

621 801  
52/-

April 2019 EXAMINATION  
III B.E. (4YDC) EXAM  
IT 38501/IT 3851 : Distributed Computing

Time: 3 Hrs.

Max. Marks: 70  
Min Marks: 22

**TOTAL NO. OF QUESTIONS IN THIS PAPER:5**

Note: Attempt all questions. Each question carries equal marks. Each question has four parts (a), (b), (c) and (d). Attempt any one from (a) and (b), similarly attempt any one from (c) and (d).

Q1 (a) Brief about the challenges which have to be met with during the construction of Distributed systems. 7

OR

(b) Define 'transparency' in context to Distributed System. Define the different transparency types. 7

- (c) 1 What is the use of Middleware? 2  
2 Draw the diagrams representing types of architectural models. 5

OR

- (d) 1 Explain the two variants of the 'Interaction model'. 2  
2 Describe the faults that are classified as the 'Omission failure'. 5

Q2 (a) Elaborate the RMI invocation semantics. 7

OR

- (b) Draw and explain the objects and modules involved in achieving a remote method invocation. 7

- (c) Write short note on the following (Draw the diagrams as applicable):  
1 Remote Procedure Call 7  
2 Events and Notification.

OR

- (d) 1 Write down the server side code to implement remote addition of two integer numbers (provided as input by user). 4  
2 Write down the steps to implement callbacks in RMI. 3

Q3 (a) Draw and brief about the 'File attribute record structure'. 7

OR

- (b) Draw the file service architecture. Describe the 'flat file service' operations and 'directory service' operations. 7

- (c) 1 Draw and describe the 'Network file system' architecture. 4  
2 Explain the concept of 'server caching' and 'client caching' associated with Sun Network file system. 3

OR

- (d) Define Name resolution. Explain 'Navigation' and its types. 7

Q4 (a) 1 Define the following terms:  
clock skew and clock drift rate. 4

'External synchronization' and 'Internal synchronization'.

- 2 Brief about Cristian's method of synchronizing clocks. 3

OR

(b) Brief about 'The Central Server algorithm' and 'Ring based algorithm' used for achieving mutual exclusion.

(c) Write down in detail about the ring based election algorithm.

OR

(d) Detail out the bully algorithm used for conducting the election.

- Q5 (a) 1 State the properties of a transaction? Define serially equivalent interleaving.  
2 Present interleaving among two concurrently executing transaction which results in:  
    The lost update problem  
    The inconsistent retrievals problem

OR

- (b) 1 Define deadlock.  
2 Brief about the following concepts in context to Deadlock:  
    Deadlock prevention  
    Deadlock detection  
    Timeouts

- (c) 1 What is 'two-version locking' and 'hierarchic locks'? State one advantage each of 'two version locking' and 'hierarchic locks'.  
2 Brief about the phases of transaction in optimistic Concurrency control.

OR

- (d) 1 State the advantages of 'nested transactions' over 'flat transactions'.  
2 Describe the two phase commit protocol.

APRIL-MAY 2017 EXAMINATION  
III B.E. (4YDC) INFORMATION TECHNOLOGY  
IT 3851: DISTRIBUTED COMPUTING

Time: 3Hrs.

Max. Marks: 70

TOTAL NO. OF QUESTIONS IN THIS PAPER: 5

Note: Attempt all five questions. Each question has 4 subparts A,B,C and D. Attempt any one part from A & B and similarly any one from C & D.

Q1 A Explain the challenges faced by the designers of a distributed system. 7  
OR

B Define transparency in context to distributed system. State the eight forms 7  
of transparencies.

C Explain the following terms with appropriate examples: 7

1. Proxy server and caches.
2. Mobile code.
3. Middleware.

OR

D Describe interaction model and failure model for distributed systems. 7

Q2 A Explain the following terms: 7

1. External data representation and marshalling.
2. Remote Procedure calling.
3. rmi callback.

OR

B Draw and describe the various components that play their role in remote 7  
method invocation.

C Draw the table representing 'Rmi invocation semantics' and describe the 7  
same.

OR

D Write down a Java based calculator application which uses the concept of 7  
rmi.

Q3 A Draw the diagram and elaborate about 'File Service Architecture'. 7

OR

B What is navigation? Write down details of navigation strategies for Name 7  
resolution.

C Draw and explain the 'Sun Network Filesystem Architecture'.  
OR

- D Write short note on:
1. Andrew file system (AFS).
  2. Mount service.
  3. Discovery service.

Q4 A Why do we need 'clock synchronization'? What are the ways of synchronization of physical clocks?  
OR

B Explain any two algorithm used as a solution to 'mutual exclusion'.  
OR

C What is an 'election'? Explain ring based election algorithm.  
OR

D Give a detailed description of 'bully' algorithm for conducting an election.  
OR

Q5 A Describe the following in context to concurrent transactions using appropriate examples:  
OR

1. Lost update problem
2. Inconsistent retrieval
3. Serial equivalence and conflicting operations

B Explain 'Dirty reads' and 'Premature writes' with examples. Also describe the concept of cascading aborts.  
OR

C What are the rules for commitment of nested transactions? State the advantages of nested over flat transaction.  
OR

D Elaborate the concept of deadlock, deadlock prevention, deadlock detection and lock timeouts.  
\*\*\*\*\*

*A*  
APR-MAY 2015 EXAMINATION  
III B.E. (4YDC) INFORMATION TECHNOLOGY  
IT 3851: DISTRIBUTED COMPUTING

356

TIME: 3 HRS

Max Marks: 70  
Min Marks: 22

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all five questions. Each Question has 4 subparts A, B, C, and D. Attempt any one part from A & B and similarly any one from C & D.

- Q.1 (a)i What are distributed systems? what are significant advantages and limitations of 4 distributed systems?  
ii Explain with the example what could be the impact of absence of global clock and shared 3 memory.

OR

- (b)i Draw and explain two main types of architectural model. 4  
ii Explain important types of transparencies in distributed system. 3

- (c)i Explain Interaction model and also describe two variants of interaction model. 5  
ii Define integrity property of reliable communication. How to overcome security threats? 2

OR

- (d)i State the techniques for failure handling in distributed system. 4  
ii Explain process control block(PCB) in detail. 3

- Q.2 (a) Consider a simple application where client sends two integer values to a server, which 7 sums the values and returns the sum to the client.  
Describe how you would implement the application using Remote method invocation(RMI). Describe interfaces ,the remote methods, and remote method invocations in client program.

OR

- (b)i Explain the concept of Remote procedure call(RPC) with a suitable example. How the 4 stubs help in making an RPC mechanism transparent ?  
ii What do you mean by distributed objects? 3

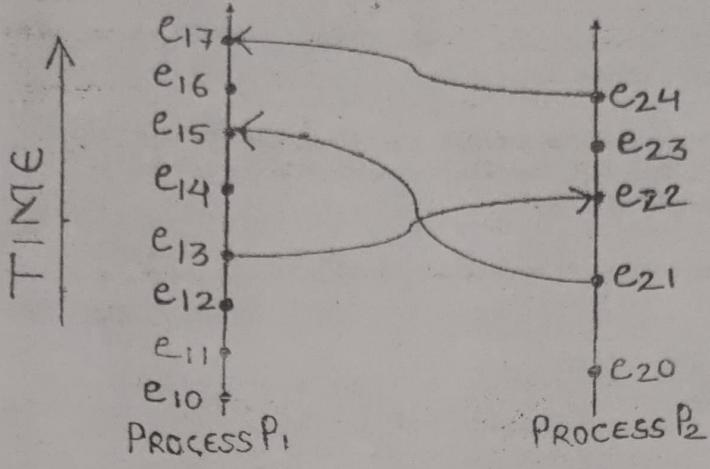
- (c) Provide a block diagram to illustrate the CORBA architecture and also explain CORBA 7 services.

OR

- (d)i Explain an architecture for distributed event notification. 3  
ii Compare and contrast CORBA with remote method invocation(RMI) 4

- Q.3 (a)i 1. Give Domain Name System (DNS) tree structure. 4  
2. Provide a block diagram to illustrate working of DNS (resolving host to IP).  
1. On which port DNS server works ? 3

2. which are the important configuration files for DNS server ?  
 3. Which command used to restart dns server ?
- OR
- (b)i Give the architecture of Sun Network File System (NFS). 3  
 ii    1. What are different versions of NFS Server?  
       2. What are different options used in /etc/exports file ?  
       3. How will you mount any file system on client machine ?  
       4. I am unable to mount a NFS share. How will you trace out the reason ? 4
- (c)i Explain X.500 Directory services. 4  
 ii Draw and Explain File Service Architecture. 3
- OR
- (d) Explain following: 7  
 I. Andrew File System(AFS) design characteristics.  
 II. Which two software component used in AFS implementation.  
 III. File name space seen by clients of AFS  
 IV. Draw System call interception in AFS
- Q.4 (a)i What is Election Algorithms? Suppose that two process detect the failure of coordinator simultaneously and both decide to hold an election using bully algorithm. What happens? 3
- ii Difference between Bully algorithm and Ring Algorithm 4
- OR
- (b) i "Let us suppose that there is a coordinator process (Pc) and three other processes P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> in the system. Also assume that requests are granted in first-come, first served order for which coordinator maintains the request queue. Suppose P<sub>1</sub> sends request for entering in critical section after that P<sub>2</sub> asks for permission to enter in same critical section. Suppose that while P<sub>1</sub> is still in the critical section P<sub>3</sub> also sends a request to enter same critical section. After some time P<sub>1</sub> exits the critical section". 3  
 Illustrate the centralized approach for mutual exclusion with suitable diagram and status of request queue.
- ii "Let us suppose that there are four processes P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub>. While P<sub>4</sub> is in a critical section, P<sub>1</sub> and P<sub>2</sub> wants to enter in same critical section. Processes P<sub>1</sub> and P<sub>2</sub>'s timestamps 4  
 6 and 4 respectively."
- Illustrate the distributed approach for mutual exclusion:
1. Status when processes P<sub>1</sub> and P<sub>2</sub> send request messages while P<sub>4</sub> is already in critical section;
  2. Status while process P<sub>4</sub> is still in critical section;
  3. Status after process P<sub>4</sub> exits critical section;
  4. Status after process P<sub>2</sub> exits critical section.
- (c)i Consider the following space time diagram for two processes P<sub>1</sub> and P<sub>2</sub>. 4

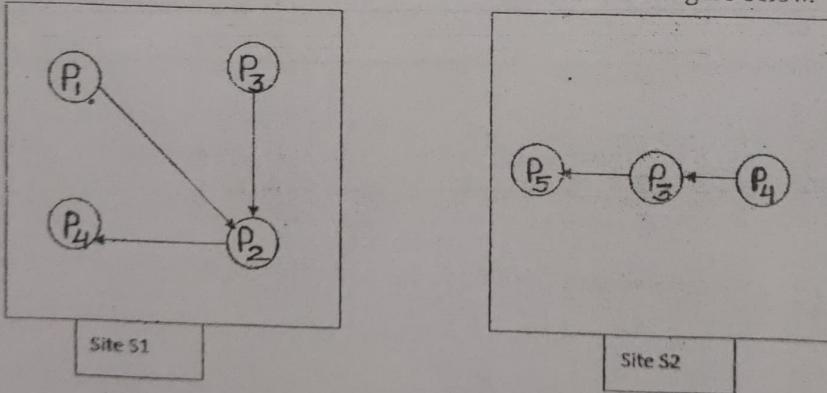


1. List all pairs of events that are related by *happened-before* relation .
2. "Suppose each processes  $P_1$  and  $P_2$ , have a counter  $C_1$  and  $C_2$ , respectively. The counters acts as a logical clocks". Give the *implementation of logical clocks using counters*.

ii Write the conditions of logical clocks for ordering an events based on the happened-before relation.

OR

- (d)i What are phantom deadlocks ? Illustrate the centralized approach for deadlock detection which could detect the phantom deadlocks ?
- ii Let us consider WFG- Based distributed algorithm for deadlock detection, there are two sites  $S_1$  and  $S_2$ , and the local WFGs of each site are shown in figure below.



