

Marks: 70

Times: 4 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 do you mean by Database and Database Management System? What are the benefits of Database system over File system and why? | 3 |
| b) Discuss different levels of data abstraction. | 2.67 |
| c) Define instance and schemas. | 2 |
| d) What is Database administrator? What are the functions of DBA ? | 4 |
| 2. a) Define super key and candidate key. | 2 |
| b) What is the difference and relationship between Cartesian-Product and Natural-Join? | 2 |
| c) What is Outer join? Discuss about different types of outer join. | 3.67 |
| d) Consider the following relational schema of employee database:

<i>employee (person-name, street, city)</i>
<i>works (person-name, company-name, salary)</i>
<i>manages (person-name, manager-name)</i> | 4 |
| Write down relational algebra for the following queries: | |
| (i) Find the names, street address, and cities of residence of all managers who work for City Bank Ltd. and earn more than BDT 100,000 per annum. | 1 |
| (ii) Modify the database so that the employee Tuhin Mahmud now lives in Gopalganj city. | 1 |
| (iii) Delete all tuples in the <i>works</i> relation for the employees of Agrani Bank Ltd. | 1 |
| (iv) Find the number of employees in each company. | 1 |
| 3. a) What is Data dictionary? | 1 |
| b) What is the difference between a primary index and a secondary index? | 2.67 |
| c) What is an index? Explain multilevel indexing with example. | 3 |
| d) What is RAID? Explain RAID levels in briefly | 5 |
| 4. a) What is entity relationship model ? | 1 |
| b) Discuss different attributes used in ER model. | 3 |
| c) Define mapping cardinalities. Discuss each type of mapping cardinalities. | 3.67 |
| d) A car-insurance company maintains data about the following entities: (i) customers: id, name, phone, email, address; (ii) cars: license, model, year; (iii) accidents: report number, date, location. | 4 |

Construct an E-R diagram for the car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Document all assumptions that you make about the mapping constraints.

Section B

5. a) Define SQL. Write down the clauses of SQL. 2
- b) Briefly explain about string operation. 2
- c) What is aggregate function? Discuss different types of aggregate function. 3.67
- d) Consider the following relational schema of student database: 5
- student(student_id, student_name, student_department)*
course(course_id, course_title)
registered(student_id, course_id)
- Write down SQL for the following queries:
- (i) Define a table for the relation *student*.
 - (ii) Insert the information in the database specifying that a new student named Robi in CSE department with id 60, registered the course Database Management System with course id: CSE-320.
 - (iii) Find the students of EEE department and their registered courses. List the records in alphabetical order according to the names of the students.
 - (iv) Find how many students registered their courses in each department.
 - (v) Update the title of the course “Cryptography” to “Security in Computing”.
6. a) What is Database Normalization? What are the objectives of normalization? 3
- b) What do you know about functional dependency and data redundancy? 2
- c) Differentiate between first normal and second normal form. 3
- d) A catering company offers different level of service and charges differently for each one. To hold the information of its customers as well as detail the service each one has ordered, the company keeps a database. Initial unnormalized relational schema (R) is as follows: 3.67
- R=(ClientName, Address, Date, EmpNo, EmpName, Service, AmountDue)*
- The set of functional dependencies F is:
- ClientName → Address*
EmpNo → EmpName
Service → AmountDue
ClientName, Date → EmpNo, Service
- Apply the normalization technique on the relational schema R in the most effective way possible.
7. a) List the ACID properties of transaction. Explain each of them with example. 4
- b) Differentiate between shared mode lock and exclusive mode lock. 1.67
- c) During its execution, a transaction passes through several states. Draw the state diagram of transaction and define each of them briefly. 3
- d) Explain different types of failure. 3
8. a) What is homogeneous and heterogeneous database system? 1.67
- b) Differentiate between data replication and data fragmentation. 3
- c) Explain about the several reasons for building distributed database system. 3
- d) Describe several architectural models for parallel machines. 4

