KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2015
Department of Computer Science and Engineering
CSE 4105
Computer Networks

TIME: 3 hours FULL MARKS: 210

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

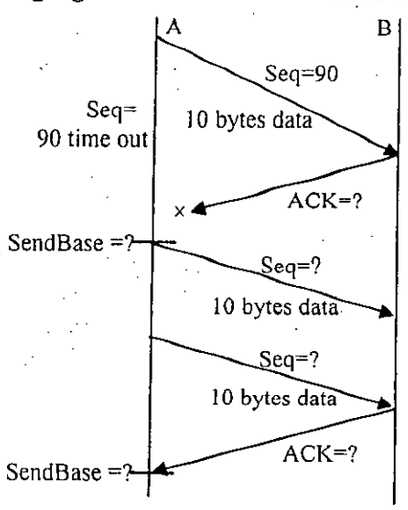
1. a) Define computer network and Internet. Explain Internet on service view points. (09)
   b) Why is it said that packet switching employs statistical multiplexing? Contrast statistical multiplexing with the multiplexing that takes place in TDM and FDM. (09)
   c) "Message segmentation reduces the end to end delay increasing resource usabilities"- Justify the statement. (08)
   d) Explain Internet structure with different tiers. What is the benefit of tierwise ISP connections for internet service? (09)

2. a) Why does TCP socket identification need 4-tuple instead of 2-tuple? What are those tuples? (08)
   b) Why UDP is called a bare-bone protocol in compare of TCP? (06)
   c) In respect of Rdt 2.0, briefly state the objective of the following used techniques: (i) Checksum (ii) ACK packet (iii) NAK packet. (09)
   d) Consider sending a file of 10KB packet with 1 Gbps bandwidth link and 15 msec end-to-end propagation delay. Answer the following questions: (12)
      (i) What is the required transmission time?
      (ii) What is the channel utilization (U)?

Note that $U = \dfrac{\frac{L}{R}}{RTT + \frac{L}{R}}$

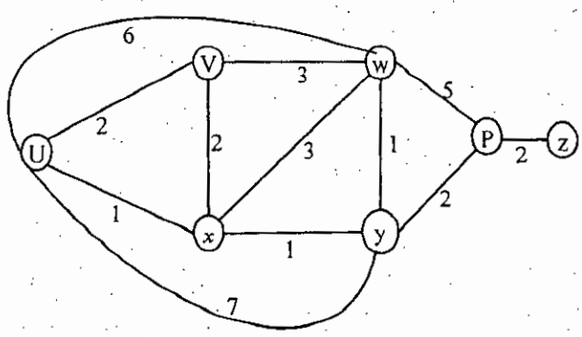
(iii) For getting the channel utilization 0.5 what will be the transmission time?

3. a) What is the performance problem of Rdt 3.0 (stop-and-wait) protocol? How this problem can be resolved? (07)
   b) Sketch a diagram where slective repeat protocol experiences a dilemma. Give your opinion how this dilemma can be overcome. (10)
   c) Consider TCP's communication scenario between A and B. A and B have initial sequence number 90 and 180 respectively. A is sending a file to B with a packet size of 10 bytes in the following figure. Determine the values of seq#, ACK# and sendBase#. (08)

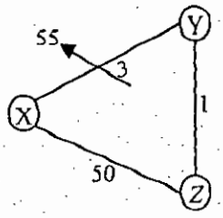


   d) What do you mean by NAT? Explain how NAT operation is performed. (10)

4. a) What is the HOL blocking in the switch fabric of a router? (05)
   b) Consider the following graph. Using Link-state algorithm find the shortest-path tree for router U. (12)



   c) Consider the following graph. Assume that link (x,y) cost has been changed from 3 to 55. Show that the poisoned reverse technique can resolve the count to infinity problem in this case. (11)



   d) Is RIP Intra-AS or Inter-AS routing protocol? Show a simple example of RIP routing table entries. (07)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Briefly explain Nonpersistent HTTP and Persistent HTTP with/without pipeline. Compare TCP connections among the three HTTP methods for a HTML file containing 10 other objects' link. (10)
   b) Differentiate GET and conditional GET commands of HTTP. How does conditional GET command improve performance of web proxy and local cache mechanism? (08)
   c) Does web browsing require UDP service along with TCP? Explain briefly. (05)
   d) "Email demands both push and pull operations"-Justify the statement. (06)
   e) Compare SMTP, HTTP and DNS on the basis of direct transfer and transfer through intermediate hosts. (06)

