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Begum Rokeya University, Rangpur
Department of Computer Science and Engineering
B.Sc. 3rd Year 2nd Semester Examination-2014

Course Title: Computer Networking
Time: 3 Hours

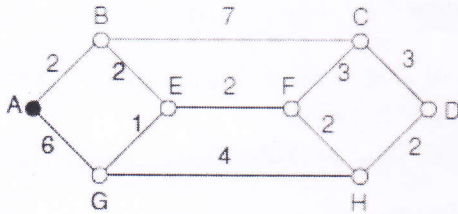
Course Code: CSE 3204
Full Marks: 50

*Note: i) Answer any FIVE questions from the following questions
ii) Numbers in the right margin indicate marks for each question.
iii) All parts of the questions must be answered sequentially.*

1. (a) Why do you think there is a need for four levels of addresses in the Internet, but only one level of addresses (telephone numbers) in a telephone network? 2
(b) Write short notes on: i) Ethernet ii) Asymmetric Digital Subscriber Line (ADSL) iii) Routers 3
(c) Discuss the TCP/IP protocol suite with necessary figures. 5
 2. (a) Briefly explain the CIDR notation for IP addressing with at least one example. 2
(b) One of the addresses in a block is 110.23.120.14/20. Find the number of addresses, the first address, and the last address in the block. 3
(c) Explain network subnetting. An organization is granted the block 130.56.0.0/16. The administrator wants to create 1024 subnets. 5
 - i) Find the subnet mask
 - ii) Find the number of addresses in each subnet
 - iii) Find the first and the last address in the first subnet
 3. (a) A router receives a packet with the destination address 201.24.67.32. Show how the router finds the network address of the packet. 2
(b) Distinguish between default mask and subnet mask. 3
(c) What is IP packet forwarding? In the following figure, find the routing table for router R2 5
- The diagram illustrates a network topology. On the left, a cloud labeled 'Rest of the Internet' is connected to a 'Default router' (R2) via interface m0. R2 has interface m1 connected to a central router (R1) via interface m0. R1 has interface m2 connected to a subnet 170.14.0.0/16 and interface m1 connected to a subnet 145.80.0.0/16. R1 also has interface m0 connected to a central router (R3) via interface m1. R3 has interface m0 connected to a subnet 192.16.7.0/24. The central router (R1) has interface m1 connected to a subnet 111.25.19.20 and interface m0 connected to a subnet 111.15.17.32. The central router (R3) has interface m1 connected to a subnet 111.30.31.18. The central router (R2) has interface m1 connected to a subnet 111.0.0.0/8.
4. (a) What is **traceroute** and **ping**? 2
(b) Briefly discuss different routing protocols. 3
(c) Define *datagrams*. Describe the IP-datagram format. 5
 5. (a) Briefly explain the working principle of a VLAN. 2
(b) What is ARP, how does it work? 3
(c) Write short notes on: i) Network Address Translation (NAT) ii) Loopback and Private addresses 5

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6. a) Why routing algorithm is needed? 2
 b) Find the shortest path from node A to node D using shortest path routing algorithm for the following undirected graph (Show every steps). 4



- c) What are the applications of Flooding routing algorithm? 2
 d) Distinguish between connection-less and connection-oriented services. 2
7. (a) What are the two types of line configuration? Define each of them. 2
 (b) Write short notes on: Telnet and FTP 3
 (c) Why is the purpose of DNS? Explain your answer. Compare and contrast the DNS structure with the UNIX directory structure. 5

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B.Sc. (Engg.) 3rd year 2nd Semester Final Examination, 2014. (Session: 2011-12)

Course Code: **CSE 3203**

Time: **3.00 hours**

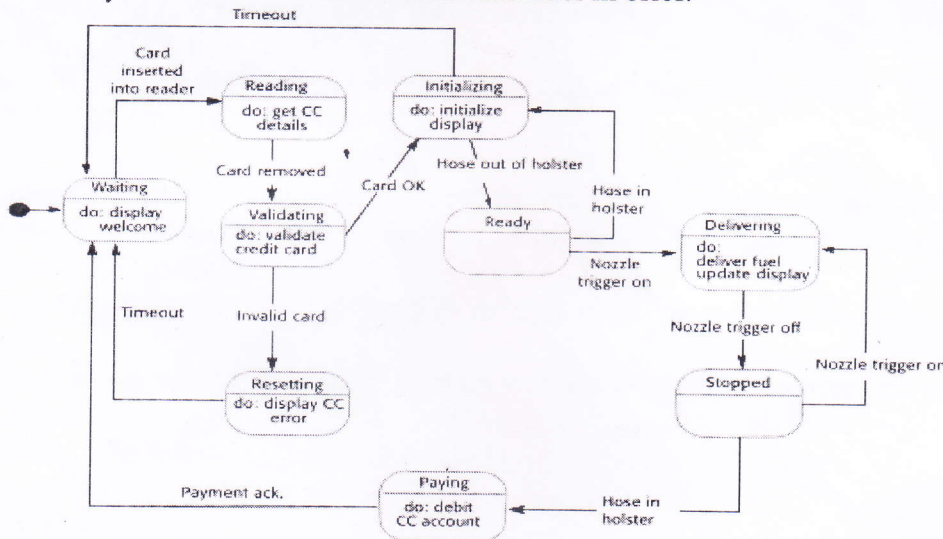
Course Title: **Software Engineering**

Total Marks: **50**

[N B: Answer any five (5) questions and figures in the right margin indicate full marks]

