1ST

5E5101

Roll No. _____ Total No of Pages: 2

5E5101

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS1A Computer Architecture
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) Explain Flynn's classification with suitable examples. [8]

(b) Explain direct and indirect register addressing modes with suitable examples. [8]

OR

Q.1 (a) Explain basic design of a simple computer system. [8]

(b) Is there any difference among software, hardware & firmware? Explain. [8]

UNIT-II

Q.2 (a) Is there any difference between RISC & CISC computers? Explain. [8]

(b) What is the advantage of pipelining? Explain instruction pipeline in detail. [8]

OR

Q.2 (a) What do you understand by speedup and efficiency? What are bottlenecks? Explain. [8]

(b) Explain arithmetic pipeline with a suitable example. Draw diagram also. [8]

UNIT-III

Q.3 (a) Explain array multiplier with a suitable example. [8]

(b) Explain stack organization of Central Processing Unit. [8]

OR

Q.3 Multiply and steps of (-37) × (21) multiplication are to be shown using Booth's multiplier algorithm. [16]

UNIT-IV

Q.4 Design 4×3 RAM. Also explain basic cell. [16]

OR

Q.4 What are the 3 different cache memory schemes? Explain in detail with suitable examples. [16]

UNIT-V

Q.5 Write short notes on -

(a) IOP [8]

(b) DMA [8]

OR

Q.5 Write short notes on

(a) Priority interrupts [8]

(b) I/O Interface. [8]

157

5E5102

Roll No. _____ Total No of Pages: 2

5E5102

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS2A Digital Logic Design

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) What are various levels of abstraction in VHDL? Also explain its structure. [8]

(b) What are the Basic Modeling Constructs in VHDL? [8]

OR

Q.1 (a) What are the Data Types in VHDL? Explain with example. [8]

(b) Write VHDL code for ripple carry adder and draw its simulation waveform. [8]

UNIT-II

Q.2 (a) Describe the sub programs and explain types of sub programs. [8]

(b) Describe the resolved signals with suitable example. [8]

OR

Q.2 (a) Explain packages and use clauses of VHDL language. [8]

(b) Compare the component declaration and component instantiations. [8]

UNIT-III

Q.3 (a) What are clocked sequential circuits? Give some examples of clocked sequential circuits. [8]

(b) What is the difference between Moore and mealy state machines? [8]

OR

Q.3 (a) Describe conversion of ASM charts to hardware with a suitable example. [8]

(b) Explain concept and working of FPGA and PLD. [8]

UNIT-IV

Q.4 (a) Explain the stable and unstable states and explain the reduction of the basic state table. [8]

(b) Explain the race free assignment by using K-map of four state variables. [8]

OR

Q.4 (a) Define Event Driven Circuits and write steps for designing these circuits. [8]

(b) What is the difference between Dynamic hazards and Functional hazards? [8]

UNIT-V

Q.5 (a) Describe the logic block and interconnection in the FPGA architecture and explain the nearest neighbor connectivity. [8]

(b) What are different approaches to achieving programmability? [8]

OR

Q.5 Write short notes on following:-

(a) SRAM [8]

(b) Flash Memory [8]

159

5E5103

Roll No. _____ Total No of Pages: 3

5E5103

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS3A Telecommunication Fundamentals
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL

2. NIL

UNIT-I

Q.1 (a) Explain the layered architecture of OSI Model. What is the significance of OSI model? What is the significance of XDR (External Data Representation) at presentation layer? [10]

(b) Calculate the channel capacity of a telephone line having bandwidth 3000Hz in following cases -

(i) SNR=3162 [3]

(ii) Noise is so strong that the signal is faint means SNR is almost zero. [3]

OR

Q.1 (a) The loss in a cable is usually defined in decibels per kilometer. If the signal at the beginning of a cable with -0.3db/km has a power of 2mW, what is the power of the signal at 5km? [4]

(b) A digital signal has eight levels. How many bits are needed per level? [2]

(c) Explain NRZ-L, NRZ-I and RZ line encoding. [6]