6. a) Explain common FTP commands and replies. (07)
   b) Explain importance of DNS in service view points. Also explain iterative and recursive DNS queries with appropriate example. (10)
   c) How DNS and CDN together and alone provide better web browsing facilities? (08)
   d) Explain importance of Network Operations Communications Center (NOCC) in content Distribution Network, (05)
   e) "In computer networking switch is transparent to hosts but router is not"-is it true? Justify your answer. (05)

7. a) Why a network interface card is a marked as semi autonomous device? (05)
   b) Explain ideal Multiple Access (MAC) protocol scenario. Compare three different MAC protocols. (09)
   c) Distinguish slotted ALOHA and pure ALOHA protocols. (06)
   d) Write filtering/forwarding algorithm of a switch. List the actions with corresponding condition(s) that a switch may perform when it receives a frame. (09)
   e) Compare routing switches and hubs on operational viewpoints. (06)

8. a) Why does a computer need an MAC address, inspite of having an IP address? (05)
   b) "MAC address of a host never goes outside the network"-is it true? Justify your answer. (05)
   c) Briefly explain various desirable properties of secure communication. (06)
   d) What are shortcomings of symmetric key cryptography? How are those solved in public key cryptography? (07)
   e) What do you mean by digital signature? How does RSA provides digital signature mechanism? (12)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 4th Year 1st Term Examination, 2015
Department of Computer Science and Engineering
CSE 4109
Artificial Intelligence

TIME: 3 hours FULL MARKS: 210

N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) What is Artificial Intelligence? How can we test whether a machine has reached the general intelligence level of a human being? Explain it. (15)
   b) What is perception-action cycle? Explain the perception-action cycle of a point-robot which will travel through a two-dimensional grid world. (12)
   c) What is an artificial agent? Explain the properties of an artificial agent. (08)

2. a) Explain uniform-cost search with example. (10)
   b) What is the problem of DFS strategy? How can the problem be solved? Explain it with an example. (13)
   c) "Greedy best-first search strategy suffers from the same defects as DFS strategy"-justify the statement. (12)

3. a) What is heuristic search? Explain using an example. (10)
   b) "A* search is optimal if h(n) is consistent"-justify the statement. (10)
   c) Define Constraint Satisfaction Problems. Explain the deferent types of Constraints those to be handled to solve CSPs. (10)
   d) Write down the local-search with min-conflict heuristic to solve the 8-Queen problem. (05)

4. a) What is adversarial search? Explain. (06)
   b) What is Min-Max procedure? Explain its working principle using a proper example. (12)
   c) What do you mean by fuzzy logic? Explain the concept of fuzzy logic using a physical example. (12)
   d) Why two player game playing a zero-sum action? Explain. (05)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Define Validity, Entailment and Skolem constant with example. (09)
   b) Why is propositional logic considered as a weak knowledge representation language? (06)
   c) State the propositional inference rules. Consider the following statements: "Either cat fur or dog fur was found at the scene of the crime. If dog fur was found, officer Thompson had an allergy attack. If cat fur was found then Macavity is responsible for the crime. But officer Thompson didn't have an allergy attack". Using the inference rules show that Macavity is responsible for the crime. (12)
   d) What do you mean by horn clause and definite clause? Consider the following knowledge base $(\neg A \vee \neg B \vee C) \wedge \neg (A \forall \neg B)$. Is the knowledge base is horn form? Are all clauses definite clauses? (08)

6. a) How can you build a knowledge-based agent using declaratic approach? (06)
   b) Convert the logic $A \Leftrightarrow (B \vee C)$ into CNF. Distinguish between Horn clauses and definite clauses. (12)
   c) Consider the following knowledge base (12)

