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**Bangabandhu Sheikh Mujibur Rahman Science and Technology University**
**Department of Computer Science and Engineering**
**3rd Year 1st Semester B.Sc. Engineering Final Examination-2017**

**Course Title: Computer Networks** **Course Code: CSE 312**
**Total Marks: 60** **Time: 3 (three) Hours**

N.B.
i) Answer **SIX** questions taking any **THREE** from each Section, ii) All questions are of equal values.
iii) Use separate answer script for each section

## Section: A

1. a) What are the uses of computer network? 2
   b) Compare UDP and TCP .Show three way handshaking of transport layer for both connection establishment and release 4
   c) Draw the conceptual path of data flow between applications of two computers by following the ISO OSI layering model and define the functions of each layer. 4

2. a) Suppose Computer Valley has a range of IP addresses **200.200.0.0/16.** You have to create at least 15 usable subnets so that each subnet contains as many addresses as possible. Answer the following: 6
   (i) What is the class of given IP block?
   (ii) How many usable subnets will be created?
   (iii) How many usable IP addresses will be there in each subnet?
   (iv) What will be the second usable IP address of the second usable subnet?
   (v) What will be the subnet mask of the fourth subnet?
   b) An organization supplied with 128. 211. 0. 16 / 28 having four bits for hosts. What will be the lowest and highest host address? Why subnet mask is used in computer networking systems?

3. a) Discuss possible services offered by the data link layer.
   b) Discuss the "Flag bytes with byte stuffing" and "Flag bits with bit stuffing" framing technique with an example of each.
   c) What is Subnetting and Supernetting?

4. a) What do you mean by error control and flow control?
   b) Why does the sender not know about fragmentation of packets? Why is fragmentation needed on an internet but not on a typical Wide Area Network?
   c) Define Single bit error and Burst errors. Calculate the transmitting frame for a frame 1101011011 using the generator $G(x) = x^4 + x + 1$.

## Section: B

5. a) Why is CSMA with Collision Detection (CSMA/CD) used? Explain briefly.
   b) Differ from each other: Repeater, Hub, Bridge, Switch, and Router.
   c) Which is better router or switch? Why?

6. a) Write down different computer network.
   b) Give the basic principle of shortest path routing. Draw the sink tree of following figure

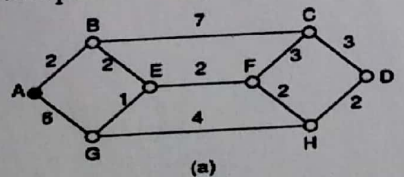



Figure-6(b)

c) Why hierarchical routing is used. Build a hierarchical routing table of 1B for the following network of routers. 2

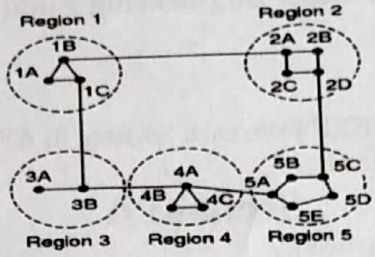
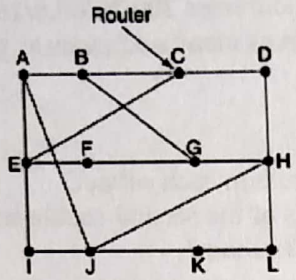



Figure-6(c)

7. a) Find the new routing table for J using distance vector routing algorithm from the following network. 6




N

| To | A | I | H | K |
|---|---|---|---|---|
| A | 0 | 24 | 20 | 21 |
| B | 12 | 36 | 31 | 28 |
| C | 25 | 18 | 19 | 36 |
| D | 40 | 27 | 8 | 24 |
| E | 14 | 7 | 30 | 22 |
| F | 23 | 20 | 19 | 40 |
| G | 18 | 31 | 6 | 31 |
| H | 17 | 20 | 0 | 19 |
| I | 21 | 0 | 14 | 22 |
| J | 9 | 11 | 7 | 10 |
| K | 24 | 22 | 22 | 0 |
| L | 29 | 33 | 9 | 9 |
| | JA delay is 8 | JI delay is 10 | JH delay is 12 | JK delay is 6 |

Vectors received from J's four neighbors

b) Discuss about the action "Hop by Hop Choke Packets". Which is taken when an output line goes in warning state?