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) Briefly explain the organization of ISA computer. | 3 |
| (b) What do you mean by performance balance? Describe various ways of maintaining performance balance? | 4 |
| (c) When does multiple interrupt occur? What are the two approaches to dealing with multiple interrupt? Explain. | $4\frac{2}{3}$ |
| 2. (a) What is the benefit of using multiple-bus architecture compared to single-bus architecture? Discuss the method of bus arbitration. | 4 |
| (b) Explain the direct mapping cache organization. Define cache hit and cache miss. | 4 |
| (c) What is the benefit of using cache memory? Show the flowchart of cache memory read operation. | $3\frac{1}{3}$ |
| 3. (a) What are key properties of semiconductor memory? | $2\frac{2}{3}$ |
| (b) What do you mean by memory hierarchy? Briefly discuss. | 3 |
| (c) What are the differences between DRAM and SRAM in terms of characteristics such as speed, size, cost and application? | 3 |
| (d) Describe the interaction between hardware and software in a computer system. | 3 |
| 4. (a) What are the major functions of an I/O module? Draw the block diagram of it. | 2+2 |
| (b) Briefly define and compare three techniques for performing I/O? | 4 |
| (c) What is DMA controller? Explain DMA driven data transfer technique. | $3\frac{1}{3}$ |

SECTION-B

- | | |
|---|----------------|
| 5. (a) What is the advantage of using twos complement representation? Perform the following calculation - $6 + 13$ using in 8-bit twos complement representation? | $2\frac{2}{3}$ |
| (b) How can an instruction be represented? Classify different types of instructions. | 3 |
| (c) Why are transfer-of-control operations required? Discuss the branch instruction operation. | 4 |

- (d) Write the two-address machine instructions to compute the following statement
 $(A-B)/(C+D \times E)$
6. (a) What are the key attributes of stack implementation? Describe basic stack operation with an example. 3
(b) Describe different kinds of addressing modes with an example of each. 4
(c) What are the roles of using registers? List the registers of 8086 processor. 2+2
7. (a) Sketch the control flow diagram of instruction pipelining. 3
(b) What are the advantages of using pipelining? Derive the formula of speed-up factor of instruction pipelining. 2+3
(c) What is pipelining hazard? Describe data hazard briefly. 3²
8. (a) Draw the block diagram of control unit organization. What functions does it perform in a processor? 3²
(b) Explain the internal control structure of the control unit using i) Hardwired Control ii) Micro programmed control 4
(c) Show the block diagram of micro-programmed control unit with its functioning. 4

Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalgonj.
 Department of Computer Science and Engineering
 3rd Year 1st Semester BSc Engineering Examination-2015
 CSE312 Computer Networks

Full Marks: 70

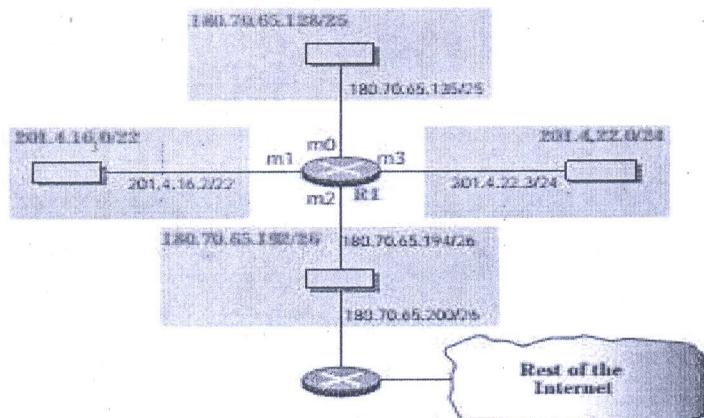
Times: 4 Hours

N.B.

