

# Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination – 2011 (Session: 2008-09)

Course Code: CSE 3201 Course Title: Distributed System

Full Marks: 50

Time: 03:00 hrs

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is Distributed System? Give some examples of Distributed System. 2  
(b) What are the challenges in Distributed System? Hence, describe Transparency and Scalability in brief. 1+3=4  
(c) With proper diagram define multiprocessor and multicomputer system. 2  
(d) What is IDL in Distributed System? 2
2. (a) What are the two popular models in Distributed System? Which purposes is fulfilled by these two models? 2  
(b) Show with architecture model, how the invocation of client-server is done in Distributed System. 3  
(c) An additional layer is used to mask the heterogeneity of two systems. Which layer is it and how the masking is done? 3  
(d) What are the three levels of any application? Show them in a typical internet search engine. 2
3. (a) Write algorithms (server side and client side) for building RMI application. 6  
(b) Compare and contrast message passing paradigm and distributed object paradigm. 4
4. (a) What is the necessity of clock synchronization in distributed system? 2  
(b) What are the two types of clock familiar in Distributed systems? How do they work? 2  
(c) Describe the happens before relation of Lamport timestamps in clock synchronization. 3  
(d) Assume, three processes are running on three different machines (A,B,C). The clock ticks on three different machines are 2, 4 and 8 for the machine A, B and C respectively. Use Lamport time stamps to synchronize the clocks on three machines. 3
5. (a) Describe the organization of Coda file system. 4  
(b) What is name resolution? Explain the difference between iterative and recursive name resolution with neat diagrams. 6
6. (a) What are the four basic properties of a Transaction? 3  
(b) How does a two-phase commit protocol work? 3  
(c) What are the ways in controlling concurrency of a server to its own objects? Discuss the ways in brief. 4
7. (a) Explain the following terms: 6  
    i. International Atomic Time      ii. Universal Coordinated Time  
    iii. Mean Solar Time              iv. Leap Seconds  
(b) To what extend is scalability of atomic multicasting important? 4

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Course Code: CSE 3203

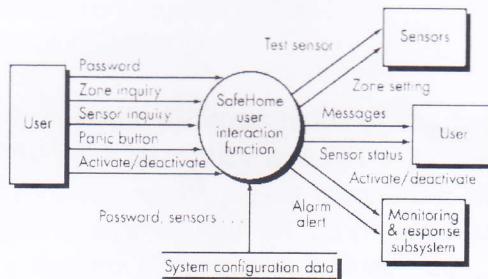
Course Title: Software Engineering

Full Marks: 50

Time: 03:00 hrs

**(Answer any Five. Figures in the right margin indicate full marks.)**

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|--|-------|
| 1. (a) Define software engineering (SE). Distinguish between SE and traditional engineering.   | 1+2=3 |
| (b) State professional and ethical responsibilities of a software engineer.  | 2     |
| (c) Who are the stakeholders in software engineer?   | 2     |
| (d) Briefly explain the attributes of good software.   | 3     |
| 2. (a) What are the umbrella activities?   | 1.5   |
| (b) Define process maturity? Explain different process maturity level provides by SEI?   | 3.5   |
| (c) What is a process model? What are the problems of waterfall model?   | 1+1=2 |
| (d) What is rapid prototyping model? Under what circumstances it is recommended to use this model?   | 1+2=3 |
| 3. (a) Compare the classic life cycle model and evolutionary software process model?   | 2     |
| (b) Explain the spiral model in details.   | 3     |
| (c) What do you understand by PM-CMM?  | 2     |
| (d) Give a comparison among Democratic Decentralization, Controlled Decentralization and Controlled Centralization   | 3     |
| 4. (a) Define software scope. What do you mean by 90-90 rule?  | 2+1=3 |
| (b) Define software metrics. Compute the function point value for the following safe home project. Assume that the weighting factor are simple and complexity adjustment factor are average. | 1+3=4 |



