6 a. Define binary tree. What is the difference between a binary tree and general tree? State binary tree properties. **(08 Marks)**

b. Write ADT specification for binary tree. Implement C++ member function :

i) Compare (X) : which compare a binary tree with binary tree X. It returns true if two binary tree are identical and false otherwise.

ii) Height : which returns height of tree. **(12 Marks)**

7 a. What are priority queues? Explain MaxHeap initialization concept using input array as : a[1 : 10] = [20, 12, 35, 15, 10, 80, 30, 17, 2, 1] as key. Write C++ functions :

i) Inserting an element into MaxHeap.

ii) Deleting an element from a MaxHeap. **(12 Marks)**

b. What is extended binary tree? Explain the concept HBLT and WBLT. Write C++ member function to delete maximum element from a MaxHBLT. **(08 Marks)**

8 a. Define binary search tree. Construct a binary search tree for the following list of integers 20, 15, 25, 12, 10, 22 and determine rank of each node. Write C++ function :

i) Search an element with key k

ii) Insert element e into search tree. **(12 Marks)**

b. Explain m-way search tree with the help of an example. **(08 Marks)**

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06EC762

Seventh Semester B.E. Degree Examination, December 2011
Real Time Systems

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define real time systems. Explain different types of real time systems. **(04 Marks)**
b. Describe the elements of a computer control system. **(08 Marks)**
c. Discuss the different types of programs in system design. **(06 Marks)**
d. Classify RTS, based on time constraints. **(02 Marks)**

2 a. With an example, explain sequence control in field application. **(10 Marks)**
b. Explain supervisory control, with an example. **(05 Marks)**
c. Write a note on Hierarchical systems. **(05 Marks)**

3 a. Explain digital signal interference, with a neat diagram. **(08 Marks)**
b. Describe multi – level interrupts. **(06 Marks)**
c. Write an explanatory note on pulse input and output interfaces. **(06 Marks)**

4 a. Discuss the requirements that a user should look for, in a programming language. **(08 Marks)**
b. Define the following with respect to real time programming languages :
i) Scope and visibility ii) Global and local variables iii) Modularity
iv) Data types v) Derived types vi) Exception handling. **(12 Marks)**

PART – B

5 a. Discuss the two methods of code sharing, in detail. **(08 Marks)**
b. Briefly explain mutual exclusion. **(06 Marks)**
c. What are the two scheduling strategies? Explain briefly. **(06 Marks)**

6 a. Explain data transfer without synchronization. **(08 Marks)**
b. What do you mean by semaphores? Explain. **(06 Marks)**
c. List and explain the three levels of priority structures. **(06 Marks)**

7 a. Explain mutual exclusion, using conditional flags. **(06 Marks)**
b. With a neat flow chart, describe the single program approach, with reference to RTS design. **(08 Marks)**
c. Write a note on the basic software module, with respect to RTS. **(06 Marks)**

8 Write explanatory notes on the following :
a. Hatley and Pirbhai method. **(10 Marks)**
b. Ward and Mellar method. **(10 Marks)**

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