(d) Assume that, in a stop and wait ARQ system, the bandwidth of the line is 1Mbps, and 1 bit takes 20ms to make a round trip. What is the bandwidth delay product? If the system data frames are 1000 bits in length, what is the utilization percentage of the link? [4]

UNIT-II

Q.2 (a) (i) Find the Hamming distance between two binary pattern 10101 and 11110. [2]

(ii) Can the value of a checksum be all 0s (in binary)? Defend your answer. Can the value be all 1s (in binary)? Defend your answer. [4]

(iii) How is the simple parity check related to the two-dimensional parity check? [4]

(b) Explain the frame structure of point to point protocol. What is difference between HDLC and PPP? [6]

OR

Q.2 (a) A pure ALOHA network transmits 200 bit frames on a shared channel of 200 kbps. What is the throughput if the system (all station together) produces 1000 frame per second? [8]

(b) What is vulnerable time in case of pure and slotted ALOHA? How we can determine the underload and overload situation for channel in pure and slotted ALOHA. [8]

UNIT-III

Q.3 (a) What is Hidden node and Exposed node problems? Explain with example. [8]

(b) Explain piconet and scatternet in Bluetooth. [8]

OR

Q.3 (a) What is looping problem is switching? Explain spanning Tree protocol in detail. [8]

(b) Explain Virtual LANs. How we can configure VLAN in switch? [8]

UNIT-IV

Q.4 (a) Explain TDMA superframe structure? Are collisions possible in TDMA and FDMA? Justify. [8]

(b) We need a three-stage space division switch with N=120. We use 10 crossbars at the first and third stages and 4 crossbars at the middle stages. Calculate the total no. of cross points. [8]

OR

Q.4 (a) What is the goal of Multiplexing? Four channels, two with a bit rate of 300 kbps and two with a bit rate of 250 kbps, are to be multiplexed using multiple slot TDM with no synchronization bit. What is the size of a frame in bits and what is the data rate? [8]

(b) Explain ADSL, DS 1 and DS 3 carriers. [8]

UNIT-V

Q.5 (a) What is difference between multiplexing and spread spectrum? Explain FHSS. [8]

(b) An FHSS system uses a 5-bit PN sequence. If the bit rate of the PN is 64 bits per second, answer the following -

(i) What is the total number of possible hops? [4]

(ii) What is the time needed to finish a complete cycle of PN? [4]

OR

Q.5 (a) Explain CDMA with help of example. [8]

(b) Write short note on following -

(i) Walsh codes [4]

(ii) Hand off [4]

5E5104

Roll No. _____ Total No of Pages: 3

5E5104

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS4A Data Base Management System
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) Explain the advantages of Database Management System over File Management System. [10]

(b) Give a brief note on the different views of data, with the necessary diagram. [6]

OR

Q.1 (a) Explain the overall system structure of database management system. [8]

(b) What is difference between logical data independence and physical data independence? [4]

(c) Briefly discuss the history of database systems. [4]

UNIT-II

Q.2 (a) What is Entity Relationship model? How is it useful in designing a real world database? [8]

(b) Explain ER modelling with the help of database for a Banking Management System. [8]

OR

Q.2 (a) Explain the notational conventions used in the ER model. [8]

(b) Explain network and object oriented model. What are the roles of these models in database design? [4]

(c) Differentiate between: [4]

(i) Ternary Relationship and Aggregation

(ii) Entity and Attribute

UNIT-III

Q.3 Consider the relation schema:

Works (Person_name, company_name, salary)

Lives (Person_name, street, city)

Located-in (company_name, city)

Managers (Person_name, manger_name)

Where manager-name refers to person-name.

Give the relational algebra for the following queries: [16]

(i) List the names of the persons work for the company 'SBC' along with the cities they live in.

(ii) Find the name of the persons who live in the same city and same street as their manager.

(iii) Find the persons whose salaries are more than the salary of every body who works for the company 'SBC'.