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

SECTION-A

- | | |
|--|------|
| 1. a) Draw the layer of TCP/IP model and explain the function of each layer in brief. | 6 |
| b) An organization is granted the block 211.171.80.0/24. The administration wants to create 64 subnets. | 4 |
| i. Find the subnet mask. | |
| ii. Find the number of addresses in each subnet. | |
| iii. Find the first and last address in the first subnet. | |
| iv. Find the first and last address in the last subnet(subnet 64) | |
| c) What is subnetting? | 1.67 |
| 2. a) Give some advantages and disadvantages of connection oriented and connectionless service. | 3 |
| b) Why we need fragmentation. What is NAT why NAT is needed? | 4.67 |
| c) Describe service provided at each router. | 4 |
| 3. a) An ISP is granted a block of addresses starting with 120.60.4.0/20. The ISP wants to distribute these blocks to 100 organizations with each organization receiving 8 addresses only. Design the subblocks and give the slash notation for each subblock. | 3.67 |
| Find out how many addresses are still available after these allocations. | |
| b) A host with IP address 137.23.56.23/16 sends a packet to a host with IP address 142.3.6.9/24. Is the delivery direct or indirect? Assume no subnetting. | 4 |
| c) | 4 |



Show the forwarding process if a packet arrives at R1 in Figure with the destination address 180.70.65.140.

4. a) Which field of IP header change from router to router.

2

- b) A host is sending 100 datagrams to another host. If the identification number of the first datagram is 1024, what is the identification number of the last? 6
- c) A router with IP address 125.45.23.12 and Ethernet physical address 23:45:AB:4F:67:CD has received a packet for a host destination with IP address 125.11.78.10 and Ethernet physical address AA:BB:A2:4F:67:CD.
- a. Show the entries in the ARP request packet sent by the router. Assume no subnetting.
- b. Show the entries in the ARP packet sent in response to part a.
- c. Encapsulate the packet made in part a in a data link frame. Fill in all the fields.

SECTION-B

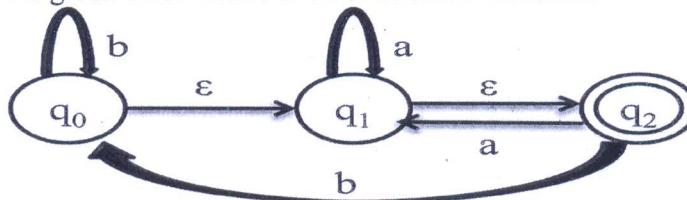
5. a) What is the purpose of including the IP header and the first 8 bytes of datagram data in the error reporting ICMP messages? 3
- b) Is registration required if the mobile host acts as a foreign agent? Explain your answer. 3
- c) Explain RIP and OSPF. 5.67
6. a) When a host makes a DNS query, the query is sent to the local DNS server, which acts a proxy, forwarding the query into the DNS server hierarchy. Discuss the procedure with appropriate figure. 4
- b) A router with IP address 195.5.2.12 and Ethernet physical address AA:25:AB:1F:67:CD. has receive a packet for a destination with IP address 185.11.78.10 when the router checks its routing table, it finds out the packet should be delivered to a router with IP address 195.5.2.6 and Ethernet physical address AD:34:5D:4F:67:CD. Show the entries in ARP request send by the router. Assume no subnetting. 4
- c) What are the differences between persistent and non-persistent HTTP? 3.67
7. a) What is the maximum size of the TCP header? What is the minimum size of the TCP header? 3.67
- b) Explain why the client issues an active open for the control connection and a passive open for the data connection. 6
- c) A sender sends a series of packets to the same destination using 5-bit sequence of numbers. If the sequence number starts with 0, what is the sequence number of the 100th packet? 4
8. a) Describe steps of DHCP client to get ip address from DHCP server. 3
- b) A DNS client is looking for the name of the computer with IP address 132.1.17.8. Show the query message 3
- c) Show the sequence of characters exchanged between the TELNET client and the server to switch from the default mode to the character mode. 2.67
- d) Discuss HTTP protocol and POP protocol. 3