8. a) Write short on: SMTP, POP3 and DNS.

b) Draw the formats of both IPv4 and IPv6 headers. Write four drawbacks of IPv4 and four reasons for finding IPv6.

c) Explain the maximum channel utilization of slotted ALOHA is 36.8% and the maximum channel utilization of pure ALOHA is 18.5%.

**Bangabandhu Sheikh Mujibur Rahman Science and Technology University**
**Department of Computer Science & Engineering**
**3rd Year 1st Semester B.Sc. Engineering Examination-2017**

**Course Title: System Analysis and Design** **Course Code: CSE 300**
**Full Marks: 60** **Time: 3(Three) Hours**

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## SECTION-A

Q.1 (a) What are the qualities of information? 2

(b) What is the relation between analysis and design? Is it possible to design a system without analysis? If yes how? If not why? 4

(c) What is operational information? In what way is it different from strategic information? For making marketing management system what would be the operational information required? 4

Q.2 (a) Define data mining with example. What is the difference between OLTP and Batch processing of data? 2

(b) Is up-to-date information always timely? If not, give an example of up-to-date but not timely information? 3

(c) Suppose you are designing an information system for BSMRSTU library. Describe the life cycle of your entire system analysis and design with appropriate example with each step. 5

Q.3 (a) What is the difference between MIS and DSS? 2

(b) Think you are a system analyst; you have to analyze & design the information system of BSMRSTU; So you have to take interview of perspective persons from BSMRSTU; now you should point out the techniques for interview. 4

(c) How should an analyst prepare before an interview? Are there some guidelines for good interviewing? Give reasons. 4

Q.4 (a) Distinguish between technical, operational, and economic feasibility. 3

(b) Give an example of a solution which is technically feasible, but not operationally feasible. 3

(c) A system costs TK 1,30,000 to install and TK 2000 per month as recurring expenses. The benefit per year is TK 33,740. Assume an interest rate of 1.5% per month, what is the payback period of the investment?(Use payback method with interest) 4

## SECTION-B

Q.5 (a) Draw the physical and logical DFDs for the following activity:
"Getting your mark sheet from BSMRSTU." 4

(b) What is a context diagram? 1

(c) What are the mistakes in the following DFDs? Correct these mistakes.

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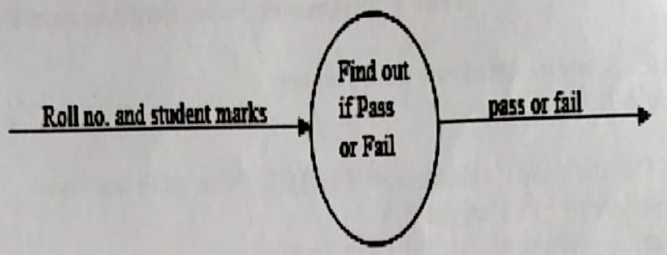


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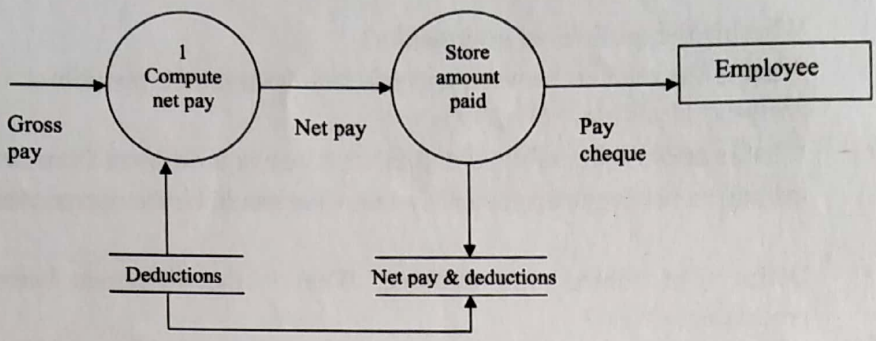


(d) Distinguish between a physical and a logical DFD. 2

Q.6 (a) What is the Relationship between Interaction and Class Diagrams? 3

(b) An organization maintains the following policies to provide discount of the customers. Give a discount of 5% if the customer pays advance or if the purchase is for 10,000 taka or more and the customer is a regular customer. Write the above process using Structured English 3