OR

Q.3 Discuss the various fundamental operations in relational algebra with suitable example. [16]

UNIT-IV

Q.4 (a) How would you use the feature of nested queries in SQL to develop complex queries? Give examples. [8]

(b) What is an Embedded SQL? Explain with an example. [8]

OR

Q.4 Consider the following tables:

Branch (Branch_No, street, city, pin code)

Staff (Staff_No, Fname, position, sex, DOB, Salary, Branch_No)

Answer the following queries using SQL commands - [4×4=16]

(i) List all staff with a salary between Rs. 20000 and Rs. 30000 of branch office Delhi or Jaipur.

(ii) Find the number of staff working in each branch and sum of their salaries.

(iii) Find all staff whose salary is larger than the salary of at least one member of staff branch 'BO3'.

(iv) Give all staff a 3% pay increases.

UNIT-V

Q.5 (a) Why BCNF to be considered stricter than 3NF? Explain decomposition of non-BCNF scheme into BCNF scheme. [10]

(b) Describe the concept of full functional dependency. [6]

OR

Q.5 (a) Decompose the schema R= (A, B, C, D, E) into (A, B, C) and (A, D, E). Also show that this decomposition is a lossless-join decomposition if the following set F of functional dependencies holds:

$A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$ [8]

(b) Define Functional Dependency. Explain Armstrong's axioms or rules, with examples. [2+6=8]

165

5E5105

Roll No. _____ Total No of Pages: 3

5E5105

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS5A Operating Systems
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) What is need of B1OS? Explain Boot strop loader also. [8]

(b) Is there any difference between kernel level and user level threads? Justify your answer. [8]

OR

Q.1 What are the benefits of threads? Explain context switching of processes and threads. [16]

UNIT-II

Q.2 (a) What do you understand by semaphores? Can it be useful to solve reader – writer problem? Explain. [8]

(b) What are different algorithmic solutions of critical section problem? Explain. [8]

OR

Q.2 Compose FCFS, SJF and Round–Robin scheduling algorithms by computing average waiting time. There are 5 processes with CPU burst time as 10, 5, 17, 25, 6 and arrival times are 0, 1, 0, 2, 7 units. Assume time quantum for Round Robin scheduling as 5 units. [16]

UNIT-III

Q.3 (a) What are the different deadlock prevention schemes? Explain. [8]

(b) Compare best Fit, worst fit and first fit memory allocation schemes. The given jobs are of memory sizes 13KB, 5KB only. [8]

Address	Size of free space
005	2
070	28
105	12
279	82
395	15

Show the allocated addresses and free space table after every job for all 3 schemes.

OR

Q.3 (a) Write and explain Banker's algorithm for deadlock avoidance. [8]

(b) There are 2 jobs of sizes 25 and 12 to be allocated memory. The free space table is - [8]

Address	Size
005	02
009	17
210	89
383	13
490	11

Apply best fit, first fit and worst fit schemes and show allocated addresses and free space table after allocation.

UNIT-IV

Q.4 (a) Is there any difference between pure paging and demand paging? Explain. [8]

(b) Compute page fault ratio. The pages referenced are 7, 5, 2, 1, 7, 5, 4, 5, 1, 2, 5, and 7 (12pages). The job is allowed 3 blocks. Compare LRU & FIFO page replacement schemes. [8]

OR

Q.4 (a) Compute number of page faults for LRU, FIFO and optimal page replacement algorithms. The given page trace is 7, 5, 1, 2, 7, 4, 5, 4, 5, 4, 5, 7 (12 pages). The job is allowed 3blocks in primary memory. [8]

(b) What do you understand by Belady's Anomaly? Explain. [8]

UNIT-V

Q.5 (a) Explain various features of fill system of linux. [8]

(b) Compare FCFS and SSTF disk scheduling algorithms. Initially the Read/Write Head is at 50. The requests are. 63, 52, 01, 93, 72, 13, 81, 54, (8requests). Compute total movement of R/W Head. [8]

OR

Q.5 (a) Explain various file system features of windows operating system. [8]

(b) Compare SCAN and C – SCAN disk scheduling algorithms. Read write Head is at 45. The requests are 63, 52, 01, 93, 72, 13, 81, and 54 (8 requests). Compute total movement of R/W Head. [8]

5E5106

Roll No. _____ Total No of Pages: 3

5E5106

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS6.1 Advance Data Structure
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) Define Red Black Tree. Explain Algorithm of Insertion in Red Black Tree with the help of suitable example. [2+8=10]

(b) Explain Dynamic Order Statistics with the help of suitable example. [6]

OR

Q.1 (a) Define Huffman Tree. Construct a Huffman tree stream of characters.