1. Give the modified WFGs of two sites after addition of node  $P_{ex}$  .
2. Give Updated local WFG of site  $S_2$  after receiving the deadlock detection message from site  $S_1$ .

- Time: 3 Hrs
- Q.5 (a) i Explain "problems of concurrency" by taking suitable example. 4  
ii Explain Distributed Transaction Model. 3

OR

- (b) i Explain Recoverable schedule and Non Recoverable schedule with the help of example. 4  
ii What is 2-PL and how 2-PL(Two-Phase locking) integrate with 2-PC(Two-Phase Commit) 3  
explain with the help of diagram.

- (c) i Write the different cases of failures( participants and coordinators) in two phase commit 3  
protocol.  
ii "Three-Phase Commit is non-blocking protocol" Justify the statements with its working 4  
and state transition diagrams.

OR

- (d) i Explain Two-phase commit protocol with its working and state transition diagrams. 4  
ii Consider the following three transactions and a schedule. Is this schedule conflict- 3  
serializable?

|    |         |         |         |          |          |          |         |          |
|----|---------|---------|---------|----------|----------|----------|---------|----------|
| T1 | Read(x) |         |         |          | write(x) |          |         |          |
| T2 |         | Read(y) |         | write(y) |          |          | Read(x) | Write(x) |
| T3 |         |         | Read(y) |          |          | write(x) |         |          |

**MAX-JUNE 2014 EXAMINATION  
III YEAR BE (4YDC) INFORMATION TECHNOLOGY  
IT3851: DISTRIBUTED COMPUTING**

Time: 3 Hrs.

|              |      |
|--------------|------|
| [Max. Marks] | : 70 |
| [Min. Marks] | : 22 |

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all the questions. From each question attempt either (a) or (b) and similarly either (c) or (d).

**Q.1** (a) Discuss the terms heterogeneity, openness, scalability and failure handling with respect to distributed systems. Pg 16, 17, OR

(b) Elaborate on the architectural models employed in distributed systems.

HTTP Pg 173

(c) Describe the three main standard technological components on which the web is based.

OR

(d) Discuss the interaction model and failure model. Pg. 44, 44

7

**Q.2** (a) Define 'external data representation', 'Interface definition language', 'remote interface' and 'Actions'. Pg 135, Pg 170, 168, OR

7

(b) Explain in detail the steps involved to enable the invocation of a remote method/operation in JAVA RMI. Also write down the steps of how one can implement callback. Pg 173

7

(c) Elaborate the roles of various components involved in a RMI. back 19

7

OR

(d) Discuss the invocation semantics associated with RMI. Pg 174, 175 maybe, atleast once

atleast once

7

**Q.3** (a) Describe the NFS architecture and its underlying models. Pg 311

7

OR

(b) Compare NFS version 3 and NFS version 4.

7

(c) Discuss the terms 'True Identifier', 'Name Space' and 'Mounting'. Pg 344

7

OR

(d) State the Name Space distribution and comparison of the name servers implementing nodes at the different layers.

Central server

7

**Q.4** (a) Discuss any two algorithms for mutual exclusion. Pg 436

7

OR

(b) What do you mean by election? Discuss the ring based election algorithm. Pg 442, 443

7

(c) Describe the bully algorithm used for election. Pg 445

7

OR

(d) Explain the concept of Multicast Communication. Pg 447

7

**Q.5** (a) Discuss the problems associated with aborting transactions which can occur even in the presence of serially equivalent executions of transactions. Pg 485 dirty reads

phantom writes

7

OR

(b) Discuss the terms deadlock, deadlock prevention, deadlock detection and the concept of timeouts. Pg 445, 496, 497

7

(c) Using lock compatibility tables discuss the concept of two version locking and hierarchical locks. Pg 449, 500

7

OR

(d) Draw and discuss the states of the coordinator and participants in the two phase commit protocol. Pg 520, 525, 526

7

## D2

Q13

30

521

APRIL-MAY 2013 EXAMINATION  
III B.E. (4YDCC) EXAM  
IT-3851: DISTRIBUTED COMPUTING

[ie: 3 Hrs.]

[Max. Marks : 70]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Each question has four parts i.e. (a), (b), (c) and (d). Attempt either (a) or (b) and similarly either (c) or (d).

- (a) What do you mean by distributed system? [02]  
State two examples of distributed system and differentiate among them. [02]  
Discuss the components on which the 'World Wide Web' is based. [03]

- (b) Discuss the following two terms. [04]  
Heterogeneity and Openness  
Discuss mobile code and associated security issues with examples. [03]

- (c) What are the challenges to the design of a scalable distributed system? [04]  
Draw well labeled diagram of three 'architectural model' types. [03]

- (d) What are the techniques for dealing with failures in distributed system? [04]  
State any three transparency of the distributed system. [03]

- (e) State the significance of 'External data representation'. [02]  
Define 'Middleware' and give its examples. [02]  
How multicast messages provide useful infrastructure for constructing distributed systems. [03]

- (b) Draw the diagram corresponding to RPC. [02]  
State two differences between a 'Local method invocation' and a 'Remote method invocation'. [02]  
Write briefly on 'Events and notification' in distributed system. [03]

- (c) Discuss the design issues for RMI. [07]  
(d) With appropriate diagram discuss the implementation of RMI [07]

- (e) State the various file system modules and their usage. [02]  
State the differences between 'unix file system interface' (operations) and 'flat file service interface' (operations). [03]  
Elaborate on the use of 'directory service' in the 'File service architecture'. [02]

- (b) Define the following terms in context to caching in client and the server computer in case of NFS implementation:  
Read-ahead  
delayed-write  
write-through caching  
Discuss 'file handles' in NFS. [02]  
What do you understand by 'path name translation'? [02]

- (c) Define the following terms  
Name resolution  
Navigation  
Discovery services [07]

OR

(d) Differentiate between 'hard mounted' and 'soft mounted' 'remote file system'.  
Draw the following

[01]

[06]

- File service architecture
- NFS architecture
- Distribution of processes in AFS

Q.4 (a) With appropriate diagram discuss the central server algorithm for mutual exclusion.  
State any three difference between central server and ring based mutual exclusion algorithm.

[04]

[03]

OR

(b) What do you mean by the term 'election' w.r.t. Distributed systems?  
Discuss the ring based election algorithm.

[02]

[05]

(c) Elaborate 'Bully algorithm' used for Election.

[07]

OR

(d) Discuss about 'Multicast communication'.

[07]

Q.5 (a) Discuss the following associated with concurrently executing transactions:  
The lost update problem and The inconsistent retrievals problem.  
Define the 'serially equivalent interleaving'.

[06]

[01]

OR

(b) Discuss the problems and solutions associated with aborting of concurrently executing transactions.

[07]

(c) Draw the lock compatibility table for hierarchical locks.  
State three drawbacks of 'locking'.

[04]

[03]

OR

(d) Discuss 'optimistic concurrency control' approach to the serialization of transactions.

[07]

APRIL - 2019 EXAMINATION

III B.E. (4YDC) INFORMATION TECHNOLOGY

IT-38504/IT3854: WEB ENGINEERING

Time : 3 Hrs.

[Max. Marks : 70]

[Min. Pass Marks : 27]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note : Attempt all five questions. Attempt any two subparts from a, b, c, and d from each question.

**Q.1** (a) Give one word for the following: (7)

- (i) Java Script is used for creating \_\_\_\_\_ type of web document.
- (ii) \_\_\_\_\_ means the receiver should be able to prove that the received message is came from a specific sender.
- (iii) \_\_\_\_\_ is a piece of code accessible over the web, used for machine to machine interaction, and based on xml protocols.
- (iv) The session attribute "login\_name" is to be assign a value "guest". The java statement for this is \_\_\_\_\_.
- (v) Servlet runs each request in a \_\_\_\_\_ ?
- (vi) \_\_\_\_\_ code in perl/python can be used to generate random number between 15 and 63.
- (vii) \_\_\_\_\_ is an example of SOAP processor.

(b) Which HTTP response code is generated when (7)

- (i) The request is successful.
- (ii) There is a syntax error in the request.
- (iii) The document is not found.
- (iv) The service is unavailable temporarily.

Now suppose GET method is used to retrieve the image from a server (www.example.com) at /www/html/images. Explain the details of HTTP request message for the mentioned case.

~~e(x)~~ Draw and discuss in detail the architecture of web browser. What are helper applications and plugins? (7)

~~o(x)~~ What are PATH and CLASSPATH variables? Write the command for setting these variables on LINUX and WINDOWS O.S. Also list all the folders in the tomcat installation directory along with the purpose of each folder. (7)

**Q.2** (a) A web based application for submitting online application for GATE examination is prepared by some company. After you have submitted your application, the CGI program has generated a unique applicant number with which later on you can track the status of your application. After 4-6 days you have visited the site and entered unique applicant number to know the status of your application. Explain how :- (7)

- I) The Http module of the application server delivers the parameter (unique number in this case) to CGI program. (Explain if method is GET method)
- II) Response is sent back to the user

(b) Write a CGI code to implement a visit count of a website with the help of a file. (7)

(c) Write a Python/Perl code to merge the content of file2 into file1. After merging the file content determine the occurrence of word "web" in the file. (7)

~~(d)~~ Write a Python/Perl code to find whether a given number is prime or not? The number is to be read from keyboard as input. (7)

**Q.3** (a) Write a JSP code to print a table consisting of two rows. The first row is number (7) from 1 to n and the second row contains square of the number. The value of 'n' is obtained from the user through a form. The form code is given to you.

(b) Write a Servlet code to authenticate the end user. Assume that the user database is (7) available in a MySQL database. The successfully authenticated user is presented with home page (available as home-user.jsp) by calling the JSP from servlet. The unauthenticated user is displayed error message by calling error.jsp from servlet. Show only the Servlet code. Also show the web.xml content for the above servlet.

• (c) What is a web-archive? How is it created? Explain the purpose of web.xml file (7) along with different xml tags used in it.

• (d) What is Model-View-Controller (MVC) architecture? How is it realized? Explain (7) by drawing a suitable diagram.

**Q.4** (a) The search engine has indexer as one of the important component. For the (7) following, determine the indexed document evaluated by the indexer.

Doc 1: DocID=D1: data web xml code servlet

Doc 2: DocID=D2: code servlet web data xml

Doc 3: DocID=D3: servlet web xml data code

(b) How sessions are managed in Servlet/JSP? Write the statement to create and destroy (7) session in JSP/Servlet.

• (c) What are web services? Explain different components of web service architecture. (7)

Differentiate between

(i) Servlet and CGI      (ii) Database based search engine and online search engine  
(iii) Session key and Public key encryption (3+2+2)

**Q5** (a) Which property of information out of Integrity, Confidentiality, Authentication and (7) non-repudiation is ensured when

(i) public key encryption technique is applied on the message  $M$  resulting in message  $M'$  as encrypted message. Then message  $M'$  is encrypted using shared key algorithm resulting in message  $M''$ ?

(ii) shared key encryption technique is applied on the message  $M$  resulting in message  $M'$  as encrypted message. Then message  $M'$  is encrypted using public key algorithm resulting in message  $M''$ ?

Also give arguments to support your answer in both the above cases.

Why digital signature is used? Explain how digital signature is implemented? (7)

• (c) What is session management? List various methods of session management. (7)  
Explain any one method in detail.

(d) Write short note on (any two) (7)

(i) Data-type definition (DTD)      (ii) JSP tags

• (iii) Issues in web site designing.

APRIL-MAY 2017 EXAMINATION  
**III B. E. (4YDC) INFORMATION TECHNOLOGY**  
**IT 3854: WEB ENGINEERING**

Time: 3 Hrs.]

[Max. Marks : 70  
[Min. Pass Marks : 22

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all the questions. Each question has four subparts A, B, C, and D. Attempt any one part from A and B and similarly any one from C and D. Answers should be brief and to the point. Make suitable assumptions wherever necessary and clearly state the same.

