44 (4) ATLN 4·4 (O)

2018

AUTOMATA THEORY AND LANGUAGES

(Old Course)

Paper : 4·4

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. *(a)* State True ***or*** False. 1×5=5

   (i) CFG is type 2 grammar.

   (ii) DFA has no transition on input ε.

   (iii) An ambiguous sentence may have two leftmost or rightmost derivations.

   (iv) Regular expressions cannot be converted to NFA.

   (v) Every context-free language is decidable.

   (b) Fill in the blanks : 1×5=5

   (i) Union of two regular expression is _____.

   (ii) CFLs are not closed under _____.

   (iii) _____ data structure is used in PDA.

   (iv) A grammar is regular if it is either _____ or _____.

2. Define the following terms : 2×10=20

   (i) DFA

   (ii) NFA

   (iii) Regular expression

   (iv) Regular grammar

   (v) Context-free grammar

   (vi) Derivation tree

   (vii) PDA

   (viii) Normal form

   (ix) Deterministic context-free language

   (x) Star closure.

3. Answer ***any four*** of the following : 5×4=20

   (a) Construct DFA for the following language :

   $$\{(ab)^n \mid n \geq 1\}$$

   (b) Give regular expression for the following languages over the alphabet $\{0, 1\}$ —

   (i) {w/w contains substrings 010 and 101}

   (ii) {w/w doesnot contain substring 0110}

   (c) Prove that the family of regular languages is closed under intersection.

   (d) Show that CFLs are not closed under intersection.

   (e) Give formal definition of PDA.

   (f) Let $L = \{a^i b^j c^k \mid i, j, k \geq 1 \text{ and } i + j = k\}$. Find a PDA that recognizes L.

4. Answer ***any three*** questions : 10×3=30

   (a) Give an algorithm to find regular expression corresponding to a DFA.

   (b) Write algorithms for deciding emptiness and finiteness of regular language.

   (c) Find a grammar equivalent to

   $S \to AB \mid AC$

   $A \to aA \mid bAa \mid a$

   $B \to bbA \mid aB \mid AB$

   $C \to aCa \mid aD$

   $D \to aD \mid bC$

   with no useless symbols.

   (d) Define Chomsky Normal form and Greibach Normal form.

   (e) Define Pumping Lemma for regular languages and CFL.

2018

COMPUTER NETWORK

(New Course/Old Course)

Paper : 5·2 / 5·3

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

(New Course)

Paper : 5·2

PART–A

1. Multiple choice questions : 1×10=10

(i) The Transmission Mode that allows both communicating devices to transmit and receive data simultaneously is _____.
- (a) Simplex
- (b) Half-Duplex
- (c) Full-Duplex
- (d) None of the above

(ii) MAN stands for _____.
- (a) Metrological Area Network
- (b) Main Area Network
- (c) Metropolitan Area Network
- (d) None of the above

(iii) ROUTER connects the nodes on _____ Network.
- (a) Same
- (b) Different
- (c) Both
- (d) None

(iv) HUB Operates in the _____ layer.
- (a) Physical
- (b) Data link
- (c) Both (a) and (b)
- (d) None of the above

(v) WiFi stands for _____.
- (a) Wireless Fidelity
- (b) Wired Fidelity
- (c) Wireless Flip-Flop
- (d) None of the above

(vi) TCP stands for _____.
- (a) Transfer Code Protocol
- (b) Total Control Protocol
- (c) Transmission Control Protocol
- (d) None of the above

(vii) OSI is a _____ layer model.
- (a) Four
- (b) Five
- (c) Seven
- (d) None of the above

(viii) ISP stands for _____.
- (a) Internet Service Provider
- (b) Information Service Provider
- (c) Intelligent Service Provider
- (d) None of the above

(ix) The amount of time taken by a message to travel from one device to another is known as _____.
- (a) Delay
- (b) Response time
- (c) Transit time
- (d) Throughput

x) The digital signal service has _____ levels.
- (a) Five
- (b) Seven
- (c) Six
- (d) Eight

PART–B

2. Answer ***any five*** questions from the following : 2×5=10
- (a) Define Computer Networking.
- (b) What is IEEE standard ?
- (c) Define TCP/ IP.
- (d) What is Modem ?
- (e) What is WiFi system ?
- (f) What do you mean by Intranet ?

PART–C

3. Answer ***any five*** questions from the following : *(Short notes)* 4×5=20
- (a) Guided and unguided transmission media
- (b) Modulation Techniques
- (c) Analog *vs* Digital Transmission
- (d) Client / Server Architecture
- (e) MAC Addressing
- (f) Socket and Port
- (g) UDP.

PART–D

*Answer **any five** questions from the following :* 8×5=40

4. What is meant by the term 'Data Communication' ? What are its components ? What are the characteristics of Data Communication ? 2+3+3=8

5. Describe the OSI model in detail. 8

6. Explain different network topologies along with their advantages and disadvantages. 8

7. Discuss the Leaky Bucket and Token Bucket Algorithms. 4+4=8

8. What is Error Connecting Code (Hamming Code) and Error Detecting Code (CRC) ? 4+4=8

9. Explain Carrier Sense Multiple Access (CSMA) Protocols. 8

10. Explain the maximum data rate of a channel according to Nyquist and Shannon law. 8

11. Explain the Stop and Wait Sliding Window Protocol. 8

12. Write short notes on : 2×4=8
- (a) HUB
- (b) BRIDGE
- (c) ROUTER
- (d) GATEWAY

DISTRIBUTED SYSTEM

(New Course)

Paper : 6·2·3

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct Answer : 1×10=10

(i) In distributed system each processor has its own —

(a) local memory

(b) clock

(c) both local memory and clock

(d) none of the mentioned.