"eebbeecdebeeebecceeeddebbbeceedebeeddeeeecceeeedeeedeeebeedeceedeb eeedeceeedebee" [2+8=10]

(b) Explain Interval Tree with the help of suitable example. [6]

UNIT-II

Q.2 (a) Prove that total number of nodes in Binomial Heap at depth is ${}^{K}C_{i}$ for i=0, 1.....k [6]

(b) Write Algorithm to explain Insertion and Union operation Binomial Heap with the help of suitable example [10]

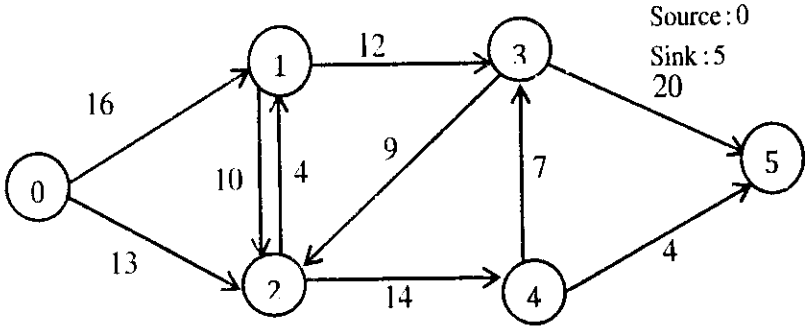
OR

Q.2 (a) Write Algorithm to explain Insertion and Decreasing Key operation in Fibonacci Heap with the help of suitable example. [10]

(b) Define Amortization Analysis with the help of suitable example. [6]

UNIT-III

Q.3 (a) Given, a graph which represents a flow network where every edge has a capacity. Also given, two vertices source 's' and sink 't' in the graph, find the maximum possible flow from s to t with following constraints. [12]



(b) Define Cut-Vertices Planer and Dual graph with the help of example [4]

OR

Q.3 (a) Explain Algorithm for connectedness with the help of suitable example [8]

(b) Explain Strongly Connected Components. Write an Algorithm for topological sort. [3+5=8]

UNIT-IV

Q.4 (a) Explain Zero-one principle with the help of suitable example. [8]

(b) Explain Bitonic Sorting Network with the help of suitable explain. [8]

OR

Q.4 (a) Explain Priority Queue and Concatenable Queue in 2-3 tree in detail. [8]

(b) Explain operation on Disjoint sets and its union-find problem. [8]

UNIT-V

Q.5 (a) Explain Fermat Primality and Miller-Rabin Primality test in detail. [6]

(b) State and Prove Chinese Remainder Theorem. [10]

OR

Q.5 (a) Explain Pollard's RHO Algorithm in detail. [8]

(b) Explain Modular Arithmetic with the help of suitable example. [8]

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(7)

5E5107

Roll No. _____ Total No of Pages: 4

5E5107

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015
Computer Science & Engineering
5CS6.2A Digital Signal Processing
Common with IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL

2. NIL

UNIT-I

Q.1 When the input to the LTI system is - [4×4=16]

$$x(n)=\left(\frac{1}{2}\right)^n u(n)+(2)^n u(-n-1)$$

the output is -

$$y(n)=6\left(\frac{1}{2}\right)^n u(n)-6\left(\frac{3}{4}\right)^n u(n)$$

(a) Find the system function H (z) of the system

(b) Find the impulse response h (n) of the system for all values of n.

(c) Write the difference equation that characterizes the system.

(d) Is the system stable? Is it causal?