Q.1 A. Draw a picture of Web Browser. Explain major features of Mozilla Firefox. Write steps to remove history pages from web browser. (07)

OR

B. What is request, response message of HTTP? Describe in details each request methods used by HTTP. (07)

Q.2 A. Why we need plug-ins in web application? Compare absolute pathname and a relative pathname. (07)

OR

D. As a Web engineer, identify at least FIVE major challenges in the design and development of an image-hosting site, where users can upload their images to a central server and the images can be retrieved via a web link or an API. Justify your answer? (07)

Q.2 A. What is a frameset? Write a HTML code to create the following frames: (07)

| Shri Govindram Seksaria Institute of Technology and Science,<br>Indore, M.P. |   |
|--|---|
| Menu   | <ul style="list-style-type: none"> <li>• About us</li> <li>• Scheme</li> <li>• Results</li> </ul> |

OR

B. Write HTML tags to perform the following task: (07)

- i. Display a picture as a background on your web pages.
- ii. How do you add scrolling text to your page?
- iii. How do you make clickable image link?

C What is Common Gateway Interface? Explain main methods of CGI. List steps by steps communication between web server and a CGI program. (07)

OR

D. Differentiate between HTML and DHTML. What are the attributes that make up a DHTML? (07)

Q3 ~~D~~ What are the ways for servlet collaboration? What is the difference between Request Dispatcher and send Redirect() methods? (07)

OR

B What is a web-archive? How is it created? Explain the purpose of web.xml file alongwith different xml tags used. (07)

C Explain the following related to JSP: (07)

- i. Import Attribute
- ii. Page Directive
- iii. javax.servlet.ServletRequest
- iv. javax.servlet.http.HttpSession

OR

~~E~~ Write a simple HTML form and write a JSP program for receiving HTML form data. (07)

Q4 A Draw the architecture of crawler based search engine. Explain each part of the search engine in detail. (07)

OR

~~B~~ What is Robot Exclusion Protocol? How robot protocol is used by search engine? (07)

→ C The basic building blocks of XML, including elements and attributes. What exactly is meant by well-formed XML? (07)

OR

D Draw & Explain the architecture of Web Services. (07)

Q5 ~~S~~ In RSA, given  $e=13$ , and  $n=100$ . Encrypt the message "HOW ARE YOU" using 00 to 25 for letters A to Z and 26 for the space. Decrypt the cipher text to find the original message. Use different blocks to make  $P < n$ . (07)

OR

B Explain various issues involved in planning and designing to construct a web-site. (07)

C What are the role of Firewall in Internet? Why they used? Explain type of firewall in short. (07)

OR

~~D~~ How Network Address Translation work? What are different types of NAT? (07)

\*\*\*\*\*

MAY-JUNE 2016 EXAMINATION  
 III B.E. (4YDC) INFORMATION TECHNOLOGY  
 IT-3854: WEB ENGINEERING

Time: 3 Hrs.]

[Max. Marks : 70  
 [Min. Pass Marks : 22

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all the questions. Each question has four subparts A, B, C, and D. Attempt any one part from A and B and similarly any one from C and D. Answers should be brief and to the point. Make suitable assumptions wherever necessary and clearly state the same.

Q.1  A What is the primary function of an HTTP? Describe the operation of retrieval of a (07) webpage with its associated messages using HTTP.

OR

B Mention the need of plug-ins in online application. What is the difference between an (07) absolute pathname and a relative pathname?

C Explain how client and server are involved in Web application with an example. Justify (07) WWW is a client server model.

OR

D What is WWW? Also explain its properties. How is it different from Internet? (07)

Q.2 A Write a dynamic web page "feedback form" with text box, text area, radio buttons, (07) checkboxes, dropdown list controls.

OR

B Write and explain any five HTML form objects that are required for obtaining user details (07) for a typical online user registration process.

C Explain the features of JAVA Servlet that make it more useful over CGI. Write a PERL (07) program to count the occurrence of a word "Web" in file f1.txt. The count value is to be stored in a file f2.txt.

OR

D What are the different types of web documents? How web server provides support for each (07) type of web documents?

Q.3  A How session management done? Describe the techniques involved in maintaining state (07) information. What is the role of cookies?

OR

B Explain the various states of an Applet. How will you pass parameters to Applet? Compare (07) repaint and paint methods.

C Consider a database table with the following schema (PNR No, status), write a Servlet (07) program to display the status, given the PNR number. What is the use of "extend" keyword?

OR

D What are the different types of directives available in JSP? Consider a database table with (07) the following structure: Movie (name, director, date released, record), write a JSP to display all the details of the movie, given the movie name.

Q.4 A Give an overview of XML parser. Justify the role of XML in electronic data interchange. (07)

OR

B Explain the use of DTD in a XML document. What do you understand by XML (07) Namespaces shows with an example?

C Draw the architecture diagram of Search Engine. Also explain the functioning of each part (07) in detail.

OR

D Give an overview on Robot Exclusion Protocol. Describe its role in WWW. (07)

Q.5 A Describes public key cryptography system working with a suitable example. What is the (07) role of firewall in present scenario?

OR

B Explain the various web security measures associated with online payment systems. What (07) are the steps involved in the development and hosting of a website? Discuss.

C How web services are created? Explain practical issues involved in web services. Describe (07) the functions of proxy server.

OR

D Describe Tomcat Architecture & its functionalities. How to Configure Tomcat to (07) deployment of web application.

\*\*\*\*\*

MAY-JUNE 2015 EXAMINATION  
**III B.E. (4YDC) INFORMATION TECHNOLOGY**  
**IT3854: WEB ENGINEERING**

Time: 3 Hrs.]

[ Max. Marks : 10  
 [ Min. Pass Marks : 12

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

**Note:** Attempt all the questions. Each question has four subparts A, B, C, and D. Attempt any one part from A and B and similarly any one from C and D. Answers should be brief and to the point. Make suitable assumptions wherever necessary and clearly state the same.

**Q1** A What is HTTP? Explain its utility and the various methods used by HTTP. Why HTTP is a stateless protocol? (07)

OR

B Draw the Web Browser architecture. Discuss how Helper Application and Plug-in are perform very important role in browsing. (07)

C What is Client-Server architecture? What do you meant by the WWW? (07)

OR

D What is Web Server? Explain the features and characteristic used for comparison of Web Servers. (07)

**Q2** A What is Perl? Write down its features. Write a Perl program to check whether number is prime or not. (07)

OR

B What is CGI? What are the limitations in developing CGI application? (07)

C Write down the Perl syntax for the following: (07)

- (i) Push & Pop function
- (ii) Shift and Unshift function
- (iii) Here Documents
- (iv) Escaping Character
- (v) Comments
- (vi) Variables

OR

D Explain different type of Web pages. Also list the steps involved in the retrieval of a dynamic web page. (07)

**Q3** A Difference between Common Gateway Interface and Servlets. Also discuss its life cycles. (07)

OR

B What do you understand by MVC architecture? Explain the significance of Web Container. Write a Servlet program that displays server information (server name, port address). (07)

C Explain different types of tags or scripting element used in JSP. Write a JSP program to (07)  
output, "Welcome to JSP world. The time now is: system current time". Use a scriptlet  
for the complete string, including the HTML tags.

OR

D Discuss the various type of techniques used in Session Tracking. Write a program to set (07)  
cookie of your name on web page. When you revisit the page your name appears on the  
screen.

Q4 A What is DTD? Why do we use it with XML documents? Explain the different (07)  
components of DTD with example.

OR

B Can you create XML pages using JSP technology? Show with the suitable example. (07)

C Explain in detail Web Services advantage over Web Application. Discuss WSDL and (07)  
UDDI.

OR

D What is Semantic Web? Draw its architecture and Briefly describe each of its (07)  
components.

A Explain the RSA algorithm. Using the RSA public key cryptography with  $a=1$ ,  $b=2$ , (07)  
 $c=3, \dots, z=26$  and  $p=5$ ,  $q=7$  and  $d=5$ , find  $e$  and encrypt "febdc".

OR

B What are the Internet Security threats? What constitutes a good firewall system? (07)

C What do you understand by an E-Mail? Also discuss all the phases of SMTP. (07)

OR

D Write Short note on following: (Any Three) (07)

(i) NAT Network Address Translation

(ii) Malwares

(iii) Search Engine

(iv) Evolution of Web \*

(v) Robot Exclusion Protocol

\*\*\*\*\*

2

MAY-JUNE 2014 EXAMINATION  
III BE-(4YDC) INFORMATION TECHNOLOGY  
IT-3854 WEB ENGINEERING

534

Time : 3 Hrs.]

[ Max. Marks : 70

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note : Attempt all five questions. Each Question has 4 parts a,b,c,d. Attempt any one from a & b and similarly any one from c & d. Write answers to the point.

MARKS

Q.1 (a) What do you mean by the term WWW? How is it different from Internet? Also write properties of WWW. 7

OR

(b) What is Client-Server architecture? Explain the working of Web Server. Also define Business Logic. 7

(c) Why is HTTP a stateless protocol? Explain Request-Response structure of HTTP. 7

OR

(d) Explain the following: 7

- Browser architecture & role of plugins.
- History of Internet

Q.2 (a) 1. Explain URL along with its structure. Also explain URL encoding. 7  
2. Explain the following Perl operators/variables:  
(I) Quote words (II) Subroutines (III) STDIN

OR

(b) What is Web application? List different types of web documents along with languages used to create each type of web document. 7

(c) Compare & Contrast Programming language & Scripting language. On this basis explain properties of PERL. 7

OR

(d) Write a Perl program which takes an integer input from the user & find whether the entered number is even/odd. 7

Q.3 (a) 1. Draw & explain life-cycle of an Applet.  
2. Write a simple program in applet, which displays your name in applet viewer. 7

OR

(b) 1. Explain the following line of code:  
(I) var x=document.getElementById("p1");  
(II) response.sendRedirect("welcome.jsp");  
(III) <% = new java.util.Date() %>  
2. Explain Implicit objects in JSP. 3+4

Q. What is servlet? Explain the importance of web container? Also Explain Servlet API in detail?

OR

(d) Why is Session management important? Write a program to set cookie of your name on web page. When you revisit the page your name appears on the screen.

Q.4

(a) Explain the working of Search Engine under following headings-

- 1.Crawling strategies
- 2.Crawling Algorithm
- 3.Policies
- 4.Doorway pages
- 5 SEO

OR

(b) 1.Differentiate between XML & HTML.  
2.Define XML Parser. Justify the statement- "A validated document is well formed but a well formed document may or may not be validated."

(c) 1.What is Semantic web? Draw Semantic Tower.  
2.Explain working procedure of Web services.

OR

(d) 1.Compare Web services over Web Application.  
2.Compare NLP searches over Keyword search.

Q.5

(a) 1.Write Short notes on the following (any 2)  
I. Cryptology II. Firewall III. Malwares.

OR

(b) What is Spamming? Explain spamming procedure.

(c) Explain E-mail under following headings-  
1.SMTPh Phases  
2.Architecture of scenario no.4  
3.IMAP

OR

(d) Encrypt the message "why,don't you?" using the Play fair cipher with the key "FEWORLD". Show the generated Ciphe text.

MAY-JUNE 2013 EXAMINATION  
III BE-(4YDC) INFORMATION TECHNOLOGY  
IT-3854 WEB ENGINEERING

Time : 3 Hrs.]

[ Max. Marks : 70 ]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note : Attempt all five questions. Each Question has 4 parts a,b,c,d. Attempt any one from a & b and similarly any one from c & d.

Q.1

MARKS

- (a) What is a Protocol? Explain the procedure of RFC publication. 7

OR

- (b) Write Short notes on the following- 7

1. History of Internet 2. WWW 3. Web Browser along with architecture 4. Plugins

Q.1

- (c) Explain Request-Response structure of HTTP. Also write definitions of HTTPS & Persistent HTTP. 7

OR

- (d) Draw 3-Tier architecture. What is a Server? Also explain the various types of Server. 7

Q.2

P

- (a) What characteristics should a Web document must possess? 7

2. Define the following -

I. CGI II. URL Encoding.

OR

- (b) 1. What is PERL? Write down its Features. 7

2. Write a Perl program which takes input from user & displays a 'Welcome' message.

- (c) What is an Applet? Write an Applet code for drawing a Face using Graphic methods. 7

OR

- (d) 1. Write a Perl Program for writing into a file. 7

2. Write a Perl program for sorting an array of numbers.

Q.3

Q.3

- (a) How is JSP better than Servlets? Explain any 5 JSP tags with proper syntax. 7

OR

- (b) Differentiate between the following- 7

1. MVC & MVC 2. Declarations & Scriptlets in JSP

Servlet

JSP

Servlet

Small

Large

less complex

Complex

flexible

(c) Write a Servlet code to display Welcome message on the screen. Also write an HTML code to generate a button upon which the corresponding Servlet will be called.