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|---|-------|
| 5. (a) What are the reusable software resources? What are the guidelines follows to use reusable component?                                     | 1+2=3 |
| (b) Explain how Constructive Cost Model (COCOMO) works for software estimation with real life example.  | 1     |
| (c) What is risk analysis? How do you identify software risk? Explain one method.   | 3     |
| (d) What is RMRR strategy? Explain how to mitigate risk.  | 1+2=3 |
| 6. (a) What do you understand by software quality assurance? What are the various activities carried out by SQA team?                           | 1+2=3 |
| (b) Define Formal Technical Review. How do you recognize a review participant who has not prepared? What do you do, if you are a review leader? | 1+2=3 |
| (c) How statistical SQA can be calculated Error Index (EI)  | 2     |
| (d) What is analysis modeling? Sketch the structure of the analysis model.  | 2     |
| 7. (a) What is DFD? State Ward and Mellor extended notation for real time system development.   | 2.5   |
| (b) Define behavioral modeling. Draw the state transition diagram for photocopier software.   | 2.5   |
| (c) Why is a highly couple model difficult to unit test?  | 2     |
| (d) Differentiate between the following:<br>i. Alpha and Beta testing.<br>ii. Verification and Validation.                                      | 3     |

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Begum Rokeya University, Rangpur

3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination – 2011 (Session: 2008-09)

Course Code: CSE 3204

Course Title: Computer Networking ✓

Marks: 50

Time: 03:00 hrs.

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**(Answer any Five. Figures in the right margin indicate full marks.)**

1. (a) What is network? Describe the network criteria. 3  
(b) What are the two types of line configuration? Categorize the four basic topologies in terms of line connection. 5  
(c) Write the elaboration of OSI, ISO, URL, ANSI, TCP, UDP 2
  
2. (a) Describe the 802.3 MAC frame. 4  
(b) How do you determine *Unicast*, *Multicast* and *Broadcast* addresses from *Ethernet* addresses in hexadecimal notation. 2  
(c) What do you mean by slot time and collision? 2  
(d) Why *Ethernet* has imposed on both the minimum and maximum length of a frame? 2
  
3. (a) Write the differences among *10Base5*, *10Base2*, *10BaseT*, and *10BaseF*. 2  
(b) In the *ALOHA*, how should the stations determine the success or failure of the transmission? 2  
(c) Depict how a collision may happen in *CSMA*? 2  
(d) Briefly describe about *CSMA/CD*. 4
  
4. (a) Define UDP and discuss the different fields of the format of a *UDP* datagram? Also, list some of the popular applications of UDP? 4+2=6  
(b) Suppose a router receives an IP packet containing 600 data bytes and has to forward the packet to a network with an MTU (Maximum Transmission Unit) of 200 bytes. Assume that the IP header is 20 bytes long. Show the fragments that the router creates and specify the relevant values in each fragment header (i.e., total length, fragment offset, and more bit). 4
  
5. (a) Distinguish between connection-less and connection-oriented services 2  
(b) Discuss Virtual Circuit Switching and Datagram approach? 4  
(c) (i) A router outside the organization receives a packet with destination address 190.240.7.91. Show how it finds the network address to route the packet. 4  
    (ii) A router inside the organization receives the same packet with destination address 190.240.33.91. Show how it finds the sub-network address to route the packet. 4
  
6. (a) What is Border Gateway Protocol (BGP)? Explain the working principle of BGP. 1+3=4  
(b) Define the type of the following destination addresses:  
    (i) 4A:30:10:21:10:1A 3  
    (ii) 47:20:1B:2E:08:EE  
    (iii) FF:FF:FF:FF:FF:FF
  
- (c) An ISP is granted a block of addresses starting with 190.100.0.0/16 (65,536 addresses). 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. 3

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(ii) The second group has 128 customers; each needs 128 addresses.

(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.

6. (a) Explain Simple Network Management Protocol in detail? 3  
(b) What is Public Key Cryptography? Give some advantages and disadvantages of Public Key Cryptography. 2  
(c) What is RSA Public-key Cryptosystem? Explain RSA encryption algorithm with the help of an example. 2+3=5
7. (a) What is cipher text? Describe a network security model. 3  
(b) Write the differences between symmetric cipher and asymmetric cipher. 2  
(c) What is the difference between substitution and transposition technique? 2  
(d) Describe *Playfair* cipher method. 3