(c) Draw a Use-Case diagram for the "**Course Registration**" system for the CSE department of BSMRSTU. 4

Q.7 (a) What is slack and surplus variable? 2

(b) Define complete decision table and different type of specification in a decision table. 3

(c) Using Simplex method, maximize the objective function $Z=6X_1+8X_2$ for the following constraint:

$5X_1+10X_2<=60$

$4X_1+4X_2<=40$

$X_1, X_2>=0$

8 (a) A small project is consists of 9 activities for which relevant data are given below. 3+2

| Activity | Immediate predecessors | Completion Time (week) |
|---|---|---|
| A | - | 5 |
| B | - | 6 |
| C | A,B | 4 |
| D | A | 3 |
| E | A | 1 |
| F | E | 4 |
| G | D,F | 14 |
| H | B,C | 12 |
| I | G,H | 2 |

i) Draw the network and project completion time
ii) Find the critical path for this project

(b) The CSE department of BSMRSTU launches scholarship for the student for every semester. The department uses the following rules to give the scholarship. If a student's attendance is 80% or above and the GPA is 3.90 or more, classify the scholarship type as A. If the student's attendance is under 80% and if the GPA is 3.90 or more, classify the scholarship type as B. If the student's attendance percentage is 80% or above and if the GPA is below 3.90, classify the scholarship type as C. If the student's attendance percentage is under 80% and the GPA is below 3.90, then do not get scholarship. 5

Your job is to read the scholarship scenario carefully. Obtain a decision table and answer the following questions:

I) Is the decision table is ERDT (Elementary Rule Decision Table)? If your answer is yes, in what way do think it is? If your answer is no, convert this table into ERDT equivalent.

II) Is the decision table is complete decision table? Explain it based on your answer.

**Bangabandhu Sheikh Mujibur Rahman Science and Technology University**
**Department of Computer Science & Engineering**
**3rd Year 1st Semester B.Sc. Engineering Examination-2017**

**Course Title: Computer Architecture and Organization** **Course Code: CSE 310**
**Full Marks: 60** **Time: 3(Three) Hours**

N.B.
i) Answer **SIX** questions, taking any **THREE** from each section.
ii) All questions are of equal values.
iii) Use separate answer script for each section.

## SECTION-A

Q.1 (a) What Moore's law states and what is the corresponding reality? 3

(b) With necessary illustration briefly explain the inter-relation between High-level language, Assembly language and Machine language. 3

(c) Explain in detail the Von Neumann machine model. 4

Q.2 (a) Describe why assessing the performance is challenging? 2

(b) The hardware designer supplied the instruction class and average clock cycles per instruction (CPI) (see table-1) and two code sequences and instruction counts for instruction class(see table-2). 6

Table-1

| Instruction class | CPI for this class |
|---|---|
| A | 1 |
| B | 2 |
| C | 3 |

Table-2

| Code Sequence | Instruction counts for instruction class | | |
|---|---|---|---|
| | A | B | C |
| 1 | 3 | 2 | 1 |
| 2 | 4 | 1 | 2 |

Your task is to find out

I. Which code sequence executes the most instructions?
II. Which will be faster?
III. What is the CPI for each sequence?

(c) If machine A runs a program in 10 seconds and machine B runs the same program in 15 seconds, how faster is A than B? 2

Q.3 (a) With the help of a diagram show the relation between execution-time, CPU-time, user CPU-time and system CPU-time. 3

(b) Define alignment restriction and spilling register. Write down the principles of hardware design. 3

(c) Finds the MIPS machine language codes for the following instructions. 4

I. add $s1,$s2,$s3
II. lw $t1, 100($t2)

Q.4 (a) Find the corresponding MIPS assembly-codes for the following machine codes. 4

I. 0000 0000 1010 1111 1000 0000 0010 0010
II. 1000 1101 0010 1000 0000 0000 0000 1010

(b) Write the MIPS assembly code for the following instructions. 4

I. g=h+A[i]
II. while(save[i]==k)
i=i+j;

(c) What do you mean by cache memory and virtual memory? Sketch the memory hierarchy. 2