OR

(d) Explain the purpose of the following here request & response object correspond to Servlet programming)

1. `response.setContentType("text/html");`
2. `var x = form.t1.value`
3. `String s=request.getParameter("t1");`
4. `Cookie ck1 = request.getCookie();`

(Q.4)

(a) Explain the working of Search Engine under following headings-

1. Web crawler, Architecture & Working.
2. Crawling Algorithm
3. Policies
4. Guidelines for Search
5. Robot Exclusion Protocol.

5

OR

(b) Explain the following-

1. Evolution of Web.
2. Semantic Web with its architecture & define each of its components.

5

(c) Explain XML under following headings-

1. XML Structure with an example and generate a DOM tree for the same example.
2. XML Parser and Validation Process

OR

(d) 1. Compare Web services over Web Application.

2. Why are Open Standards preferred? Explain each protocol of Web Services.

(Q.5)

(a) Write Short notes on the following (any 3)

- I. VPN
- II. Firewall
- III. Malwares.

5  
2. Indicate whether the following statements are True or False-

1. BFS follows LIFO strategy to search.
2. Default value of page buffer is 8 kb.
3. Before indexing, data is available for search.
4. web.xml is also known as Deployment Descriptor.
5. Anchor part of URL is optional.
6. Service method in servlet life cycle is invoked only once.

OR

(b) Compare the following-

1. XML & HTML.
2. POP3 & IMAP

(c) What is an E-mail? Explain all the phases of SMTP.

OR

(d) What are Web security Principles? Also explain attacks associated with each of them.

**NOV 2018 EXAMINATION  
IV-BE (4YDC) INFORMATION TECHNOLOGY  
IT-4806: COMPILER DESIGN**

Time: 3 Hrs.

[Max. Marks : 70]  
[Min. Marks : 22]

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all the questions. Each question carries four subparts a, b, c & d.

Attempt any one question from a & b and similarly any one question from c & d.

Q.1 (a) Define following terms:

- i. Compiler
- ii. Interpreter
- iii. Assembler
- iv. Regular Expression
- v. Token
- vi. Lexeme
- vii. Pattern

L

7

OR

(b) How do you check whether the grammar is LL (1) or not? Justify your answer with appropriate example. ✓

7

(c) Eliminate the left recursion from the following grammar:

$$A \rightarrow Aa \mid Aad \mid bd \mid c$$

7

OR

(d) Check the following grammar is LR(1) or not.

7

$$S \rightarrow AaAb$$

$$S \rightarrow BbBa$$

$$A \rightarrow \epsilon$$

$$B \rightarrow \epsilon$$

Q.2 (a) Compute LR(0) items for the following grammar:

7

$$S \rightarrow L=R \mid R$$

$$L \rightarrow *R \mid id$$

$$R \rightarrow L$$

OR

(b) How bottom-up parsers differs from top-down parsers? Mention the conflicts that occur during shift-reduce parsing.

7

(c) Implement the following grammar using Recursive Descent Parser.

7

$$S \rightarrow Aa \mid bAc \mid bBa,$$

$$A \rightarrow d,$$

$$B \rightarrow d$$

OR

(d) Design the FIRST SET and FOLLOW SET for the following grammar.

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T^* F \mid F$$

$$F \rightarrow (E) \mid id$$

Q.3 (a) Apply shift reduce parser for parsing following string using unambiguous grammar.  
id - id \* id - id

OR

(b) Translate the arithmetic expression  $a^* - ( ) + c$  into

1. Syntax tree
2. Postfix notation
3. Three address code

(c) Construct the LALR parsing table for the following grammar.

$$S \rightarrow CC$$

$$C \rightarrow aC$$

$$C \rightarrow d$$

OR

(d) Construct the CLR parsing table from:

$$S \rightarrow AA,$$

$$A \rightarrow Aa \mid b$$

Q.4 (a) Define an Operator Precedence Grammar. Also write down the rules to find relationship between each pair of terminal symbols.

OR

(b) Explain SLR parser. How is its parse table constructed?

(c) Draw syntax tree and DAG for following statement. Write three address codes from both.  
 $a = (a + b * c) \wedge (b * c) + b * c \wedge a ;$

OR

(d) Construct a parse tree of  $(a+b)^*c$  for the grammar  $E \rightarrow E+E \mid E^*E \mid (E) \mid id$ .

Q.5 (a) Write a short note on code optimization

OR

(b) Write a short note on parameter parsing.

(c) Translate the expression  $-(a^*b)+(c^*d)+(a^*b^*c)$  into  
1. Quadruples  
2. Triples  
3. Indirect triples.

OR

(d) (i) Compare top-down and bottom-up parser.  
(ii) Explain right-most-derivation-in-reverse with the help of an example.

**NOV-DEC 2017 EXAMINATION  
IV-BE (4YDC) INFORMATION TECHNOLOGY  
IT-4806: COMPILER DESIGN**

Time: 3 Hrs.

[Max. Marks : 70]  
[Min. Marks : 22]

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

Note: Attempt all the questions. Each question carries four subparts a, b, c & d.

Attempt any one question from a & b and similarly any one question from c & d.

- Q.1 (a) How bottom-up parsers differs from top-down parsers? Mention the conflicts that occur during shift-reduce parsing. 7

OR

- (b) Define token and lexeme. What is handle pruning? What are the limitations of static allocation? 7

- (c) Differentiate between shift-reduce and Operator Precedence Parsers. 7

OR

- (d) Eliminate immediate left recursion and left factoring for the following grammar: 7

$$\begin{aligned} E &\rightarrow E+T \mid E-T \mid T \\ T &\rightarrow a \mid b \mid (E) \end{aligned}$$

- Q.2 (a) Compute LR(0) items for the following grammar: 7

$$\begin{aligned} S &\rightarrow L=R \mid R \\ L &\rightarrow *R \mid id \\ R &\rightarrow L \end{aligned}$$

OR

- (b) Define lexeme, token and pattern. Identify the lexemes that make up the tokens in the following program segment. Indicate corresponding token and pattern. 7

```
void swap(int i, int j)
{
    int t;
    t=i;
    i=j;
    j=t;
}
```

- (c) Verify whether the following grammar is LL(1) or not? 7

$$\begin{aligned} E &\rightarrow E + T \mid T \\ T &\rightarrow T^* F \mid F \\ F &\rightarrow ( F ) \mid a \mid b. \end{aligned}$$

OR

- (d) Test whether the grammar is LL (1) or not, and construct a LL (1) table for following grammar: 7

$$S \rightarrow iEtSS_1 \mid a \quad S_1 \rightarrow eS \mid \epsilon \quad E \rightarrow b$$

Q.3 (a) Construct the syntax directed translation to convert infix notation into postfix notation. 7

OR

(b) Differentiate compiler and interpreter. Explain the role of the lexical analyzer. 7

(c) Construct the LALR Parsing table for the following grammar and parse the sentence 7  
 $(a+b)^*c$ .

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid id$$

OR

(d) Construct the CLR parsing table from: 7

$$S \rightarrow AA$$

$$A \rightarrow aA \mid d$$

Q.4 (a) Construct a SLR parsing table for the following grammar. 7

$$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$$

$$A \rightarrow d$$

$$B \rightarrow d$$

and parse the sentence "bdc" and "dd".

OR

(b) What is operator grammar? How 7

$$S \rightarrow a \mid ^ \mid (T)$$

$$T \rightarrow T, S \mid S$$

can be parsed through operator precedence parser.

(c) Construct the syntax tree and postfix notation for the expression 7  
 $(a + (b * c)) \wedge d - e / (f + g)$ .

OR

(d) What is a syntax tree? Draw the syntax tree for the following statement: 7  
 $c b c b a - * + - * =$

Q.5 (a) What is code optimization? Explain in detail with example. 7

OR

(b) Write short notes on

i) call by need

ii) call by value-result

(c) Write the rule to find the first and follow function. Compare the performance of LR parsers. 7

OR

(d) What are the advantages of DAG representation? Give example. 7

**NOV-DEC 2016 EXAMINATION  
IV-BE (4YDC) INFORMATION TECHNOLOGY  
IT-4806: COMPILER DESIGN**

**Time: 3 Hrs.**

[Max. Marks : 70]  
[Min. Marks : 22]

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 5**

**Note:** Attempt all the questions. Each question carries four subparts a, b, c & d.

**Attempt any one question from a & b and similarly any one question from c & d.**

- Q.1** (a) Explain the need for dividing the compilation process into various phases and explain its functions. 7

**OR**

- (b) Explain the bootstrapping process with suitable diagrams. Also explain LEX and YACC. 7

- (c) Eliminate the left recursion from the following grammar:  
 $A \rightarrow Aa | Aa | bd | c$  7

**OR**

- (d) Eliminate immediate left recursion for the following grammar: 7

$$\begin{aligned} E &\rightarrow E+T \mid T, \\ T &\rightarrow T^* F \mid E, \\ F &\rightarrow (E) \mid id. \end{aligned}$$

- Q.2** (a) Compute LR(0) items for the following grammar: 7

$$\begin{aligned} S &\rightarrow L=R \mid R \\ L &\rightarrow *R \mid id \\ R &\rightarrow L \end{aligned}$$

**OR**

- (b) How bottom-up parsers differs from top-down parsers? Mention the conflicts that occur during shift-reduce parsing. 7

- (c) Construct LL(1) parser table for the following grammar: 7

$$\begin{aligned} E &\rightarrow E+t \\ T &\rightarrow T+F \\ F &\rightarrow (E) \mid id \end{aligned}$$

**OR**

- (d) Find FIRST & FOLLOW for the following grammar and construct the LL(1) parsing table: 7

$$\begin{aligned} S &\rightarrow L=R \mid R \\ L &\rightarrow *R \mid id \\ R &\rightarrow L \end{aligned}$$

- Q.3** (a) Construct the syntax directed definition to convert infix notation into postfix notation. 7

**OR**

- (b) Differentiate compiler and interpreter. Explain the role of the lexical analyzer. 7

- (c) Construct the LALR Parsing table for the following grammar:

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T^* F \mid F$$

$$F \rightarrow (E)/id$$

OR

- (d) Construct the CLR parsing table from:

$$S \rightarrow AA,$$

$$A \rightarrow Aa \mid b$$

- Q4 (a) Given the following grammar  $S \rightarrow AS \mid b$ ,  $A \rightarrow SA \mid a$ . Construct a SLR parsing table for the string baab.

OR

- (b) Find the SLR parsing table for the given grammar and parse the sentence  $(a+b)^*c$ .

$$E \rightarrow E+E \mid E^*E \mid (E) \mid id$$

- (c) Derive the string and construct a syntax tree for the input string ceaedbe using the grammar

$$S \rightarrow SaA \mid A, A \rightarrow AbB \mid B, B \rightarrow cSd \mid e$$

OR

- (d) Construct a parse tree of  $(a+b)^*c$  for the grammar  $E \rightarrow E+E \mid E^*E \mid (E) \mid id$ .

- Q5 (a) Write a short note on code optimization

OR

- (b) Write a short note on parameter parsing.

- (c) Write about implementation of three addressing statements. Write the 3-address code for the statements  $a = b^* - c + b^* - c$ .

OR

- (d) Define tokens, patterns and lexemes.