# **Department of Computer Science & Engineering**

**Begum Rokeya University, Rangpur**

**3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination – 2011 (Session: 2008–09) ২০১০**

**Course Code: CSE 3206 Course Title: System Analysis and Design**

**Full Marks: 50**

**Time: 03:00 hrs**

**(Answer any Five. Figures in the right margin indicate full marks.)**

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|--|-------|
| 1. (a) Define System? What are the elements required for a system?   | 1+4=5 |
| (b) Describe open system and closed system.  | 3     |
| (c) What categories of information are relevant to decision making in business?  | 2     |
| 2. (a) Describe System Development Life Cycle (SDLC) in brief with each of its cycle.  | 4     |
| (b) Why prototyping of system is preferred? What are the steps in prototyping a system?  | 3     |
| (c) What is the difference between analysis and design? Can one begin to design without analysis? Why?   | 3     |
| 3. (a) What are the four steps for assessing economic feasibility?   | 2     |
| (b) List two intangible benefits. Describe how these benefits can be quantified.   | 4     |
| (c) Give three examples of business reasons of a system to be built.   | 2     |
| (d) What is stakeholder analysis?  | 2     |
| 4. (a) How Return on Investment (ROI) and Net Present Value (NPV) help us in cost-benefit analysis of a system?  | 3     |
| (b) What are the formulas for calculating estimate effort and estimate time of a project?  | 2     |
| (c) Suppose, a system analyst has been asked to develop an inventory system. The approximated lines of codes required for developing the system is <b>25000000</b> lines of code. What will be the estimate effort and time? | 3     |
| (d) What do you mean by staffing a project?  | 2     |
| 5. (a) What is the basic step in the analysis process?   | 1.5   |
| (b) What are the biggest challenges to success in BPA, BPI and BPTR?   | 4.5   |
| (c) Explain the difference between a closed-ended question, an open-ended question, and a probing question. When would you use each?   | 4     |
| 6. (a) Describe the elements of Data Flow Diagram.   | 3     |
| (b) What is physical and logical data modeling? What are the two strategies used for these two data modeling?  | 2     |
| (c) Draw a level-0 DFD for a doctor's chamber.   | 3     |
| (d) Is it mandatory to normalize a group of data? Give reasons to your answer.   | 2     |
| 7. (a) What are the parent processes for the following process?<br>i. 3.2.1    ii. 4.3.2.3    iii. 1.2   | 3     |
| (b) Draw the data model for the following entities:<br>i. Movie (Title, producer, length, director, genre)<br>ii. Ticket (Price, adult or child, showtime, movie)<br>iii. Patron (name, adult or child, age)                 | 6     |
| (c) What is an intersection entity?  | 1     |

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3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination – 2011 (Session: 2008-09)

Course Code: CSE 3207 Course Title: Theory of Computation and Automata  
Full Marks: 50 Time: 03:00 hrs

**(Answer any Five. Figures in the right margin indicate full marks.)**

1. (a) Define finite automata? Why should you study automata? 1+1=2  
 (b) The non-determinism of an NFA makes it more powerful over DFA. Explain. 2  
 (c) Construct a DFA to recognize the following set of languages over the alphabet {0,1}. 3
    - i.) The set of all strings such that the number of 0's is divisible by 4 and the number of 1's divisible by 3.
    - ii.) The set of all strings that are valid BCD codes.
(d) Prove that a language  $L$  is accepted by some DFA if and only if  $L$  is accepted by some NFA. 3
  
  2. (a) What do you mean by ECLOSE of a state in an  $\epsilon$ -NFA. What does it signify 1+1=2  
 (b) Convert the following  $\epsilon$ -NFA to a DFA and finally draw the DFA. 3
- |                 |             |             |             |             |
|-----------------|-------------|-------------|-------------|-------------|
|                 | $\epsilon$  | A           | b           | c           |
| $\rightarrow p$ | {q, r}      | $\emptyset$ | {q}         | {r}         |
| q               | $\emptyset$ | {p}         | {r}         | {p, q}      |
| * r             | $\emptyset$ | $\emptyset$ | $\emptyset$ | $\emptyset$ |
- (c) Design an  $\epsilon$ -NFA for recognizing decimal numbers of the form [-][digits].digits. Here, entries enclosed within [] refer to optional entries. 2  
 (d) Prove that a language  $L$  is accepted by some  $\epsilon$ -NFA iff,  $L$  is accepted by some DFA. 3
  
  - 3 (a) Mention the allowed operators along with example of each from regular expressions. 1  
 (b) Write regular expressions for the following languages. 3
    - i.) The set of all strings that are valid identifiers in C language. Assume keywords as identifiers too.
    - ii.) The set of all strings that can be a valid course code for any course in BRUR. Note that a Dept. may have a 3 letter (e.g. CSE) or a 4 letter (e.g. CHEM) prefix in its course codes.
    - iii.) The set of all strings over {0, 1} having at most one pair of 0's or at most one pair of 1's.
(c) Write down the *annihilator* and *identity* for the concatenation and union operators of regular expressions respectively? Mention two languages whose *Kleen closures* are finite. 1+1=2
  