## SECTION-B

Q.5 (a) Write down the 16-bit binary version of 6 then negate the binary number also convert the 16-bit binary versions of 6 and -6 to 32-bit binary numbers. 3

(b) Draw a 32 bit ALU that can perform **AND**,**OR**,**add**, **sub**, **slt** and **beq** operations. 3

(c) Define propagate ($p_i$) and generate ($g_i$) and explain why they are named so. 4

Determine the $C_4$values of these two 16 bit numbers:

a: 0001 1010 0011 0011

b: 1110 0101 1110 1011

Q.6 (a) Using Booth's algorithm multiply $2_{ten}$ by $-5_{ten.}$ 5

(b) Divide 7 by 2 using first version of division algorithm. 5

Q.7 (a) What is meant by bus control? 1

(b) List the methods of processor control. Draw and explain the PLA control organization. 3

(c) Classify the pipelining hazard. 2

(d) Describe the microprogram control logic with appropriate diagram. 4

Q.8 (a) What are the major characteristics of a pipeline? 2

(b) Discuss the various hazards that might arise in a pipeline? What are the remedies commonly adopted to overcome these hazards. 4

(c) Draw the block diagram of a DMA controller. What are the main functions of a typical DMA controller? 4

**Bangabandhu Sheikh Mujibur Rahman Science & Technology University**
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**3rd Year 1st Semester B.Sc. (Engg.) Final Examination-2017**

**Course No.:** CSE320 **Course Title:** Database Management Systems
**Full Marks:** 60 **Time:** 3 hours

**N.B.:**
i) Answer **SIX** questions taking, any **THREE** from each section.
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iii) Use separate answer script for each section.

## Section-A

1. a) "Databases touch all aspects of our lives" – justify this. 3
   b) Explain four significant differences between a file-processing system and a DBMS. 3
   c) Explain the different level of abstraction of of RDBMS. 4

2. a) Draw an ER diagram for the following situations – 7
   "In an organization, several projects are undertaken. Each project can employ one or more employees. Each employee can work on one or more projects. Each project is undertaken on the required of client. A client can request for several projects. Each project has only one client. A project can use a number of items and an item may used by several projects".
   b) What do you understand by *Super Key, Candidate Key* and *Primary Key*. 3

3. a) Transform the following ER diagram (**Figure-2**) into relations. [(*) sign indicates the identifying attribute] 7

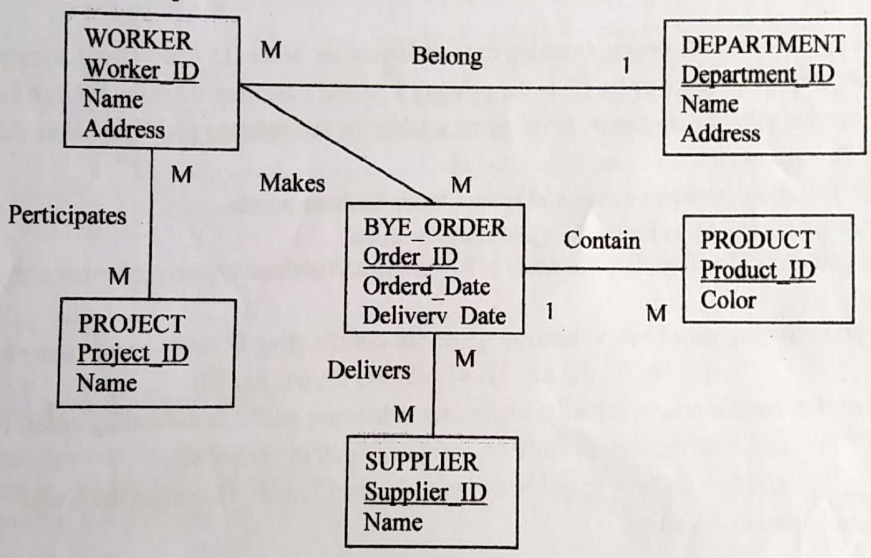


**Figure-2: ER diagram.**

   b) Define mapping cardinalities. Discuss each type of mapping cardinalities. 3

4. a) Normalize the following invoice (**Figure-2**) of a book company up to 3NF. 7

