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10EC/TE71

Seventh Semester B.E. Degree Examination, June/July 2016
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 ISO – OSI reference model with suitable diagram. Discuss the functions of each layer. (10 Marks)
- b. Describe the SS7 signaling and services with suitable model. (06 Marks)
- c. The internet users in the year January – 2015 is 50,000. It will roughly doubling in size for every 18 months. What is the expected number of internet users in the year December 2026? (04 Marks)
- 2 a. Generate CRC code and check if there is any error in the code word. If data word is 1001 and divisor is 1011. How these are implemented using encoder and decoder? (10 Marks)
- b. Explain stop-and-wait ARQ protocol with suitable timing diagram. (06 Marks)
- c. A channel has a bit rate of 4 Kbps and a propagation delay of 20 msec. For what range of frame sizes does stop and wait protocol give an efficiency of at least 50%? (04 Marks)
- 3 a. Discuss the behaviour of the three persistence methods of CSMA. (06 Marks)
- b. Discuss three channelization protocols. (09 Marks)
- c. A group of N stations share a 56 Kbps pure ALOHA channel. Each station outputs a 1000 bit frame on an average of once every 100 sec. What is the maximum value of N? (05 Marks)
- 4 a. Explain 802.3 Ethernet frame format and addressing technique. (10 Marks)
- b. Briefly discuss the distributed co-ordination function and point co-ordination function of 802.11 MAC sub-layer. (10 Marks)

PART – B

- 5 a. Discuss the loop problem in bridged LAN. How loop problems are solved in bridged LAN? (10 Marks)
- b. Differentiate between a bus back bone network and star back bone network. (06 Marks)
- c. What characteristics are used to group station in a VLAN? (04 Marks)
- 6 a. Explain class full addressing. What are default masks? (06 Marks)
- b. Find the class full address : (04 Marks)
 - i) 125.05.13.8
 - ii) 225.06.13.8
 - iii) 14.23.120.5
 - iv) 220.06.120.5.
- c. An ISP is granted a block of addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows :
 - i) The first group has 64 customers ; each needs 256 addresses
 - ii) The second group has 128 customers ; each needs 128 address
 - iii) The third group has 128 customers ; each needs 64 addresses
Design the sub blocks and find out how many addresses are still available after these allocations. (10 Marks)

- 7 a. Explain the distance vector routing for following graph. (10 Marks)

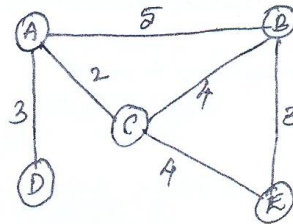


Fig. Q7(a)

- b. Find a shortest path three for following graph using Dijkstra algorithm. (10 Marks)

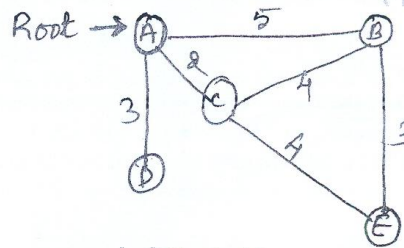


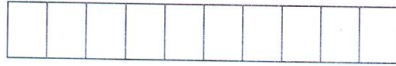
Fig. Q7(b)

- 8 a. Explain three way hand shake based connection establishment in TCP. (10 Marks)
 b. Explain the different field in UDP, with suitable diagram. (06 Marks)
 c. Differentiate between connection less and connection-oriented service. (04 Marks)

- 6 a. Discuss subcarrier multiplexing. (06 Marks)
b. Explain link power budget with a relevant diagram. (06 Marks)
c. Write a short note on:
i) Chirping.
ii) Extinction ratio penalty. (08 Marks)
- 7 a. Explain the principal of operation of WDM with relevant block diagram. (07 Marks)
b. Discuss the design and operation of a polarization independent isolator made of three miniature optical components. (06 Marks)
c. Explain with help of relevant diagrams various application of fiber Bragg gratings. (07 Marks)
- 8 a. With the help of energy level diagrams, explain the working of Erbium-Doped Fiber Amplifiers (EDFA). (10 Marks)
b. Write short notes on :
i) SONET / SDH frame formats.
ii) High-speed lightwave links. (10 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2016
Power Electronics