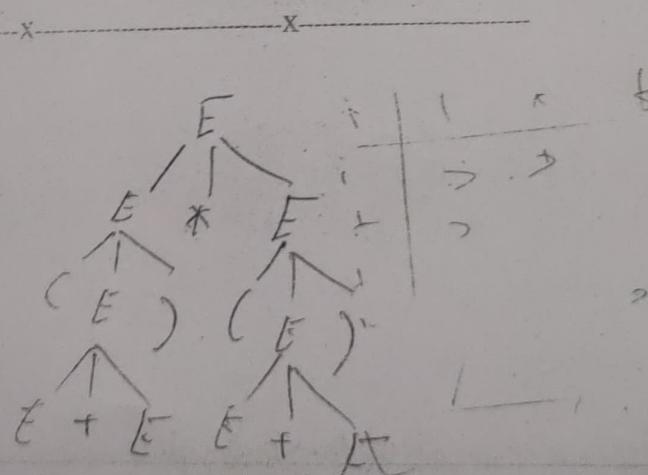
$$T_1 = b$$

$$T_2 = \text{unary } C$$

$$T_3 = T_1 * T_2$$

$$T_4 = T_3 + T_3$$

$$a = T_4$$



**APRIL 2019 EXAMINATION**  
**3<sup>rd</sup> Year B.E. 4YDC INFORMATION TECHNOLOGY**  
**IT38503/IT3853 : DATA BASE MANAGEMENT SYSTEMS**

Time : 3 hours

Maximum Marks : 70  
Min Pass Marks : 22

**Notes:** All Five questions are compulsory. Each Question has 3 subparts A, B, and C. Attempt any one part from A & B and C is compulsory. Marks are indicated against the questions. Be specific and use proper assumption if any data is missing.

9

- \* Q 1 A Consider the following schema:

Suppliers (sid: integer, sname: string, address: string)  
 Parts (pid: integer, pname: string, color: string)  
 Catalog (sid: integer, pid: integer, cost: real)

Write the following queries in SQL & relational algebra.

- i. Find the names of suppliers who supply some red part.
- ii. Find the sids of suppliers who supply some red or green part.
- iii. Find the sids of suppliers who supply some red part or are at 221 Packer Ave.
- iv. Find the sids of suppliers who supply some red part and some green part.
- v. Find the sids of suppliers who supply every red part.
- vi. Find the sids of suppliers who supply every red or green part.

OR

- B Consider the following relations containing airline flight information:

Flights (fno: integer, from: string, to: string, distance: integer, departs: time, arrives: time)  
 Aircraft (aid: integer, aname: string, cruisingrange: integer)  
 Certified (eid: integer, aid: integer)  
 Employees (eid: integer, ename: string, salary: integer)

9

Note that the Employees relation describes pilots and other kinds of employees as well; every pilot is certified for some aircraft (otherwise, he or she would not qualify as a pilot), and only pilots are certified to fly. Write the following queries in SQL & relational algebra.

- i. Find the eids of pilots certified for some Boeing aircraft.
- ii. Find the names of pilots certified for some Boeing aircraft.
- iii. Find the aids of all aircraft that can be used on non-stop flights from Bonn to Madras.
- iv. Find the eids of employees who make the highest salary.
- v. Find the eids of pilots who are certified for the largest number of aircraft.
- vi. Find the eids of employees who are certified for exactly three aircraft.

- C Explain following with appropriate example:

5

- i. Dirty read problem
- ii. Lost update problem
- iii. Concurrency Control

**Q2 A** The Prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicines if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:

- ✓ Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
- ✓ Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
- ✓ Each pharmaceutical company is identified by name and has a phone number.
- ✓ For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
- ✓ Each pharmacy has a name, address, and phone number.
- ✓ Every patient has a primary physician. Every doctor has at least one patient.
- ✓ Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
- ✓ Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
- ✓ Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
- ✓ Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.
  - i. Draw an ER diagram that captures the above information. Identify any constraints that are not captured by the ER diagram.
  - ii. How would your design change if each drug must be sold at a fixed price by all pharmacies?
  - iii. How would your design change if the design requirements change as follows: If a doctor prescribes the same drug for the same patient more than once, several such prescriptions may have to be stored.

OR

- B** Assume we have the following applications that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following:
- a. We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.
  - b. Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DoB, start year, and shirt number that he uses.
  - c. Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.

- d. For each match we need to keep track of the following:
- The date on which the game is played.
  - The final result of the match.
  - The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
  - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
- e. Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referee.

Design an ER diagram to capture the above requirements. State any assumptions you have made that affect your design. Make sure cardinalities and primary keys are clear. Map the ER diagram in to create the relational model corresponding to the described application. Basically, list the CREATE TABLE statements with the attribute names, and appropriate data types. Also make sure to have the primary keys and foreign keys clearly defined.

**C** What is indexing? How indexing is helpful in file organization? Explain following types of indexing with example. 6

- Primary index
- Clustering index
- Secondary index

**A** Describe ACID? Explain the transitions of a transaction from one state to another with the suitable diagram. 7

**OR**

**B** What is transaction & transaction Management? How can we test the serializability of the schedules? 7

**C** Consider the following schedule S of transaction T1, T2, T3, T4 : 7

| T1       | T2       | T3       | T4      |
|----------|----------|----------|---------|
|          | Read(X)  |          |         |
|          |          | Write(X) |         |
|          |          | Commit   |         |
| Write(X) |          |          |         |
| Commit   |          |          |         |
|          | Write(Y) |          |         |
|          | Read(Z)  |          |         |
|          | Commit   |          |         |
|          |          |          | Read(X) |
|          |          |          | Read(Y) |
|          |          |          | Commit  |

- i. Draw precedence graph of the above schedule S and check whether schedule is conflict serializable or not. If it is serializable than what is the order of serializability?
- ii. Is the following schedule is recoverable or not?
- iii. Is the following schedule is cascadelss or cascading?
- iv. Is the following schedule is strict or not?

**Q 4 A** Briefly explain all normal forms and study the following database of Car Hire Services 8  
case study carefully and normalize it.

| CarRegno | Outletno | Custno | Make | Model | OutletLoc | CustName | Hiredate |
|----------|----------|--------|------|-------|-----------|----------|----------|
|----------|----------|--------|------|-------|-----------|----------|----------|

Make the functional Dependency and indicate the final tables after 1NF, 2NF, 3NF and so on if applicable. Clearly indicate all the intermediate steps followed during process of normalization.

OR

**Q 4 B** Briefly explain all normal forms and study the following database of Film Actor Role 8  
case study carefully and normalize it.

| Film_No | TimeonScreen | Film_Title | Director_No | Director_Name | Actor_No | Actor_Name | Role |
|---------|--------------|------------|-------------|---------------|----------|------------|------|
|---------|--------------|------------|-------------|---------------|----------|------------|------|

Make the Functional Dependency and indicate the final tables after 1NF, 2NF, 3NF and so on if applicable. Clearly indicate all the intermediate steps followed during process of normalization.

- Q 5 A** Find out that below relation is in which normal form? Also, show all intermediate steps. 6
- i. For relation given R {A, B, C, D, E} where dependencies are  $AB \rightarrow CD$ ,  $D \rightarrow A$ ,  $BC \rightarrow DE$
  - ii. For relation given R {A, B, C, D, E, F} where dependencies are  $ABC \rightarrow D$ ,  $ABD \rightarrow E$ ,  $CD \rightarrow F$ ,  $CDF \rightarrow B$ ,  $BF \rightarrow D$

**Q 5 A** Write the SQL queries for the following relational algebra statements. 6

- i.  $\Pi_{customer-name, branch-name}(depositor \bowtie account) \div \Pi_{branch-name}(\sigma_{branch-city = "Brooklyn"}(branch))$
- ii.  $\Pi_{customer-name}(borrower) \cup \Pi_{customer-name}(depositor)$
- iii.  $\Pi_{loan-number}(\sigma_{amount > 1200}(loan))$

OR

**B** Write the SQL queries for the following relational algebra statements. 6

- i.  $\Pi_{balance}(account) - \Pi_{account.balance}(\sigma_{account.balance < d.balance}(account \times \rho_d(account)))$
- ii.  $\Pi_{customer-name}(\sigma_{branch-name = "Perryridge"}(\sigma_{borrower.loan-number = loan.loan-number}(borrower \times loan))) - \Pi_{customer-name}(depositor)$
- iii.  $\Pi_{customer-name}(borrower) \cap \Pi_{customer-name}(depositor)$

**C** Explain following with example : 8

- i. 2-Phase locking protocol
- ii. Graph based locking protocol
- iii. Difference between B and B+ tree
- iv. File Organization

2017

IT 6 SEM

Apr-May 2017 EXAMINATION  
II B.E. (4YDC) EXAM  
IT-3853: DATABASE MANAGEMENT SYSTEMS

[ Max. Marks : 70 ]

Time : 3 Hrs.]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 6

Note : Question 1 is compulsory. From Question 2 to Question 6 Attempt any one part from A and B and similarly one part from C and D.

**Q.1 Do as directed.**

- 1 ✓ The student marks should not be greater than 100. This is \_\_\_\_\_ constraint.  
 2 ✓ Which constraint in SQL is used to test whether a sub-query has any tuples in its result ?  
 3 ✓ An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause. True / False  
 4 ✓ The HAVING clause acts like a WHERE clause, but it identifies groups that meet a criterion, rather than rows. True / False  
 5 ✓ The condition in a WHERE clause can refer to only one value. True/False  
 6 ✓ VIEW level is the highest level of abstraction. True / False  
 7 ✓ Let R = ABCDE is a relational scheme with functional dependency set F = {A → B, B → C, AC → D}. Find the attribute closures of A and E.  
 8 ✓ Third normal form is based on the concept of \_\_\_\_\_  
 9 ✓ A relation in 3NF is always in BCNF. True / False  
 10 ✓ A file is organized so that the ordering of data records is the same as or close to the ordering of data entries in some index. Then that index is called \_\_\_\_\_.

**Q.2 Attempt any one part from A and B and similarly one part from C and D.**

- A (I). Discuss the capabilities that should be provided by a DBMS.  
 (II). What are the responsibilities of the DBA and the database designers ?

OR

- B (I). Discuss the main characteristics of the database approach and how it differs from traditional file system.  
 (II). Discuss the role of high-level data model in database design process.  
 C (I). Describe the three-schema architecture with suitable diagram.  
 (II). What is the difference between logical data independence and physical data independence?  
 Which one is harder to achieve? Why?

OR

- D (I). What is a relationship type? Explain the differences among a relationship instance, a relationship type, and a relationship set.  
 (II). What is generalization? Illustrate how it is helpful with an example.

**Q.3 Attempt any one part from A and B and similarly one part from C and D.**

- A ✓ Discuss the complete set of relational algebra operations with suitable example.

OR

- B Consider the two tables T1 and T2. Show the results of the following operations

- (I).  $T1 \text{ JOIN}_{T1.P = T2.A} T2$   
 (II).  $T1 \text{ LEFT OUTER JOIN}_{T1.P = T2.A} T2$   
 (III).  $T1 \text{ RIGHT OUTER JOIN}_{T1.O = T2.B} T2$   
 (IV).  $T1 \text{ JOIN}_{(T1.P = T2.A \text{ AND } T1.R = T2.C)} T2$

| P  | Q | R |    | A  | B  | C |
|----|---|---|----|----|----|---|
| 10 | a | 5 | T1 | T2 | 10 | b |
| 15 | b | 8 |    | 25 | c  | 3 |
| 25 | a | 6 |    | 10 | b  | 5 |

C Consider the following relations  
 EMPLOYEE (Fname, Lname, Ssn, Bdate, Address, Sex, Salary, Super\_ssn, Dno)  
 DEPARTMENT (Dname, Dnumber, Mgr\_ssn, Mgr\_start\_date)  
 DEPT\_LOCATIONS (Dnumber, Dlocation)  
 PROJECT (Pname, Pnumber, Plocation, Dnum)  
 WORKS\_ON (Essn, Pno, Hours)  
 DEPENDENT (Essn, Dependent\_name, Sex, Bdate, Relationship)

Write SQL expressions for the following queries:

- (I). For each department, retrieve the department number , the number of employees in the department , and their average salary.
- (II). For each project, retrieve the project number, the project name, and the number of employees from department 5 who work on the project.
- (III). List the name of managers who have at least one dependent
- (IV). Find all employees who were born during the 1950s.
- (V). Retrieve the names of all employees who do not have supervisors.
- (VI). Find the name of employees whose salary is grater than the maximum salary of department 5.