OR

Q.1 (a) Explain the following:- [4×2=8]

(i) Symmetric property of LTI system

(ii) Magnitude and phase response of LTI system

(b) Evaluate the convolution sum of - [4×2=8]

(i) $y(n) = \left(\frac{1}{2}\right)^{n+1} u(n+1) * u(n-2)$

(ii) $y(n) = \sin\left(\frac{\pi}{4}n\right) u(n) * u(n+1)$

UNIT-II

Q.2 (a) Tabulate the important properties of Z – Transform [8]

(b) Determine the inverse Z – transform of - [8]

$$X(Z) = \frac{1}{1-1.5Z^{-1}+0.5Z^{-2}}$$

If -

(i) ROC $|Z| > 1$

(ii) ROC $|Z| < 0.5$

(iii) ROC $0.5 < |Z| < 1$

OR

Q.2 (a) Convolve the given finite duration sequences - [4]

$x(n) = 2\delta(n) - 3\delta(n-2) + 4\delta(n-3)$

$h(n) = \delta(n) + 2\delta(n-1) + \delta(n-2)$ by using Z-transform

(b) Find Z – transform of $x(n) = a^{|n|} u(n)$. Define ROC of the function. Also find Z- transform of $x(n+3)$. [8]

(c) Find the DTFT (Discrete Time Fourier Transform) of unit Ramp and unit impulse sequence. [4]

UNIT-III

Q.3 (a) Explain the continuous time processing of discrete time signal. [6]

(b) A continuous time signal is given as follow:- [10]

$x_c(t) = \cos(4000\,\pi t)$

and this signal is sampled with a sampling period T to obtain discrete time signal.

$x(n) = \cos\left(\frac{\pi n}{3}\right)$

(i) Determine a choice for T consistent with this information.

(ii) Is your choice for T in part (i) unique? If so, explain why. If not so, specify another choice of T consistent with the information given.

OR

Q.3 (a) A waveform (20+20sin (500 t+30)) is to be sampled periodically and reproduced from these samples. Determine the maximum allowable time interval between sample values. How many sample values required to be stored in order to reproduce 0-1 sec. of this waveform. [10]

(b) What is sampling theorem? What is the importance of sampling theorem? [6]

UNIT-IV

Q.4 (a) Compute the DFT of the sequence [6]

$$x(n) = \begin{cases} 0.25 & ; \text{ for } n = 0,1,2 \\ 0 & ; \text{ otherwise} \end{cases}$$

(b) Compute the DFT of the sequence [10]

$x(n) = \cos\frac{n\pi}{2}$ using DIF-FFT algorithm where N = 4

OR

Q.4 (a) Compute the linear convolution of x(n) and h(n) using DFT method given that [6]

$$x(n) = \begin{cases} 1 & ; \text{ for } n=0 \\ 0.5 & ; \text{ for } n=1 \\ 0 & ; \text{ otherwise} \end{cases} \quad \text{and } h(n) = \begin{cases} 0.5 & ; \text{ for } n=0 \\ 1 & ; \text{ for } n=1 \\ 0 & ; \text{ otherwise} \end{cases}$$

(b) Determine the four point DFT of x (n) = {0, 1, 2, 3} using DIT-FFT algorithm.[10]

UNIT-V

Q.5 (a) A digital filter has 3dB band width cutoff frequency 0.25 π. This digital filter is designed from the analog filter whose system function is given as -

$$H(s) = \frac{\Omega c}{s + \Omega c}$$

by using Bilinear transformation obtain the digital transfer function H (Z). [8]

(b) Design a lowpass FIR filter with the following descried frequency response [8]

$$H_d\left(e^{j\omega}\right) = \begin{cases} e^{-j2\omega} & ; \ -\frac{\pi}{4} \le \omega \le \frac{\pi}{4} \\ 0 & ; \ \frac{\pi}{4} < |\omega| < \pi \end{cases}$$

by using the rectangular window with the window function

$$W_R(n) = \begin{cases} 1 & 0 \le n \le 4 \\ 0 & \text{otherwise} \end{cases}$$

OR

Q.5 Design a digital Butterworth low pass filter with the following specifications - [16]

$$0.7 \le |H(e^{j\omega})| \le 1 \quad ; \quad 0 \le \omega \le 0.2\pi$$

$$|H(e^{j\omega})| \le 0.3 \quad ; \quad 0.6\pi \le \omega \le 0.2\pi$$

by using the impulse invariant transformation.