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 different types of power electronic converter circuits with neat circuit diagram and input and output waveforms. Also mention its application. (08 Marks)
- b. Write the symbol and characteristic features of the following devices: (08 Marks)
- (i) BJT (ii) TRIAC (iii) GTO (iv) MOSFET.
- c. Discuss the peripheral effects of power electronic converters. Also write the remedies. (04 Marks)

2. a. For the circuit shown in Fig.Q2(a), the BJT is specified to have β in the range of 12 to 75. If $V_{cc} = 40$ V, $R_c = 1.5 \Omega$, $V_B = 6$ V, $V_{CE(sat)} = 1.2$ V and $V_{BE(sat)} = 1.6$ V and $R_b = 0.7 \Omega$. Calculate: (i) Overdrive factor ODF (ii) Forced β_F (iii) Total power dissipation(P_T) (07 Marks)

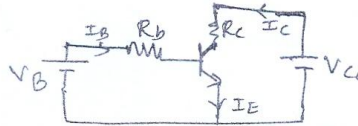


Fig.Q2(a)

- b. With the transient model of MOSFET explain switching characteristics. (06 Marks)
- c. What is the need for isolation for gate drive circuits? Discuss the different methods of providing isolation of gate drive circuits from power circuits. (07 Marks)

3. a. Explain the V-I characteristics of SCR by clearly indicating different states on characteristics. Also explain different modes of operation. (06 Marks)
- b. With two transistor analogy of a thyristor obtain the equation for anode current. (06 Marks)
- c. An SCR employs an R-triggering as shown in Fig.Q3(c) with $I_{g(min)} = 0.1$ mA and $V_{g(min)} = 0.5$ V. The diode is silicon and the peak amplitude of the input voltage is 24 volts. Determine the triggering angle α for $R = 100$ k Ω and $R_{min} = 10$ k Ω . (04 Marks)

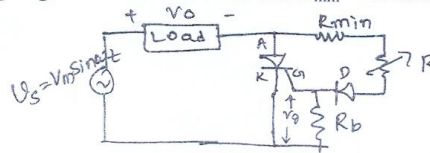


Fig.Q3(c)

- d. A SCR has a $di/dt = 50$ A/ μ sec and $dv/dt = 150$ V/ μ sec. It operates on a 100 V, calculate the snubber circuit elements using approximate expressions. (04 Marks)

4. a. With necessary circuit and waveforms explain the principle of operation of single phase semiconverter. Also derive an expression for the average output voltage. (06 Marks)
- b. With neat circuit diagram explain the operating principle of dual converter with and without circulating current. (08 Marks)

- c. A single phase half wave controlled rectifier is used to supply power to 10Ω load from 230V , 50 Hz supply at a firing angle of 30° . Calculate (i) average output voltage (ii) effective output voltage (iii) average load current. (06 Marks)

PART - B

- 5 a. What is the necessary condition for successful commutation of SCR? Compare between forced and natural commutation. (06 Marks)
- b. With necessary circuit and waveforms explain the working of complementary commutation. Also perform circuit analysis. (08 Marks)
- c. For the impulse commutated thyristor of circuit Fig.Q5(c), determine the turn-off time of the circuit, if $V_s = 200 \text{ V}$, $R = 10 \Omega$, $C = 5 \mu\text{F}$ and $V_c(t = 0) = V_s$. Also derive the equations used. (06 Marks)

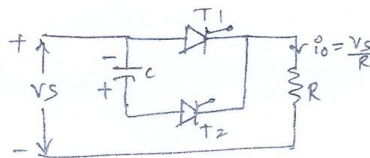


Fig.Q5(c)

- 6 a. With the help of neat circuit and relevant waveforms explain the working of ON-OFF control, for single phase AC voltage controller with resistive load. Also derive an expression for RMS output voltage. (08 Marks)
- b. A 1ϕ half wave ac voltage controller has an input voltage of 120 V , 60 Hz and a load resistance of 10Ω . The firing angle of thyristor is 60° . Find (i) RMS output voltage (ii) Input power factor (iii) Average input current. (08 Marks)
- c. What is the problem caused by sharp single pulse triggering in a 1ϕ AC voltage controller when the load is inductive? How can this be solved? (04 Marks)
- 7 a. Briefly explain the classification of choppers with circuit, waveforms and quadrant diagrams. (08 Marks)
- b. For the chopper shown in below Fig.Q7(b), DC source voltage is 200 V , load resistance is 20Ω . Consider the voltage drop of 4 V across chopper when it is ON. For a duty cycle of 0.6 , calculate (i) Average and rms value of output voltage. (04 Marks)