OR

D Explain the following

- (I). Union compatibility
- (II). ALTER command in SQL
- (III). Division operation in relational algebra.

Q.4 Attempt any one part from A and B and similarly one part from C and D.

A (I) Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples.

(II) Write the Armstrong's inference rules for functional dependencies in their basic form.

OR

B (I). Relation R has eight attributes ABCDEFGH . Fields of R contain only atomic values.  
 $F = \{ CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG \}$  is a set of functional dependencies (FDs) that hold for R. Find the highest normal form of relation R.

(II). Discuss the different conditions of modifications of a B-tree and B<sup>+</sup>-tree when an element is inserted.

C (I). Given R(A, B, C, D, E, F, G, H, I, J) and the set of function dependency on R given by  $F = \{ AB \rightarrow C, A \rightarrow DF, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ \}$ . What is the key for R? Decompose R into 2NF and then 3NF relations.

(II). Consider a relation schema R = (A, B, C, D, E, H) on which the following functional dependencies hold: $\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$ . What are the candidate keys of R?

OR

D (I). Given the set of functional dependencies  
 $\{A \rightarrow BCD, CD \rightarrow E, E \rightarrow CD, D \rightarrow AH, ABH \rightarrow BD, DH \rightarrow BC\}$  Find the non-redundant cover.

(II). For relation R = (L, M, N, O, P) the following dependencies hold:

$\{M \rightarrow O, NO \rightarrow P, P \rightarrow L, L \rightarrow MN\}$ . R is decomposed into R 1 = (L, M, N, P) and R 2 = (M, O). The above decomposition is lossless or lossy justify your answer.

Q.5 Attempt any one part from A and B and similarly one part from C and D.

A (I). The following key values are inserted into a B + tree in which order of internal nodes is 3, and that of leaf node is 2, in the sequence given below. The order of internal nodes is the maximum number of tree pointers in each node, and the order of leaf nodes is the maximum number of data items that can be stored in it. The B + tree is initially empty. 10, 3, 6, 8, 4, 2, 1. The maximum number of times leaf nodes would get split up as a result of these insertions also draw the final tree.

(II). Consider a B<sup>+</sup> tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non root node?

OR

B (I). How does multilevel indexing improve the efficiency of searching an index file?

(II). A hash function f defined as  $f(\text{key}) = \text{key mod } 13$ , with linear probing is used to insert keys 55, 58, 68, 91, 27, 145. What will be the location of 79 ? Also draw the insertion of each element.

Explain different steps of query processing with suitable diagram.

OR

2  
2  
2

4  
2  
3

3  
3  
4

2  
3  
3

4

2  
3  
3

6

D What are the differences among primary, secondary and clustering indexes? How do these differences affect the ways in which these indexes are implemented? Which of the indexes are dense, and which are not? 6

Q.6 Attempt any one part from A and B and similarly one part from C and D.

A Consider the two transaction  $T_1$  and  $T_2$  and four schedule  $S_1, S_2, S_3, S_4$  of  $T_1$  and  $T_2$  as given below: 6

$T_1 : R_1[x] W_1[x] W_1[y]$

$T_2 : R_2[x] R_2[y] W_2[y]$

$S_1 : R_1[x] R_2[x] R_2[y] W_1[x] W_1[y] W_2[y]$

$S_2 : R_1[x] R_2[x] R_2[y] W_1[x] W_2[y] W_1[y]$

$S_3 : R_1[x] W_1[x] R_2[x] W_1[y] R_2[y] W_2[y]$

$S_4 : R_2[x] R_2[y] R_1[x] W_1[y] W_1[y] W_2[y]$

Draw the precedence graph for each schedule and conclude which of the above schedules are conflict serializable ?

OR

B ~~(I). Draw a state transition diagram, and discuss the typical state that a transition goes through during execution.~~ 3

~~(II). Explain 2 phase locking technique and its variants.~~ 3

C ~~(I). Discuss the deferred update technique of recovery. What are the advantages and disadvantages of this technique? Why it is called the NO-UNDO / REDO method?~~ 4

~~(II). What are the necessary conditions for conflict operations?~~ 2

OR

D ~~X~~ Explain the following terms.

~~(I). The lost update problem~~ 1

~~(II). Dirty update problem~~ 1

~~(III). Shadow paging~~ 4

**Apr-May 2016 EXAMINATION  
II B.E. (4YDC) EXAM  
IT-3853: DATABASE MANAGEMENT SYSTEMS**

**Time : 3 Hrs.]****[ Max. Marks : 70****TOTAL NO. OF QUESTIONS IN THIS PAPER : 6**

**Note :** Question 1 is compulsory. From Question 2 to Question 6 Attempt any one part from A and B and similarly one part from C and D.

**Q.1** Do as directed.

The student marks should not be greater than 100. This is logical constraint. 10

Which constraint in SQL is used to test whether a sub-query has any tuples in its result ?

An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause. True / False

4. The HAVING clause acts like a WHERE clause, but it identifies groups that meet a criterion, rather than rows. True / False

5. The condition in a WHERE clause can refer to only one value. True/False

6. VIEW level is the highest level of abstraction. True / False

7. Let R = ABCDE is a relational scheme with functional dependency set F = {A → B, B → C, AC → D}. Find the attribute closures of A and E.

8. Third normal form is based on the concept of \_\_\_\_\_

9. A relation in 3NF is always in BCNF. True / False

10. A file is organized so that the ordering of data records is the same as or close to the ordering of data entries in some index. Then that index is called \_\_\_\_\_

**Q.2** Attempt any one part from A and B and similarly one part from C and D.

A (I). Discuss the capabilities that should be provided by a DBMS.

(II). What are the responsibilities of the DBA and the database designers ?

OR

B (I). Discuss the main characteristics of the database approach and how it differs from traditional file system.

(II). Discuss the role of high-level data model in database design process.

(I). Describe the three-schema architecture with suitable diagram.

(II). What is the difference between logical data independence and physical data independence?

Which one is harder to achieve? Why?

OR

D (I). What is a relationship type? Explain the differences among a relationship instance, a relationship type, and a relationship set.

(II). What is generalization? Illustrate how it is helpful with an example.

**Q.3** Attempt any one part from A and B and similarly one part from C and D.

A Discuss the complete set of relational algebra operations with suitable example.

OR

B Consider the two tables T1 and T2. Show the results of the following operations

(I). T1 JOIN<sub>T1.P = T2.A</sub> T2

(II). T1 LEFT OUTER JOIN<sub>T1.P = T2.A</sub> T2

(III). T1 RIGHT OUTER JOIN<sub>T1.Q = T2.B</sub> T2

(IV). T1 JOIN<sub>(T1.P = T2.A AND T1.R = T2.C)</sub> T2

| P   | Q | R |    | A  | B | C |
|-----|---|---|----|----|---|---|
| -10 | a | 5 | T1 | T2 | b | 6 |
| 15  | b | 8 |    | 25 | c | 3 |
| 25  | a | 6 |    | 10 | b | 5 |

C Consider the following relations

EMPLOYEE (Fname, Lname, Ssn, Bdate, Address, Sex, Salary, Super\_ssn, Dno)  
DEPARTMENT (Dname, Dnumber, Mgr\_ssn, Mgr\_start\_date)  
DEPT\_LOCATIONS (Dnumber, Dlocation)  
PROJECT (Pname, Pnumber, Plocation, Dnum)  
WORKS\_ON (Essn, Pno, Hours)

DEPENDENT (Essn, Dependent\_name, Sex, Bdate, Relationship)

Write SQL expressions for the following queries:

- (I). For each department, retrieve the department number, the number of employees in the department, and their average salary.
- (II). For each project, retrieve the project number, the project name, and the number of employees from department 5 who work on the project.
- (III). List the name of managers who have at least one dependent
- (IV). Find all employees who were born during the 1950s.
- (V). Retrieve the names of all employees who do not have supervisors.
- (VI). Find the name of employees whose salary is grater than the maximum salary of department 5.

OR

D Explain the following

- (I). Union compatibility
- (II). ALTER command in SQL
- (III). Division operation in relational algebra.

Q.4 Attempt any one part from A and B and similarly one part from C and D.

A (I) Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples.

- (II) Write the Armstrong's inference rules for functional dependencies in their basic form.

OR

B (I). Relation R has eight attributes ABCDEFGH . Fields of R contain only atomic values.

$F = \{ CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG \}$  is a set of functional dependencies (FDs) that hold for R. Find the highest normal form of relation R.

(II). Discuss the different conditions of modifications of a B-tree and B<sup>+</sup>-tree when an element is inserted.

C (I). Given R(A, B, C, D, E, F, G, H, I, J) and the set of function dependency on R given by  $F = \{ AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ \}$ . What is the key for R? Decompose R into 2NF and then 3NF relations.

(II). Consider a relation schema R = (A, B, C, D, E, H) on which the following functional dependencies hold:  $\{ A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A \}$ . What are the candidate keys of R?

OR

D (I). Given the set of functional dependencies

$\{ A \rightarrow BCD, CD \rightarrow E, E \rightarrow CD, D \rightarrow AH, ABH \rightarrow BD, DH \rightarrow BC \}$  Find the non-redundant cover.

(II). For relation R = (L, M, N, O, P) the following dependencies hold:

$\{ M \rightarrow O, NO \rightarrow P, P \rightarrow L, L \rightarrow MN \}$ . R is decomposed into R 1 = (L, M, N, P) and R 2 = (M, O). The above decomposition is lossless or lossy justify your answer.

Q.5 Attempt any one part from A and B and similarly one part from C and D.

A (I). The following key values are inserted into a B + tree in which order of internal nodes is 3, and that of leaf node is 2, in the sequence given below. The order of internal nodes is the maximum number of tree pointers in each node, and the order of leaf nodes is the maximum number of data items that can be stored in it. The B + tree is initially empty. 10, 3, 6, 8, 4, 2, 1. The maximum number of times leaf nodes would get split up as a result of these insertions also draw the final tree.

(II). Consider a B<sup>+</sup> tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non root node?

OR

B (I). How does multilevel indexing improve the efficiency of searching an index file?

(II). A hash function f defined as  $f(\text{key}) = \text{key mod } 13$ , with linear probing is used to insert keys 55, 58, 68, 91, 27, 145. What will be the location of 79? Also draw the insertion of each element.

Explain different steps of query processing with suitable diagram.

OR

D What are the differences among primary, secondary and clustering indexes? How do these differences affect the ways in which these indexes are implemented? Which of the indexes are dense, and which are not? 6

Q.6 Attempt any one part from A and B and similarly one part from C and D.

A Consider the two transaction  $T_1$  and  $T_2$  and four schedule  $S_1, S_2, S_3, S_4$  of  $T_1$  and  $T_2$  as given below: 6

$T_1 : R_1[x] W_1[x] W_1[y]$

$T_2 : R_2[x] R_2[y] W_2[y]$

$S_1 : R_1[x] R_2[x] R_2[y] W_1[x] W_1[y] W_2[y]$

$S_2 : R_1[x] R_2[x] R_2[y] W_1[x] W_2[y] W_1[y]$

$S_3 : R_1[x] W_1[x] R_2[x] W_1[y] R_2[y] W_2[y]$

$S_4 : R_2[x] R_2[y] R_1[x] W_1[x] W_1[y] W_2[y]$

Draw the precedence graph for each schedule and conclude which of the above schedules are conflict serializable?

OR

B ~~(I)~~. Draw a state transition diagram, and discuss the typical state that a transition goes through during execution. 3

~~(II)~~. Explain 2 phase locking technique and its variants. 3

C ~~(I)~~. Discuss the deferred update technique of recovery. What are the advantages and disadvantages of this technique? Why it is called the NO-UNDO / REDO method? 4

~~(II)~~. What are the necessary conditions for conflict operations? 2

OR

D Explain the following terms.

(I). The lost update problem 1

(II). Dirty update problem 1

(III). Shadow paging 4

Time : 3 Hrs.]

TOTAL NO. OF QUESTIONS IN THIS PAPER : 6

Note : Question 1 is compulsory. From Question 2 to Question 6 Attempt any one part from a and b and similarly one part from c and d.

