UG/5th Sem/Comp(H)/T/19

2019

B.Sc. (Honours)

5th Semester Examination

COMPUTER SCIENCE

Paper - DSE-2T

Full Marks : 40 Time : 2 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

[Network Programming]

Group - A

Answer any *five* questions from the following. 2×5=10

1. (a) What is socket interface ?

   (b) What do you mean by 'active open' in client server model ?

   (c) What do you understand by signal handling ?

   (d) What is the purpose of flow control ?

[Turn Over]

(e) What is TELNET ?

(f) What is anonymous FTP ?

(g) Provide the 'Sockaddr' structure for specifying addresses associated with sockets.

(h) Why listen( ) function is used ?

Group - B

Answer any *four* questions : 5×4=20

2. Briefly explain iterative client server communication process using UDP and datagram sockets.

3. Differentiate between the working mechanisms of POP3 and IMAP4.

4. What is the maximum size of a user datagram ? Describe the user datagram format in brief. 1+4

5. What are the basic task performed by TCP echo client server program ? Why signal handling is needed ? 3+2

6. Why firewalls are used ? Describe how packet filter firewalls work. 1+4

7. What do you mean by private networks ? How the shortage of IPV4 addresses can be resolved by network address translation (NAT) ? 1+4

Group - C

Answer any *one* question. 10×1=10

8. (a) With a suitable diagram briefly describe the three way handshake process to establish TCP connection.

   (b) With an example, explain the concept of subnetting. 6+4

9. What is the utility of socket API ? What do you understand by IPC ? Briefly decribe the functionalities of DNS. 3+2+5

[Computational Linguistics]

Group - A

Answer any *five* questions from the following. 2×5=10

1. (a) Define : Rule-Based POS Taggers and Stochastic POS Taggers. 1+1

   (b) What do you mean by lexicon ? 2

   (c) Define : Homonymy. 2

[Turn Over]

(d) Define different types of Smoothing Evaluation for N-grams language modelling. 2

(e) How are related the methods of computational linguistics and of artificial intelligence ? 2

(f) What is lexicography ? Why is it important for NL processing ? 1+1

(g) What are dependency tree in computational linguistics ? 2

(h) What are holistic and reduced models ? Is the most detailed and broad model always the better one ? 1+1

Group - B

Answer any *four* questions : 5×4=20

2. (a) Given the following corpus below.

<s> I am Sam </s>

<s> Sam I am </s>

<s> I am Sam </s>

<s> I do not like green eggs and Sam </s>

Using a bigram language model with add-one smoothing, what is P(Sam/am) ? Include <s> and </s> in counts just like any other token.

(b) What is a sign ? What is a linguistic sign ? What is the syntactics of a linguistic sign in the Meaning Text Theory ? What is the structure of linguistics sign in Head-driven phase structure Grammar ? 1+1+1+2

(c) What is synonymy ? What kinds of synonymy exist ? Can synonymy be avoided in natural language ?

(d) Design word sense disambiguation with proper example. 5

(e) Define NLTK. Give the output of following statements.

```
>>> sentence = " " " At eight o'clock on
... Thursday morning Arthur didn't
... feel very good." " "
```

(i) tokens = nltk. word tokenize (sentence)

What will be the output in "tokens" ?

(ii) tagged = nltk. pos-tag (tokens)

What will be the output in "tagged" ?

(f) Describe the class of strings matched by the following regular expressions : 1×5

(i) [a–z A–z]+

(ii) [A–Z] [a–z] *

(iii) \d+(\.\d+] ?

(iv) ([bcdfgh] [aeiou] [bcdfgh] *

(v) [^Ss]

3. Answer any *one* question. 10×1=10

(a) Define Pumping Lemma of Regular Language. Prove that $L = \{0^i 1^i : i \geq 0\}$ is NOT regular. Prove that $L = \{0^i : i \text{ is a prime}\}$ is NOT regular.

2+4+4

(b) Define Morphological analysis for finite state linguistics Transducers. Define different types of morphological processes and write down the difference among them. 2+1+7

[Machine Learning]

Group - A

Answer any *five* questions from the following. 2×5=10

1. (a) What do you understand by selection bias ?

   (b) Differentiate inductive and deductive learning.

   (c) What is meant by Entropy ?

   (d) What is overfitting ?

   (e) What are collinearity and multicollinearity ?

   (f) What is cluster sampling ?

   (g) How do you choose an algorithm for a classification problem ?

Group - B

Answer any *four* questions. 5×4=20

2. (a) Explain Linear Regression in layman's term.

   (b) Explain classification. 3+2

3. What is Bayes theorem and maximum posterior hypothesis ?

4. Describe Brute force MAP learning algorithm.

5. Discuss locality weighted regression.

6. Discuss the Naive Bayees classifier.

7. Discuss the K-nearest neighbour language.

Group - C

Answer any *one* question. 10×1

8. Discuss the method of comparing two algorithms. Justify with paried to tests method. 6+4

9. Design a two layer network of perception to implement XOR and AND gates. 10