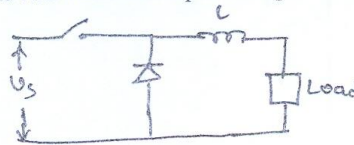


Fig.Q7(b)

- c. Explain the operation of step down chopper with RL load. Also derive an expression of peak-peak output ripple current. (08 Marks)
- 8 a. Explain the principle of single phase half bridge inverter with suitable circuit and waveforms. (10 Marks)
- b. Explain the performance parameters of inverter. (04 Marks)
- c. Explain principle of working of variable DC link inverter. Also mention advantages and disadvantages. (06 Marks)

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10EC74

Seventh Semester B.E. Degree Examination, June/July 2016
Embedded System Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What is an embedded system? List out three kinds of computing engines that are utilized in embedded system. (04 Marks)
- b. Briefly describe the major elements of embedded system development life cycle. (08 Marks)
- c. Define: i) Watch dog timer ii) Instruction cycle (08 Marks)
- iii) Hard real time system iv) Soft real time system
- 2 a. Briefly describe the more commonly used addressing modes. (08 Marks)
- b. Describe the four operations of instruction cycle in ISA and RTL level. (06 Marks)
- c. Write short notes on finite state machines. (06 Marks)
- 3 a. Write short notes on: (08 Marks)
- i) Overlays
- ii) Dynamic RAM with read and write operation timing.
- b. A system specification requires an SRAM system that can store upto $4K \times 16$ bit words, however the longest memory size available is $1K \times 8$ bit. Assume the processor having 16 address and data lines. Show the SRAM design for the above specification with read and write timing diagram. (06 Marks)
- c. Explain in detail direct mapped cache design with word size of 32 bits for: (06 Marks)
- i) Cache size of 64K words organized as 128 0.5k word blocks.
- ii) Main memory size of 128 M words organized as 2k pages holding 128 blocks each.
- 4 a. What is a product life cycle and explain briefly V life cycle and spiral mode. (08 Marks)
- b. List out the five steps and its importance in the design process of a successful embedded system design. (06 Marks)
- c. Briefly describe the three areas that should be considered in static analysis of a system design. (06 Marks)

PART – B

- 5 a. Define thread. Enumerate the difference between a process and a thread. (05 Marks)
- b. Write short notes on foreground/background system. (05 Marks)
- c. What is a scheduling strategy? Define the three general categories of scheduling strategy. (04 Marks)
- d. Explain the core responsibilities of operating system. (06 Marks)
- 6 a. Explain in detail about TCB (Task Control block) and its functions. (06 Marks)
- b. Briefly explain about interrupts and its importance in developing kernel of embedded software. (06 Marks)
- c. Describe the different kinds of stack that one might find in an embedded application. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8=50$, will be treated as malpractice.

- 7 a. What is Amdahl's law? Consider a system with the following characteristics. The task to be analysed and improved currently executes in 100 time units and the goal is to reduce execution time to 80 time units. The algorithm under consideration in the task uses 40 time units. Calculate the amount of improvement required. (05 Marks)
- b. Write short notes on Big 'O' notation. (05 Marks)
- c. Perform the complexity analysis for loop constructs:
- i) for loop
- ```
int sum = 0;
for (int j = 0; j < n; j++)
 sum = sum+j;
```
- ii) while loop
- ```
int prod = 1;
int n;
while (! Done)
{ prod = prod*n;
  n --;
  if(n <= 1)
  done = true;
}
```
- (10 Marks)
- 8 a. Define response time. Describe the major components of response time analysis of (i) polled loop, (ii) pre-emptive schedule in an embedded application. (08 Marks)
- b. What are the common mistakes that might be made during performance optimization analysis? (05 Marks)
- c. How can we measure and reduce the effect that a software algorithm can have on power consumption? (07 Marks)

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10EC753

Seventh Semester B.E. Degree Examination, June/July 2016
Artificial Neural Networks

Time: 3 hrs.