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) Define compiler? Briefly define the two major parts of a compiler with example. 3
 b) List the three jobs of a compiler. Briefly describe the each of the job. 3.67
 c) Draw the block diagram of different phases of compiler (interfaces between them). 3
 (d) How compiler is differ from an interpreter? 2
2. a) Define tokens, patterns and lexemes with proper example. 3
 b) Write a short note on: input buffering. 3
 c) Obtain the tokens and lexemes from following source code 2
- ```
int main (int a, int b)
if(a < b) return a;
else return b;
```
- d) Write the process by which we can remove all the  $\epsilon$  transitions from given NFA. 2 Convert the given NFA with  $\epsilon$  to NFA to NFA without  $\epsilon$ . 3.67



3. a) Consider the grammar given below 4  
 $E \rightarrow E+E \mid E-E \mid E^*E \mid E/E \mid a \mid b$   
 Obtain left most and right most derivation for the sting  $a+b^*a+b$
- b) Consider the following grammar 2.5+  
 $E \rightarrow E+T \mid T$   
 $T \rightarrow id \mid id [ ] \mid id [X]$   
 $X \rightarrow E, E \mid E$   
 i. Eliminate left recursion.  
 ii. Perform left factoring  
 iii. Obtain First and Follow set. 2.67
4. a) Write the rules to compute the First and Follow. 4  
 b) Find the First and Follow funtions for the following grammar with expalnation. 6  
 $E \rightarrow TE'$   
 $E' \rightarrow +TE' \mid \epsilon$   
 $T \rightarrow FT'$   
 $T' \rightarrow *FT' \mid \epsilon$   
 $F \rightarrow (E) \mid id$
- c) Compute closure (I) and goto (I) for the grammar  $X \rightarrow Xc \mid d$  1.67

## Section - B

5. a) Construct LL(1) parsing table for the following grammar. 5  
 $S \rightarrow pB \mid pC \mid Su \mid Sv$   
 $B \rightarrow qBr \mid w$   
 $C \rightarrow x$
- Is it LL(1) grammar? Justify your answer?
- b) For the above grammar 5 (a) construct SLR (1) parsing table. 6.67
6. a) What do you mean by L attribute? Check whether the given SDD is L attribute or not? 3
- |                                              |                                                                                                                                |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| $A \rightarrow PQ$<br><br>$A \rightarrow XY$ | $P.in := p (A.in)$<br>$Q.in := q(P.sy)$<br>$A.sy := f (Q.sy)$<br>$Y.in := y (A.in)$<br>$X.in := x (Y.sy)$<br>$A.sy := f(X.sy)$ |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
- b) Construct the syntax tree for the expression  $p*q - 3 + r$ . 4
- c) For the following given grammar construct the syntax directed definition and generate the code fragment using S-attributed definition. 4.67
- |                                                                                                                    |                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| $S \rightarrow EN$<br>$E \rightarrow E + T$<br>$E \rightarrow E - T$<br>$E \rightarrow T$<br>$T \rightarrow T * F$ | $T \rightarrow T / F$<br>$T \rightarrow F$<br>$F \rightarrow (E)$<br>$F \rightarrow \text{digit}$<br>$N \rightarrow ;$ |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
7. a) What is Backpatching? Using Backpatching generate an intermediate code for following expression 6  
 $A < B \text{ OR } C < D \text{ AND } P < Q$
- b) Write the algorithm for partitioning into basic blocks. 3
- c) What are the benefits of using machine independent intermediate code. 2.67
8. a) What do you understand by code optimization? Describe the classification of optimization. 5
- b) Compare local optimization with global optimization. Give suitable example. 4
- c) Write the properties of intermediate language? 2.67

**Bangabandhu Sheikh Mujibur Rahman Science and Technology University**  
**Department of Computer Science and Engineering**  
**3<sup>rd</sup> Year 1<sup>st</sup> Semester B.Sc. Engineering Examination-2015**