15

Q.1 Do as directed.

1. A column declared as unique may contain null value in any row. True / False
2. A column as subset of a composite primary key may have the same value in more than one row. True / False
3. A column declared as foreign key may contain null value in any row. True / False
4. Which language provides the ability to query information from the database and to insert tuples into, delete tuples from, and modify tuples in the database ?
5. What is left outer join.
6. What is view in SQL.
7. Let  $R = (A, B, C, D, E, F)$  be a relation scheme with the following dependencies:  
 $C \rightarrow F, \quad E \rightarrow A, \quad EC \rightarrow D, \quad A \rightarrow B.$  What is a key for R?
8. The term attribute refers to a \_\_\_\_\_ of a table.
9. A table has fields F1, F2, F3, F4, and F5, with the following functional dependencies:  
 $F1 \rightarrow F3, \quad F2 \rightarrow F4, \quad (F1, F2) \rightarrow F5$  in terms of normalization, this table is in \_\_\_\_\_ normal form.
10. For each attribute of a relation, there is a set of permitted values, called the \_\_\_\_\_ of that attribute.
11. Consider the following relation schema pertaining to a students database: Student (rollno, name, address), Enroll (rollno, courseno, coursename) where the primary keys are shown underlined. The number of tuples in the Student and Enroll tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in (Student \* Enroll), where '\*' denotes natural join ?
12. A \_\_\_\_\_ is a pictorial depiction of the schema of a database that shows the relations in the database, their attributes, and primary keys and foreign keys.
13. Select \_\_\_\_\_ from instructor where dept name= 'Comp. Sci.'; Which should be used to find the mean of the salary ?
14. Select count (---- ID) from teaches where semester = 'Spring' and year = 2010;  
If we do want to eliminate duplicates, we use the keyword \_\_\_\_\_ in the aggregate expression.
15. \_\_\_\_\_ makes the transaction permanent in the database.

Q.2 Attempt any one part from a and b and similarly one part from c and d.

A Describe the three schema architecture. What is difference between logical data independence and physical data independence. List two reasons why we may choose to define a view. 8

OR

B Draw the system architecture of data base management system and list the responsibilities of DBA. 8

C Discuss any three main characteristic of the database approach. 3

OR

D List three significant differences between a file-processing system and a DBMS. 3

Q.3 Attempt any one part from a and b and similarly one part from c and d.

A(i) Suppose you are given the following requirements for a simple database for the National Hockey League (NHL): the NHL has many teams, each team has a name, a city, a coach, a captain, and a set of players, each player belongs to only one team, each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records, a team captain is also a player, a game is played between two teams (referred to as host\_team and guest\_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2). Construct a clean and concise ER diagram for the NHL database. 5

(ii) Explain the difference between a weak and a strong entity set. 3

OR

B(i) A university registrar's office maintains data about the following entities: 5

1. courses, including number, title, credits, syllabus, and prerequisites;
2. course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
3. students, including student-id, name, and program;
4. instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

(ii) Explain the distinction between total and partial constraints. 3

C What is the difference between a primary index and a secondary index? What is the difference between a sparse index and a dense index? 3

OR

D Construct a B+ tree for the following set of key values:  
(2, 3, 5, 7, 11, 17, 19, 23, 29, 31) Assume that the tree is initially empty and values are added in ascending order.  
Construct B+ trees for the cases where the number of pointers that will fit in one node is Four. 3

Q.4 Attempt any one part from a and b and similarly one part from c and d. 8

A Consider the following relations:

Student(snum: integer, sname: string, major: string, level: string, age: integer)  
Class(name: string, meets\_at: string, room: string, fid: integer)  
Enrolled(snum: integer, cname: string)  
Faculty(fid: integer, fname: string, deptid: integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class.

Write the following queries in SQL. No duplicates should be printed in any of the answers.

1. find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof Ram.
2. For each level, print the level and the average age of students for that level.
3. Find the names of students not enrolled in any class.
4. Find the age of the oldest student who is either a History major or enrolled in a course taught by Prof Ram.
5. Find the names of all students who are enrolled in two classes that meet at the same time.

OR

B Consider the following schema:

Suppliers(sid: integer, sname: string, address: string)  
Parts(pid: integer, pname: string, color: string)  
Catalog(sid: integer, pid: integer, cost: real)

The Catalog relation lists the prices charged for parts by Suppliers.

Write the following queries in SQL:

1. Find the sids of suppliers who supply a red part and a green part.
2. For every supplier who supplies at least 1 red part, print the name of the supplier and the total number of red parts that he or she supplies.
3. Find the distinct pnames of parts for which there is some supplier.
4. Find the price of the least expensive red part.
5. For every supplier, print the name of the supplier and the total number of parts that he or she supplies.

C Explain the distinctions among the terms primary key, candidate key and superkey. 3

OR

D Explain entity integrity and referential integrity constraints. 3

Q.5 Attempt any one part from a and b and similarly one part from c and d. 5

A (i) The relation EMPDT1 is defined with attributes empcode(unique), name, street, city, state, and pincode. For any pincode, there is only one city and state. Also, for any given street, city and state, there is just one pincode. In normalization terms state the highest normal form for EMPDT1.

(ii) Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F={CH → G, A → BC, B → CFH, E → A, F → EG} is a set of functional dependencies (FDs). How many candidate keys does the relation R have? State the highest normal form for relation R. 3

OR

B(i) The relation schema Student\_Performance (name, courseNo, rollNo, grade) has the following FDs:  
name, courseNo → grade, rollNo, courseNo → grade  
name → rollNo, rollNo → name  
what is the highest normal form of this relation scheme. 5

(ii) The following functional dependencies in a database.  
Date\_of\_Birth → Age, Age → Eligibility, Name → Roll\_number, Course\_number → Course\_name,  
Roll\_number → Name, Course\_number → Grade  
(Roll\_number, Course\_number) → Grade  
what is Consider the highest normal form of this relation scheme.

Name → Roll\_number  
Course\_number → Instructor

(Roll\_number, Name, Date\_of\_birth, Age)  
C Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples. 3

OR

D What is meant by functional dependency. Explain Armstrong's inference rules of functional dependency? 3

Q.6 Attempt any one part from a and b and similarly one part from c and d. 8

A Check whether the schedule is conflict serializable or not?

**TOTAL NO. OF QUESTIONS IN THIS PAPER : 6**

**Note :** Question 1 is compulsory. From Question 2 to Question 6 Attempt any one part from a and b and similarly one part from c and d.

20

**Q.1 Do as directed.**

1. The database schema is written in DDL.
2. An entity set that does not have sufficient attributes to form a primary key is a weak entity set.
3. The statement in SQL which allows to change the definition of a table is ALTER.
4. List some of the properties of a relation. Reflexive, Symmetric & Transitive.
5. Define the phases of two phase locking protocol A-B A-B xRy = yRa = G.
6. A set of possible data values is called domain.
7. Given the following data file EMPLOYEE( NAME, SSN, ADDRESS, JOB, SAL, ... ) Suppose that record size R=150 bytes block size B=512 bytes and r=30000 records. calculate blocking factor and number of file blocks required for above mentioned data. growing Phase shrinking Phase
8. What is trigger?
9. What is called mirroring?
10. Use of UNIQUE while defining an attribute of a table in SQL means that the attribute values are -----.
11. What is data dictionary?
12. In the relational modes, cardinality is termed as -----.
13. What is view in SQL? How is it defined?
14. How do you create index in SQL?
15. what are the relational algebra operations supported in SQL?
16. What is meant by computing the closure of a set of functional dependency? Functional L'K
17. E-R model uses this symbol to represent weak entity set ?
18. Define hot swapping.
19. Key to represent relationship between tables is called -----.
20. Consider the join of a relation R with relation S. If R has m tuples and S has n tuples, then the maximum size of join is: -----.

**Attempt any one part from a and b and similarly one part from c and d.**

Describe the three schema architecture. What is difference between logical data independence and physical data independence.

5

OR

Draw the system architecture of data base management system.  
 Discuss the main characteristic of the database approach.

5

OR

D Discuss advantage of DBMS over traditional file processing system.

5

**Q.3**  
**A**

**Attempt any one part from a and b and similarly one part from c and d.**

When is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type, and partial key.

5

OR

B C What is primary,secondary,dense ,sparse ,clustering and nonclustering index.

5

Consider the following set of requirements for a UNIVERSITY database that is used to keep track of students' transcripts.

5

- a. The university keeps track of each student's name, student number, Social Security number, current address and phone number, permanent address and phone number, birth date, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and ZIP Code of the student's permanent address and to the student's last name. Both Social Security number and student number have unique values for each student.
  - b. Each department is described by a name, department code, office number, office phone number, and college. Both name and code have unique values for each department.
  - c. Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of the course number is unique for each course.
  - d. Each section has an instructor, semester, year, course, and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ..., up to the number of sections taught during each semester.
  - e. A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, or 4).
- Draw an ER diagram for the schema. Specify key attributes of each entity type, and structural constraints on each relationship type.
- Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

5

OR

Construct a B+ tree for the following set of key values: (2,3,5,7,11,17,19,23,29,31) assume that the tree is initially empty and values are added in the ascending order. Number of pointers that will fit in one node is four.

5

9.4 Attempt any one part from a and b and similarly one part from c and d.

A Explain the following Constraints with example.  
-Check Constraints -Not-Null Constraints -Unique Constraints -Primary Keys -Foreign  
Keys

B Perform the INNER, LEFT, RIGHT, FULL, OUTER JOIN Joined Tables commands on the given table R1 and R2.

| R1 |    |    |
|----|----|----|
| A  | B  | C  |
| a1 | b1 | c1 |
| a2 | b2 | c2 |
| a3 | b3 | c3 |

| R2 |    |    |
|----|----|----|
| B  | D  | E  |
| a2 | d2 | e2 |
| a4 | d4 | e4 |
| a5 | d5 | e5 |

Consider the following relations for a database that keeps track of business trips of salespersons in a sales office:

SALESPERSON (SSN, Name, start\_year, Dept\_no)  
TRIP (SSN, From\_city, To\_city, Departure\_Date, Return\_Date, Trip\_ID)  
EXPENSE(TripID, Account#, Amount)

Specify the following queries in relational algebra:

- Give the details (all attributes of TRIP) for trips that exceeded \$2000 in expenses.
- Print the SSN of salesman who took trips to 'Honolulu'
- Print the trip expenses incurred by the salesman with SSN = '234-56-7890'. Note that the salesman may have gone on more than one trip. List them individually.

OR

Given the following relations

TRAIN (NAME, START, DEST)  
TICKET (PNRNO., START, DEST, FARE)  
PASSENGER (NAME, ADDRESS, PNRNO.)

Write SQL expressions for the following queries:

Note: Assume NAME of Train is a column of Ticket.

- List the names of passengers who are travelling from the start to the destination station of the train.
- List the names of passengers who have a return journey ticket.
- Insert a new Shatabdi train from Delhi to Bangalore.
- Cancel the ticket of Tintin.

Attempt any one part from a and b and similarly one part from c and d.

Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples.

B Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?

C Find the minimal cover of

$$F = \{ A \rightarrow BC, B \rightarrow CE, A \rightarrow E, AC \rightarrow H, D \rightarrow B \}$$

OR

D Consider the following relation: Shipping (ShipName, ShipType, VoyageID, Cargo, Port, ArrivalDate)  
ArrivalDate is the date the ship arrives in the given Port.

FD1: ShipName  $\rightarrow$  ShipType

FD2: VoyageID  $\rightarrow$  ShipName, Cargo

FD3: ShipName, ArrivalDate  $\rightarrow$  VoyageID, Port

Suppose the key for above mentioned relation is ShipName, ArrivalDate. Normalize to 2NF, 3NF, BCNF.

Attempt any one part from a and b and similarly one part from c and d.

What problems are occurred when transaction are executed concurrently.

OR

Draw a state diagram, and discuss the typical states that a transaction goes through during its execution.