Max. Marks: 100

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

PART – A

1. a. With the help of a neat diagram and relevant equations, explain the structure and working of an artificial neuron. (06 Marks)
 b. List the important properties of artificial neural networks, which make them useful. (06 Marks)
 c. List and explain any four applications of artificial neural networks, with examples. (08 Marks)
2. a. Give the perceptron training algorithm for separating two classes. Explain the algorithm, using the example of an AND gate. (10 Marks)
 b. Explain how non-numeric inputs can be given to the perceptron training algorithm. (04 Marks)
 c. What are Adalines? Explain the LMS algorithm used to train Adalines. (06 Marks)
3. a. With an appropriate diagram and relevant equations, explain the back propagation algorithm, applied to multilayer networks. (12 Marks)
 b. Explain how an appropriate learning rate can be chosen for the back propagation algorithm. (08 Marks)
4. a. What is network pruning? What are the various techniques for network pruning? (10 Marks)
 b. Explain in detail, the learning processes with conjugate gradient methods. (10 Marks)

PART – B

5. a. What are recurrent neural networks? Develop a suitable training algorithm for recurrent networks. (10 Marks)
 b. Considering the Hamming network, derive an expression for the distance between a stored pattern and an input pattern. Assume necessary parameters. (10 Marks)
6. a. With an example, explain the LVQ1 algorithm. (10 Marks)
 b. Explain Kohonen's self-organizing Maps, along with the relevant algorithm. (10 Marks)
7. a. Briefly explain the Brain-state-in-a-Box network with an example. (10 Marks)
 b. Explain the Boltzmann machine learning algorithm. (10 Marks)
8. a. Explain how a hopfield neural network can be used to solve a traveling salesman problem, with an example using 4 cities. (08 Marks)
 b. Briefly explain the following, with respect to evolutionary computation : (12 Marks)
 i) Mutation ii) crossover iii) schema theorem.

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10EC755

Seventh Semester B.E. Degree Examination, June/July 2016
Applied Embedded System Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What is embedded system? Explain the components of embedded system. (06 Marks)
b. Discuss the design process in embedded system. (10 Marks)
c. Explain the classification of embedded system. (04 Marks)
- 2 a. What are the types of instructions in 8051? Explain each with example. (10 Marks)
b. Describe three stage pipeline architecture in ARM – 7. (06 Marks)
c. Discuss the Princeton and Harvard architecture. (04 Marks)
- 3 a. Which are the techniques used in serial communication? Explain each in detail. (06 Marks)
b. List out the features in sophisticated interfacing device ports. (06 Marks)
c. Explain wireless and mobile system protocols. (08 Marks)
- 4 a. What interrupt? Explain interrupt service mechanism. (10 Marks)
b. Describe context, context switching, interrupt latency and dead line. (10 Marks)

PART – B

- 5 a. What are the advantages of assembly and high level language? (08 Marks)
b. Describe queue, stack, lists and trees. (12 Marks)
- 6 a. Discuss the various programming models. (10 Marks)
b. Briefly explain the UML basic elements. (10 Marks)
- 7 a. Write the distinction between function, ISR (interrupt service routine) and task. (08 Marks)
b. What is shared data problem? How shared data problem is solved? Explain with example. (12 Marks)
- 8 a. Define RTOS. Explain basic functions of RTOS. (06 Marks)
b. Describe memory managing strategy. (06 Marks)
c. Describe the following scheduling models :
i) Preemptive scheduling
ii) Round robin scheduling. (08 Marks)

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10EC763

Seventh Semester B.E. Degree Examination, June/July 2016
Image Processing

Time: 3 hrs.

Max. Marks: 100

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

PART - A

- 1 a. With a neat block diagram, explain the components of a general purpose image processing system. (10 Marks)
- b. Draw a neat cross sectional view of human eye and label its parts. (06 Marks)
- c. Discuss brightness discrimination and plot the typical weber ratio curves. (04 Marks)

- 2 a. With neat diagrams, explain image acquisition using linear and circular sensor strips. (10 Marks)
- b. Let the set of gray levels used to define connectivity be {94, 95, 96, 97} and compute the shortest D_4 and D_8 distances between pixels p and q for the image segment shown in Fig.Q2(b). Indicate the shortest path by double lines.