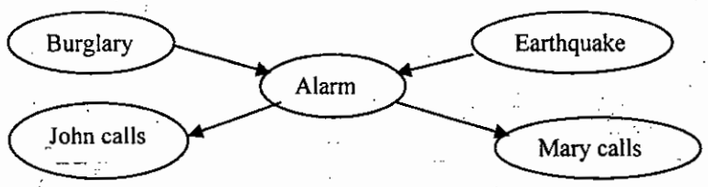
$$A \Leftrightarrow B$$
$$C \wedge D \Rightarrow A$$
$$Q \wedge C \Rightarrow D$$
$$P \wedge A \Rightarrow C$$
$$P \wedge Q \Rightarrow C$$
$$P$$
$$Q$$

Draw corresponding AND-OR graph and using Backward chaining find out whether the query B is true.

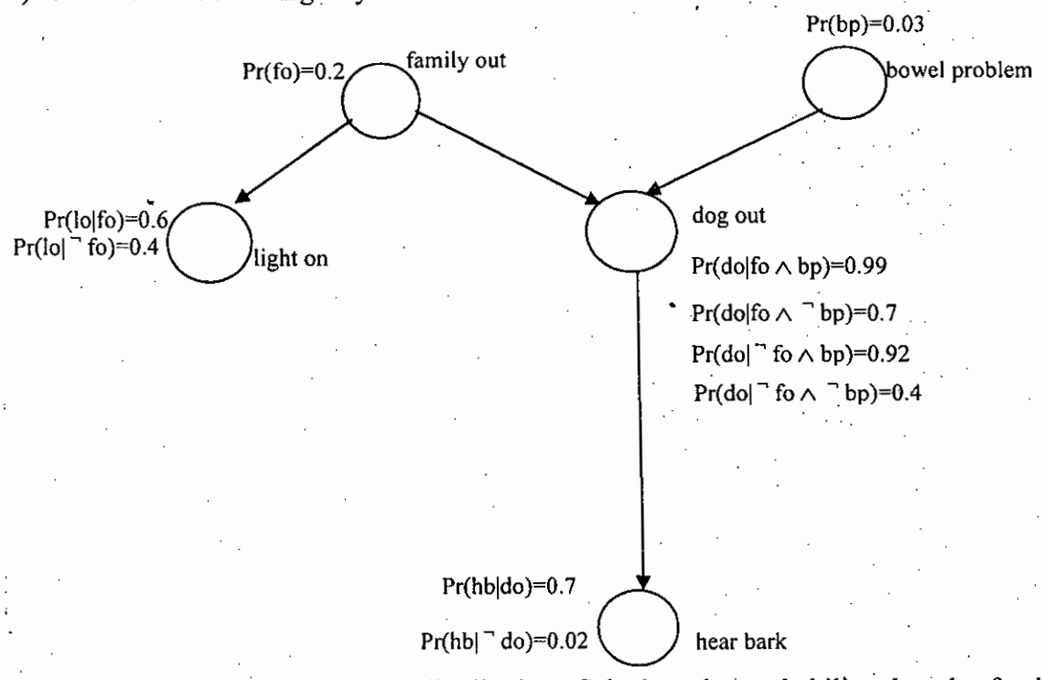
d) How can you define the relation of logical entailment between sentences? (05)

7. a) What is decision tree? Write down the basic idea of decision tree algorithm. (10)
   b) Construct a grammar for the following sentence. Also draw the syntactic tree. (17)
   "The fact that dogs bark shocked him". Use top down approach to parse it.
   c) What is pruning? What is the goal of pruning? (08)

8. a) Derive the product formula for Bayesian networks. Show the steps to calculate the product formula of the following Bayesian network. (12)



b) Consider the following Bayesian network (17)



Find out the joint probability distribution. Calculate the probability that the family is out, given that the light is on and we hear barking.

c) What do you mean by anaphora and metaphore in Natural Language Processing (NLP)? (06)