ALPHA BOOK HOUSE
Gopalganj-8100
Date: XX-XX-XXXX

| Customer No | Customer Name | Customer Address | ISBN | Book Title | Author Name | Author Country | Copies | Unit Price |
|---|---|---|---|---|---|---|---|---|
| … | … | … | … | … | … | … | … | … |

**Figure-2:** Invoice of a book company.

   b) When the Boyce-Codd normal form will be applied in a relation? Explain with proper example. 3

## Section-B

5. a) Consider the database schema below:

employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
managers (person-name, manager-name)
Note: A manager is also an employee of a company.
Give SQL and RA expressions for the following queries:

i. Find names, street addresses and cities of residence of all employees who work for First Bank Corporation and earn more than Tk. 30000.
ii. Find all employees in the database who earn more than any employee of Medium Bank Corporation.

b) Consider the relational database of **Figure-4**, where the primary keys are underlined. 6

TRAIN (Name, Start, Destination)
TICKET (PNR_NO, Start, Destination, Fare)
PASSENGER (Name, Address, PNR_NO)

**Figure-4:** Database schemas.

Write SQL expressions for the following queries:

i) List the names of passengers who are travelling from the start to the destination station of the train.
ii) Change the destination address of "Tungipara Express" to "Ghonapara".
iii) Find the name of all passengers whose address includes the substring "Gopalganj".

6. a) Suppose a relation *order*, contains four attributes i.e. order ID, order date, description and customer ID, where order ID is the primary key and customer ID is the foreign key, comes from the relation *customer*. Now create a table for this relation and then delete this using the SQL command. 3

b) Differentiate between dense and sparse index in three points. 3

c) Explain the condition for lossless-join decomposition. 2

d) Explain why the allocation of records to blocks affects database-system performance significantly. 2

7. a) The following set of key values are given for constructing $B^+$-tree: 6

(3, 10, 17, 23, 28, 31, 41, 45, 51, 59, 61, 65, 70)

Assume that the tree is initially empty and values are added in ascending order. Now Construct $B^+$ -tree such that maximum three pointers are fitted in each node.

b) Use Armstrong's axioms to prove the soundness of Union, Decomposition and Pseudotransitivity rules. 4

8. a) Write the distribution properties of ideal hash function. 1

b) Compare between static and extendable hashing. 2

c) Give the main principle of the timeout-based schemes for handling deadlock state. 3

d) Specify the four considerations to select a transaction (or set of transactions) is needed to be rollback after detection the deadlock. 4

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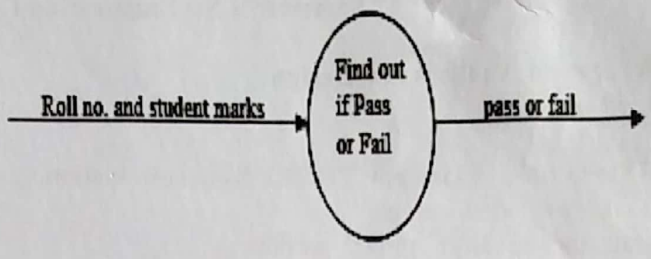


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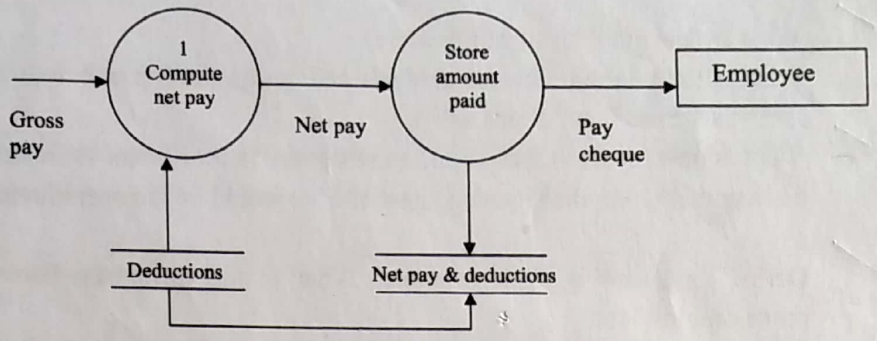


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