**Course No:** CSE 300  
**Full Marks:** 70

**Course Title:** Computer Graphics  
**Time:** 4 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 is Computer Graphics? What are the differences between computer graphics and image? Write input and output device for computer graphics.                                                                                                            | 5    |
|     | (b) Digitize a line from (10,12) to (15,15) on a raster screen using Bresenham's straight line algorithm.                                                                                                                                                    | 4.67 |
|     | (c) What is fixed point scaling?                                                                                                                                                                                                                             | 2    |
| Q.2 | (a) Explain about various color models?                                                                                                                                                                                                                      | 4    |
|     | (b) Write down the algorithm (with appropriate comments) to convert RGB to HLS color model.                                                                                                                                                                  | 3    |
|     | (c) Convert the following CMY to HLS color, where C = 0.3, M = 0.7 and Y = 0.8                                                                                                                                                                               | 4.67 |
| Q.3 | (a) Explain in detail the Sutherland-Hodgeman clipping algorithm with an example.                                                                                                                                                                            | 6.67 |
|     | (b) Consider a rectangular window whose lower left hand corner is R (2, 6). Find the region codes for the end point of the following two lines using Cohen-Sutherland line clipping algorithm.<br>i. Line A(-4, 2), B (-1, 7)<br>ii. Line C(-2, 3), D (1, 2) | 5    |
|     | Also determine the clipping category of the above lines.                                                                                                                                                                                                     |      |
| Q.4 | (a) The color format in BMP file is BGR, whereas the format in OpenGL is RGB. What will happen for the following colors if someone assumes BMP file as RGB format?<br>(i) Red (ii) Green (iii) Blue (iv) Cyan (v) Magenta (vi) Black (vii) White             | 3.67 |
|     | (b) Convert the following RGB Colors into equivalent HSV model.<br>(i) (0.5, 0.7, 0.3) and (ii) (0.4, 0.6, 0.8)                                                                                                                                              | 4    |
|     | (c) What do you understand by the composition of geometric/ 3D transformations? Show that composition of geometric transformation is a must when the center of rotation is not on the origin.                                                                | 4    |

### SECTION-B

- |     |                                                                                                                                                                                                                                                |      |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Q.5 | (a) What are the advantages of using homogeneous coordinate system?                                                                                                                                                                            | 2.67 |
|     | (b) What are the mesh simplification operations goals? Briefly explain varieties of mesh operations.                                                                                                                                           | 5    |
|     | (c) What is active edge table? Write down the processing steps of global edge table in scan line algorithm.                                                                                                                                    | 4    |
| Q.6 | (a) Differentiate parallel projection from perspective projection.                                                                                                                                                                             | 4    |
|     | (b) Let P (10.0,0.0,30.0) be the coordinate of a three dimensional point on a sphere whose center is at (10.0,50.0,30.0). Determine the new coordinate of P after $\theta_x = 30^\circ$ and $\theta_z = 60^\circ$ . (use the composite matrix) | 6    |
|     | (c) What is antialiasing?                                                                                                                                                                                                                      | 1.67 |
| Q.7 | (a) Explain about Hermite curve with proper mathematical derivations.                                                                                                                                                                          | 5    |
|     | (b) Consider a quadratic parametric cubic curve $Q(t) = T.M.G$ , where $T=[t^2, t, 1]$ . The geometry vector for                                                                                                                               | 5    |

this curve is defined as  $G = [P_0, P_1, P_2]$ .

- (i) Find the basic Matrix M.
- (ii) Find the blending functions for this curve.
- (c) What is  $G'$  and  $C'$  continuity?

Q.8 (a) Define flat shading? Explain different conditions of flat shading.

(b) What do you know about Z buffer? Suppose  $Z_1, Z_2$  and  $Z_3$  make a triangle. Describe the interpolation of z values along polygon edges.

(c) What are spline curves? Give example. What do you know about diffuse reflection? Explain with appropriate figure.