  - (d) If  $L = L(A)$  for some DFA  $A$ , then there is a regular expression  $R$  such that  $L = (R)$ . 4

# Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination – 2011 (Session: 2008-09) *000240*

Course Code: CSE 3207 Course Title: Theory of Computation and Automata

Full Marks: 50

Time: 03:00 hrs

**(Answer any Five. Figures in the right margin indicate full marks.)**

1. (a) Define finite automata? Why should you study automata? 1+1=2  
 (b) The non-determinism of an NFA makes it more powerful over DFA. Explain. 2  
 (c) Construct a DFA to recognize the following set of languages over the alphabet {0,1}. 3

- i.) The set of all strings such that the number of 0's is divisible by 4 and the number of 1's divisible by 3.  
 ii.) The set of all strings that are valid BCD codes.

- (d) Prove that a language  $L$  is accepted by some DFA if and only if  $L$  is accepted by some NFA. 3

2. (a) What do you mean by ECLOSE of a state in an  $\epsilon$ -NFA. What does it signify 1+1=2  
 (b) Convert the following  $\epsilon$ -NFA to a DFA and finally draw the DFA. 3

	$\epsilon$	A	b	c
$\rightarrow p$	{q, r}	$\emptyset$	{q}	{r}
q	$\emptyset$	{p}	{r}	{p, q}
*r	$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$

- (c) Design an  $\epsilon$ -NFA for recognizing decimal numbers of the form [-][digits].digits. Here, entries enclosed within [] refer to optional entries. 2  
 (d) Prove that a language  $L$  is accepted by some  $\epsilon$ -NFA iff,  $L$  is accepted by some DFA. 3

- 3 (a) Mention the allowed operators along with example of each from regular expressions. 1

- (b) Write regular expressions for the following languages. 3

- i.) The set of all strings that are valid identifiers in C language. Assume keywords as identifiers too.

- ii.) The set of all strings that can be a valid course code for any course in BRUR. Note that a Dept. may have a 3 letter (e.g. CSE) or a 4 letter (e.g. CHEM) prefix in its course codes.

- iii.) The set of all strings over {0, 1} having at most one pair of 0's or at most one pair of 1's.

- (c) Write down the *annihilator* and *identity* for the concatenation and union operators of regular expressions respectively? Mention two languages whose *Kleen closures* are finite. 1+1=2

- (d) If  $L = L(A)$  for some DFA  $A$ , then there is a regular expression  $R$  such that  $L = (R)$ . 4

4. (a) Briefly describe the state elimination process of converting DFA's to regular expressions. Find regular expression corresponding to the following DFA using this process.

2+3=5

	0	1
$\rightarrow^* q_1$	$q_1$	$q_2$
$q_2$	$q_3$	$q_2$
$q_3$	$q_1$	$q_2$

- (b) What is the complexity of the standard process for converting an n-state DFA to its equivalent regular expression? 2
- (c) Construct  $\epsilon$ -NFA for each of the following regular expressions. 3
- i.)  $(0+1)^*(00+11)(0+1)^*$
  - ii.)  $0^*(1^*0^*)^*$
5. (a) If  $L$ ,  $M$ , and  $N$  are any language, then prove that  $L(M \cup N) = LM \cup LN$ . 3
- (b) State and prove the *pumping lemma* for regular languages. 3
- (c) Using *pumping lemma* for regular languages, determine if the following languages over are regular or non-regular. 2+2=4
- i.)  $L = \{0^{2n} \mid n \geq 1\}$
  - ii.)  $L = \{0^n 1 \mid n \geq 1\}$
6. (a) Define *CFG*? Give the *CFG* that generates palindrome for binary numbers. 1+1=2
- (b) Design *CFG*'s for the following languages. 2+2=4
- i.)  $L = \{0^{2n} 1^n \mid n \geq 1\}$
  - ii.)  $L = \{(n^n) \mid n \geq 1\}$
- (c) If  $G$  is the grammar,  $S \rightarrow SbS \mid a$ , then prove that  $G$  is ambiguous. How can you remove ambiguity from  $G$ . 2+2=4
7. Write short notes on the following topics. 2.5x4=10
- i.) *lm*
  - ii.) *Lazy evaluation*
  - iii.) Parse tree
  - iv.) Sentential form