(p) 96 97 94 97

98 98 100 96

99 97 98 95

(q) 97 96 97 96

Fig.Q2(b)

- c. Let p and q are the two pixels at coordinates (100, 120) and (130, 160) respectively. Compute: i) Eucliden distance, ii) Chess board distance, iii) Manhattan distance. (06 Marks)

- 3 a. Give any three properties of unitary transforms. (06 Marks)
- b. Compute the 2D-DFT of the 4×4 gray scale image given by

$$u(m,n) = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

(04 Marks)

- c. For the 2×2 transform A and the image U,

$$A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}, \quad U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$$

Calculate the transformed image V and the basis images. Also reconstruct the original image U by inverse transform. (10 Marks)

- 4 a. Generate Haar basis for $N = 2$. (08 Marks)
- b. Compute the K-L transform of the following matrix:

$$X = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$

(12 Marks)

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PART - B

- 5 a. Discuss histogram equalization for contrast enhancement. (10 Marks)
 b. For the image shown in Fig.Q5(b), plot the histograms before and after the histogram equalization.

$$\begin{bmatrix} 4 & 3 & 5 & 3 & 4 \\ 4 & 4 & 4 & 4 & 4 \\ 5 & 3 & 5 & 3 & 5 \\ 4 & 4 & 4 & 4 & 4 \\ 4 & 3 & 5 & 3 & 4 \end{bmatrix}$$

Fig.Q5(b)

(10 Marks)

- 6 a. Filter the image shown in Fig.Q6(a) by using a 3×3 median filter mask and hence prove that median filtering minimizes salt and pepper noise.

$$\begin{bmatrix} 24 & 23 & 33 & 25 & 32 & 24 \\ 34 & 255 & 24 & 0 & 26 & 23 \\ 23 & 21 & 32 & 31 & 28 & 26 \end{bmatrix}$$

Fig.Q6(a)

(10 Marks)

- b. Explain a filtering approach for simultaneous dynamic range compression and contrast enhancement. (10 Marks)
- 7 a. Discuss adaptive median filtering method for image restoration. Also give its advantages. (10 Marks)
 b. Derive the expression for observed image when the degradation are linear, position invariant. (10 Marks)
- 8 a. Explain the procedure for converting colors from RGB to HIS and vice-versa. (10 Marks)
 b. Explain the concept of intensity slicing for pseudocolor image processing. (10 Marks)

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10TE73

Seventh Semester B.E. Degree Examination, June/July 2016
Wireless Communication

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. Describe with a block diagram, the AMPS cellular system. Illustrate with a diagram the various signals that flow over the AMPS forward and reverse control channels. (10 Marks)
- b. With a flow diagram, explain AMPS mobile originated call and terminated call operations. (10 Marks)
- 2 a. Describe the basic sections of the subscriber device with a neat block diagram. (10 Marks)
- b. Illustrate hardware view and software view of a cellular system. (10 Marks)
- 3 a. With relevant sketches, explain cellular capacity expansion techniques. (10 Marks)
- b. For a mobile system of cluster size 3, determine the frequency reuse distance, if the cell radius is 3 km. Repeat the calculation for cluster size of 4 and 7 and comment on relation between N, D and interference. (05 Marks)
- c. Discuss the different handoff algorithms criteria using RSS measurements with a signal graph. (05 Marks)
- 4 a. With a block diagram, explain GSM network architecture. (10 Marks)
- b. Explain GSM channel concept. (10 Marks)

PART – B

- 5 a. List the GSM call setup operations. Briefly explain any three operations. (10 Marks)
- b. With a neat diagram, explain GSM inter- BSC handover operation steps. (10 Marks)
- 6 a. Explain the basic spectrum spreading operation and procedure used on CDMA forward channels. (10 Marks)
- b. With a neat diagram, explain the generation of the CDMA synchronization and paging channel. (10 Marks)
- 7 a. Explain the following :
i) Frequency hopping spread spectrum
ii) RAKE receiver. (10 Marks)
- b. What is the received power in dBm for a signal in free space with a transmitting power of 1W frequency of 1900 MHz and distance from the receiver of 1000 meters, if the transmitting antenna and receiving antennas both use dipole antennas with gains of approximately 1.6? What is the path loss in dB? (10 Marks)
- 8 a. Explain the components of the Bluetooth architecture with relevant figure. (10 Marks)
- b. Describe IEEE 802.16 wireless MAN'S network and its deployment and antenna sectoring scheme. (10 Marks)

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