[All part of each question must be answered sequentially]

1. a) What are the differences between software engineering and system engineering? 2
 b) Define software process. Discuss fundamental activities in software process that leads to the production of a software product. 1+3
 c) Briefly discuss a generic process framework that includes different framework activities and a set of umbrella activities. 4
2. a) Do you think software engineering is different from other types of engineering? Explain. 3
 b) Write down the differences between Milestones and Deliverables. 2
 c) Discuss the risk management process in short. 3
 d) Define gantt charts and activity network. 2
3. a) What is Requirement engineering Process? What are the goals of Requirement engineering Process? 1+2
 b) Discuss different non-functional requirement that you have to remember, when developing software. 3
 c) Briefly depict Scrum as an agile software development method. 4
4. a) What is localizing errors? 1
 b) What is System model? Discuss context model in brief. 4
 c) 5



Explain Above state machine model of a petrol pump.

5. a) "The job of software architect is very important", discuss it from your viewpoint. 2
 b) Discuss how can a model is driven by Interrupt? 3
 c) Draw a data flow diagram shows how information might flow within a system allowing students to register for tests. 5
6. a) What are the guidelines for testing software to the novice software engineer from a senior 2

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- b) What are benefits of Test Driven Development? 3
 - c) What are the scope of following testing:
 - i. Block box and white box testing
 - ii. Alpha, beta and acceptance testing3
 - d) Discuss the assessment of software quality according to the quality attributes. 3
7. a) What are reusable software resources? What are the guidelines follows to use reusable component? 3
- b) Explain how Constructive Cost Model (COCMO) works for software estimation with real life example. 4
 - c) Define software scope. What do you mean by 90-90 rule? 3

Time: 3 hours

Full Marks: 50

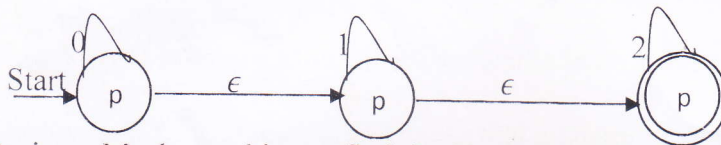
N.B.

- There are **SEVEN** questions in this course. Answer any **FIVE** questions.
- The figures in the margin indicate full marks.
- All parts of the questions must be answered sequentially.

- What do you mean by natural and formal languages? 2
 - Design a DFA, M which accepts the language $L(M) = \{w \in (a, b)^* : w \text{ does not contain three consecutive } b\text{'s}\}$. 4
 - Design an FSM to check divisibility by five, where $\Sigma = \{0, 1, 2, 3, \dots, 9\}$. 4
- Define finite automata. What are the applications of finite automata? 3
 - Every DFA is also an NFA, Is this statement true or false? Explain your answer. 3
 - Convert the NFA: $M = [\{p, q\}, \{0, 1\}, \delta, p, \{q\}]$ to its equivalent DFA and finally draw the DFA, where the state transition function δ is as shown in the following table 4

$\Sigma \backslash Q$	0	1
p	$\{p, q\}$	$\{q\}$
q	\varnothing	$\{p, q\}$

- What do you mean by unreachable states and dead states? Give example. 3
 - Construct an equivalent DFA for the NFA with ϵ -moves in (Fig a). 4



- Design a Mealy machine to find the 2's complement of a given binary number. 3
- Let $L = \{0^n | n \text{ is a prime}\}$; show that L is not regular. 2
 - Show that i) $(a + b)^* = (a + b)^* + (a + b)^*$ ii) $(a^* b^*)^* = (a + b)^*$ 3
 - Draw the NFA with ϵ -moves for the regular expressions (step by step) 5
 $r = 01[((10)^* + 111)^* + 0]^* 1$
- What is Chomsky normal form? Discuss the procedure to find equivalent grammar in CNF. 5
 - Define Greibach Normal Form. Obtain a grammar in CNF equivalent to the grammar G with productions P given by 5

$$S \rightarrow ABa, A \rightarrow aab \quad B \rightarrow AC$$

- What is an ambiguous grammar? Explain with the help of an example, the removal of ambiguity in CFGs 4
 - Show that the following grammar is $LL(1)$ 6

$$\begin{aligned} E &\rightarrow TE' \\ E' &\rightarrow +TE' \mid \epsilon \\ T &\rightarrow FT' \\ T' &\rightarrow *FT' \mid \epsilon \\ F &\rightarrow (E) \mid id \end{aligned}$$