(ii) The capability of a system to adapt the increased service load is called —

(a) scalability

(b) tolerance

(c) capacity

(d) reliability.

(iii) Internet provides _____ for remote login.

(a) http

(b) telnet

(c) ftp

(d) RPC.

(iv) What are the characteristics of processor in distributed system ?

(a) They vary in size and function

(b) They are same in size and function

(c) They are manufactured with single purpose

(d) They are real-time devices.

(v) What are the types of distributed operating system ?

(a) Zone based operating system

(b) Network operating system

(c) Level based operating system

(d) All of the mentioned.

(vi) What is the common problem found in distributed system?

(a) Process synchronization

(b) Communication synchronization

(c) Deadlock problem

(d) Power failure.

(vii) What are the different ways distributed system may suffer?

(a) Failure of links

(b) Failure of sites

(c) Loss of messages

(d) All of the mentioned

(viii) What is a stateless file server ?

(a) It keeps tracks of states of different objects

(b) It maintains internally no state information at all

(c) It maintains some information in them

(d) None of the mentioned.

(ix) In distributed system, a logical clock is associated with —

(a) each instruction

(b) each register

(c) each process

(d) none of the mentioned.

(x) If timestamps of two events are same, then the events are —

(a) concurrent

(b) non-concurrent

(c) monotonic

(d) serial.

2. Answer the following questions very briefly : 2×5=10

(a) Define a Distributed System.

(b) What is the need of clock synchronization in distributed system ?

(c) Write *two* disadvantages of Client-Server system.

(d) What do you mean by Middleware ?

(e) Write *two* examples of distributed systems.

3. Answer ***any four*** questions : 5×4=20

(a) Explain briefly about Remote Procedure Call (RPC).

(b) Explain the Thin client model.

(c) Explain the Lamport's Logical Clock.

(d) Discuss about distributed failure model.

(e) Discuss about the different types of distributed systems.

4. Answer ***any three*** questions : 8×3=24

(a) Explain a token based algorithm for distributed mutual exclusion.

(b) Explain the Bully's election algorithm with proper example.

(c) Explain briefly about distributed consistency and replication.

(d) What are the challenges faced during construction of a distributed system ?

5. Write short notes on : **(*any four*)** 4×4=16

(a) Distributed transaction

(b) Centralized mutual exclusion algorithm

(c) IPC

(d) Tightly coupled and loosely coupled multiprocessor systems

(e) Marshalling and Unmarshalling of data.

44 (5) SAUL 5·1

2018

SYSTEM ADMINISTRATION USING LINUX

Paper : 5·1

(New Course)

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : ***(any five)*** 1×5=5

   (a) What is the usefulness of Ping Command in Linux ?

   (b) Which command is used to check the IP address of LAN card ?

   (c) How does device presented in Linux ?

   (d) What is the process ID of 'init' process ?

   (e) What are various IDs associated with a process ?

Contd.

   (f) What operators are used for output redirection ?

2. Answer the following questions : ***(any five)*** 2×5=10

   (a) What do you mean by the term 'System Administration' ?

   (b) What is daemon ? Give *any two* examples of daemon used in Linux.

   (c) What do you mean by pipelining ? Give example.

   (d) How could an user change his password in Linux ?

   (e) Mention *any two* functions performed by 'root' account.

   f) Name the type of classes in which following IP address belong :

      (i) 10.10.169.26

      (ii) 193.129.203.7

3. Answer the following questions :

   (a) Write the general syntax and functions of *any three* File and Directory Handling Commands used in Linux. 3×2=6

Or

Write brief description on the following File System types used in Linus: ex3, ReiserFS, ISO 9660.

   (b) Write a brief note on the popular Linux Distribution that you like most. 2

4. Answer the following questions : ***(any three)*** 4×3=12

   (a) What are the basic characteristics of '&' and nohup ?

   (b) Discuss the Mounting and Unmounting of File System in Linux.

   (c) How is a process created in Linux ? Write *two* basic process attributes.

   (d) What are the significance of the following shell variables ?

   PWD, USER, TERM, LOGNAME.

5. Answer the following questions : ***(any five)*** 5×5=25

   (a) Describe the basic features of Linux operating system.

   (b) Discuss various system administration tasks.

   (c) What are the rules that governs the IP address classes. Mention the different classes of IP address with their range.

   (d) What are the uses of pipes and filters in Linux ? Give examples of *any two* filters used in Linux with their use.

   (e) What is 'File Ownership' and ' Access Permission' ? Discuss with example.

   (f) Describe — 'Basic Process Controls' and their role in 'Access Control'.

6. Answer the following questions :

   (a) What do you mean by the File system ? Explain the Architecture of Linux file system. 2+8

Or

Briefly define the different types of files used in Linux. Explain the File System hierarchy of a Linux System. 3+7

   (b) What is NFS ? Write the steps for configuring and setting up an NFS Server ? 2+8

Or

What is DHCP server ? Write the steps for configuring and setting up a DHCP Server.