- What do you mean by recursive descent parser? What are the basic steps for construction of RD parser? 3
 - Explain backtracking in the context of top-down parsing. Give suitable examples wherever required. 2
 - State how Greibach theorem can be used to prove that many problems related to CFGs are 5

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B.Sc. (Engg.) 3rd year 2nd Semester Final Examination, 2014. (Session: 2011-12)

Course Code: **CSE 3201**

Time: **3.00 hours**

Course Title: **Distributed System**

Total Marks: **50**

[N B: Answer any five (5) questions and figures in the right margin indicate full marks]

[All part of each question must be answered sequentially]

1. a) What is distributed system? What are the significant advantages and limitations of distributed system? 3
b) What are the challenges you need to encounter in designing a Distributed System? Hence, describe Heterogeneity, Openness and Scalability in brief? 1+6
2. a) Why do we use different System Models in designing a Distributed System? 2
b) Considering Architectural Model, answer the following questions 4
 - i. What are the entities that communicate in a Distributed System environment?
 - ii. What communication paradigm is used in a Distributed System?
- c) How a Web Proxy server works in a Distributed System environment. Describe it in details. 4
3. a) What system layers exist in a Distributed System? Discuss how two nodes communicate in different System Layers. 1+3
b) Distinguish between Process and Thread. Discuss procedure of creation of a new Process in a Distributed System. 1+3
c) How Shared-memory Multiprocessor works in Distributed System? 3
4. a) Discuss different Threats and Attacks that a Distributed System designer should consider. 3
b) What is main-in-the-middle attack? 1
c) Consider two users of a Distributed System named Alice and Bob. They want to communicate securely by using public/private key pair. In what scenario they can encounter man-in-the-middle attack? How it can be secured? 2+4
5. a) What is Distributed File System? Discuss what requirements you need to fulfill in designing a Distributed File System? 1+5
b) Describe how Sun Network File system is implemented in a Distributed System environment. 4
6. a) What is the necessity of clock synchronization in distributed system? 2
b) 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 Cristian's algorithm to synchronize the clocks on three machines. 3
c) What is NTP? What are the chief design aims and features on NTP? 3
d) What do you mean by global state? What are the properties of detecting global state? 2
7. a) Describe how Google Search engine works in a Distributed System environment. 5
b) Write short notes on two of the followings 5
 - i. Web Service
 - ii. Inter-process Communication
 - iii. Cryptography

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Course Code: **PHY 1125**
Course Title: **Physics**

Time: **3.00 hours**
Total Marks: **50**

[N B: Answer any five (5) questions and figures in the right margin indicate full marks]

[All parts of each question must be answered sequentially]

1.
 - a) Define electric charge. Explain about quantization of charges. 1+2
 - b) What is point charge? State and explain Coulomb's law of electrostatics. 1+3
 - c) Define electric field, electric field intensity, and lines of force. 3
2.
 - a) What is electric potential? Derive the relation between electric potential and electric field strength. 1+2
 - b) State and explain Gauss law in electrostatics. 2.5
 - c) Using Gauss's law, derive electric field intensity and electric potential of a charged sphere at a point outside it. 4.5
3.
 - a) Explain electric dipole and dipole moment. 1+1
 - b) Calculate the electric field due to an electric dipole at a point on the perpendicular bisector of the dipole. 6
 - c) An electric dipole consists of two opposite charges of magnitude 2.0×10^{-6} C separated by a distance 1.0 cm. It is placed in an external magnetic field of 2.0×10^5 N/C. What maximum torque does the field exert on the dipole? 2
4.
 - a) State and explain Faraday's laws of induction. 3
 - b) Define self-induction and mutual induction. 2
 - c) Deduce the expression of inductance of a toroid. 5
5.
 - a) What is radioactivity? Write down the properties of α and β - rays. 1+3
 - b) State the law of radioactive disintegration. Deduce the relation: $N = N_0 e^{-\lambda t}$. 1+3
 - c) The half-life of radium is 1620 years. In how many years will one gram of pure element (i) lose centigram and (ii) be reduced to one centigram? 2
6.
 - a) Define crystalline solids and amorphous. Distinguish between the two. 3.5
 - b) Define (i) lattice, (ii) basis. 1.5
 - c) Define Unit cell. Sketch the plane and direction having Miller indices (110), (234) and [111], [101]. 1+4
7.
 - a) State and explain the Bragg's law. 3
 - b) What do you mean by ionic bonding? Deduce an expression for the ionic potential energy in a crystal. 1+6