Consider the three transactions  $T_1$ ,  $T_2$ , and  $T_3$ , and the schedule  $S_1$  and  $S_2$  given below. Draw the serializability (precedence) graphs for  $S_1$  and  $S_2$  state whether each schedule is serializable or not.

$S_1: r1(x); r2(z), r1(z), r3(x), r3(y), w1(x), w3(y); r2(y), w2(z), w2(y);$

$S_2: r1(x); r2(z); r3(x); r1(z); r2(y); r3(y); w1(x); w2(z); w3(y); w2(y);$

Explain steps of query processing.

NOV-DEC 2016 EXAMINATION  
IV B.E. (4YDC) INFORMATION TECHNOLOGY  
IT 4825: ADVANCED COMPUTER NETWORKS

TIME: 3 HRS

 Max Marks: 70  
 Min Pass Marks: 22

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: All the parts of Question no. 1 are compulsory. Attempt the remaining four questions by answering the part A and any one part either part B or part C.

**Q1. A** Indicate True or False for the following giving a brief reason for your answer: 5

- i) RSVP is a signalling protocol.
- ii) In MPLS an operator can override normal IP routing.
- iii) A network management system reactively controls and proactively manages the system.
- iv) RIP provides QoS guarantees.
- v) TCP is a bit stream oriented protocol.

**B** Fill in the blanks from the appropriate choices in the lists given below (please note that all the choices may or may not be applicable):

- i) " \_\_\_\_\_ " located at " \_\_\_\_\_ " are periodically queried by the " \_\_\_\_\_ " for the data about " \_\_\_\_\_ ". 2

List: (managed devices, managed objects, managing entity, managing agents)  
 ii). The service of transmitting and translating information from one machine-specific format to another is called \_\_\_\_\_ . 1

List: (session service, presentation service, translation service, transmission service)

- iii) Port numbers for SNMP and trap messages are \_\_\_\_\_ , and \_\_\_\_\_ respectively. 2

List: ( 160, 161, 162, 163 )

**C** Match the pairs: 5

|                   |                      |
|-------------------|----------------------|
| TCP               | tunneling            |
| IPv6              | cumulative acks      |
| BGP               | bandwidth scaling    |
| RTCP              | longest prefix match |
| packet forwarding | route aggregation    |

**D** Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interface as follows: 8

| Destination Address Range | Link Interface |
|---------------------------|----------------|
|---------------------------|----------------|

|                                     |  |
|-------------------------------------|--|
| 11100000 00000000 00000000 00000000 |  |
|-------------------------------------|--|

through

0

|                                     |  |
|-------------------------------------|--|
| 11100000 11111111 11111111 11111111 |  |
|-------------------------------------|--|

|                                     |  |
|-------------------------------------|--|
| 11100001 00000000 00000000 00000000 |  |
|-------------------------------------|--|

through

1

|                                     |  |
|-------------------------------------|--|
| 11100001 00000000 11111111 11111111 |  |
|-------------------------------------|--|

|                                     |  |
|-------------------------------------|--|
| 11100001 00000001 00000000 00000000 |  |
|-------------------------------------|--|

through

2

|                                     |  |
|-------------------------------------|--|
| 11100001 11111111 11111111 11111111 |  |
|-------------------------------------|--|

otherwise

3

(a) Provide a forwarding table that has four entries in the form a.b.c/x, uses longest-prefix matching and forwards packets to the correct link interfaces.

(b) Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

- (i) 11001000 10010001 01010001 01010101
- (ii) 11100001 00000000 11000011 00111100
- (iii) 11100001 10000000 00010001 01110111



Explain the structure and the following system calls with the prototype information, used for socket programming in C:

- (i) bind,
- (ii) listen

7

2

Q.2 A (i) Explain the following terms:

- (a) hierarchical routing,
- (b) hot potato routing

(ii) Is it necessary that every autonomous system use the same intra-AS routing algorithm? 2

Why or why not?

1

(iii) Mention the three types of IGMP messages.

1

B (i) Explain what is the difference between IGP and EGP.

4

(ii) State the four types of OSPF routers and their role in OSPF routing.

OR

3

C (i) What is meant by the following in BGP:

- (a) Autonomous system number, (b) route, (c) PATH attributes

(ii) The Classless Inter Domain Routing (CIDR) prefix of any multicast group in IPv4 is 224.0.0.0/4. What are the leading 4 bits in the address of a multicast group in IPv4? 2  
What is the size of multicast address space?

2

1

Q.3 A (i) Why is path MTU discovery done?

1

(ii) What problem can be encountered in a TCP session when Nagle's algorithm is enabled? 2

(iii) Which byte of the unfragmented packet is the starting byte of the fragment whose offset field has a value of 64 and why? 2

4

B (i) Explain delayed acknowledgement in TCP with a suitable example. 4

1

(ii) Explain what is meant by saying that TCP uses positive acknowledgements.

OR

3

C (i) Write the constraint to ensure that the TCP is not permitted to overflow the receive buffer. Also write the expression for receive window using the variables used in the above constraint.

2

(iii) In a TCP session, a situation is faced when the receiving TCP peer has advertised RevWindow=0 and the sender TCP has data remaining to be sent. What problem is faced in this scenario and what mechanism is adopted to overcome it? 2

1

2

Q.4 A (i) What are the five areas of network management defined by ISO ?

2

(ii) Which SMI construct is used to specify the following:

- (a) managed objects, (b) MIB modules

1

(iii) What is meant by TEV encoding?

4

B (i) Describe the following in brief:

- (a) SNMP engine, (b) RMON

1

(ii) Why is UDP chosen for SNMP rather than TCP?

OR

5

(g) Describe in brief the seven message types used in SNMP.

5

Q.5 A (i) With the help of a suitable diagram explain the working of a leaky bucket. How leaky bucket can be used to police burst size and average rate? 5

5

B (i) Describe the five RTP header fields.

5

OR

5

(g) Explain SIP call establishment with a suitable diagram.

\*\*\*\*\*

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Attempt all five questions. Each Question has 4 subparts A, B, C, and D. Attempt any one part from A & B and similarly any one from C & D.

**Q.1. A** Explain the algorithms used for link state routing and distance vector routing with a suitable example of each. 7

359 358

OR

**B** Explain the following: 7  
 (i) tunneling in IPv6 → Q1 348  
 (ii) TCP header format 231  
 (iii) cumulative acknowledgement

**C** Explain with a suitable example each of the following: 7  
 (i) longest prefix matching for packet forwarding  
 (ii) route aggregation ✓  
 (iii) IP fragmentation

OR

**D** Explain the structure and the following system calls with the prototype information, used for socket programming in C: 7  
 (i) bind, (ii) listen

**Q.2 A** Explain the hierarchical routing in the Internet and how it solves the problem of scaling. Why and how is hot potato routing done? Mention briefly the steps in adding an outside autonomous system (AS) destination in a router's forwarding table. Is it necessary that every autonomous system use the same intra-AS routing algorithm? Why or why not? 7

OR

**B** What is the difference between IGP and EGP, explain giving one example of each. State the four types of OSPF routers and their role in OSPF routing. 7

Explain briefly how the routing tables are kept updated using RIP advertisements with a suitable example.

**C** What is meant by the following in BGP: 7  
 (i) destination, (ii) Autonomous system number, (iii) route, (iv) PATH attributes

Explain briefly the salient features of routing policy in BGP with a suitable example.

What prefix will be advertised by an autonomous system in BGP if there are the following four subnets attached to it: 138.16.64/24, 138.16.65/24, 138.16.66/24 and 138.16.67/24.

OR

**B555** Explain the methods to achieve controlled flooding in broadcast routing. What is the purpose of IGMP protocol? Describe briefly the three types of IGMP messages. 7

**Q.3. A** Explain delayed acknowledgement in TCP with a suitable example. 4+3

Suppose datagrams are limited to 1500 bytes (including header), between source host A and destination host B. Assuming a 20 byte IP header, how many datagrams would be required to send an MP3 file consisting of 4 million bytes?

OR

**B** Explain the necessity and the working of Nagle's algorithm. Explain with a suitable example, what is silly window syndrome. How can it be prevented? 7

**C** Explain the congestion window and the window adjustment mechanisms additive increase and multiplicative decrease as well as slow start in various TCP protocols. 7

OR

**D** Explain how can the flow control mechanism in TCP help in avoiding deadlock? 7

the conditions to be ensured/maintained on both the sides.

Q.4. A

What are the five areas of network management defined by ISO ? Discuss the seven message types used in SNMP. 7

OR

B

Describe the following in brief:

(a) SNMP engine, (b) RMON

C

What is the purpose of the following:

(a) ASN.1 object identifier tree, (b) ASN.1 Basic Encoding Rules

Explain with the help of suitable examples.

OR

D

Explain SMI and MIB in detail.

Q.5. A (i)

Explain how the FIFO scheduling mechanism alone can be used to police the network flow.

(ii) Explain the working of n multiplexed leaky bucket flows with WFQ scheduling. Derive the expression for the maximum delay that can be experienced by a packet when n multiplexed leaky bucket flows with WFQ scheduling are used.

OR

B

Explain the following: (i) Intserv model, (ii) Diffserv model

C

Explain SIP call establishment, name translation and user location with example.

OR

D

Write short notes on: (i) Routing in MPLS, (ii) RSVP protocol.

NOV-DEC 2014 EXAMINATION  
IV B.E. (4YDC) INFORMATION TECHNOLOGY  
IT 4825: ADVANCED COMPUTER NETWORKS

Max Marks: 70  
Min Pass Marks: 22

TIME: 3 HRS

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Attempt all five questions. Each Question has 4 subparts A, B, C, and D. Attempt any one part from A & B and similarly any one from C & D.

- Q.1. A** Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interface as follows:
- Link Interface
- Destination Address Range
- |                                     |   |
|-------------------------------------|---|
| 11100000 00000000 00000000 00000000 | 0 |
| through                             |   |
| 11100000 11111111 11111111 11111111 |   |
| 11100001 00000000 00000000 00000000 | 1 |
| through                             |   |
| 11100001 00000000 11111111 11111111 |   |
| 11100001 00000001 00000000 00000000 | 2 |
| through                             |   |
| 11100001 11111111 11111111 11111111 |   |
| otherwise                           | 3 |

(a) Provide a forwarding table that has four entries in the form a.b.c/x, uses longest-prefix matching and forwards packets to the correct link interfaces.

(b) Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

- (i) 11001000 10010001 01010001 01010101
- (ii) 11100001 00000000 11000011 00111100
- (iii) 11100001 10000000 00010001 01110111

OR

- B (i)** What is meant by tunneling in IPv6? Why is it used?  
**(ii)** Describe briefly the layers in the TCP/IP protocol stack.

3

4

- C** Explain the structure and the following system calls with the prototype information, used in socket programming in C:  
 (a) accept, (b) listen.

OR

- D** The Classless Inter Domain Routing (CIDR) prefix of any multicast group in IPv4 is 224.0.0.0/4. What are the leading 4 bits in the address of a multicast group in IPv4? What is the size of multicast address space? Suppose now that two multicast groups randomly choose a multicast address. What is the probability that they choose the same address?

7

4

- A (i)** Explain the following terms:  
 (a) hierarchical routing, (b) hot potato routing  
**(ii)** Explain with an example how routing tables are updated in RIP using RIP advertisements?

3

OR

- Compare and contrast the advertisements used by RIP and OSPF routing protocols.

7

3

- Explain what is meant by a route in BGP?  
 Explain the BGP route selection using elimination rules.  
 How BGP routing policy is different from the routing policy used in other routing schemes?  
 Explain with an example.

2

3

2

1

OR

- D (i) Explain the centre based approach to building a spanning tree with a suitable example. 3  
(ii) What is the difference between a group-shared tree and a source-based tree in the context of multicast routing? 1  
(iii) Give the names of two Internet multicast routing protocols. 3

- Q.3. A (i) Why is path MTU discovery done? Explain briefly a mechanism for path MTU discovery. 3  
(ii) What problem can be encountered in a TCP session when Nagle's algorithm is enabled? 2  
(iii) Which byte of the unfragmented packet is the starting byte of the fragment whose offset field has a value of 64 and why? 2

OR

- B (i) Explain delayed acknowledgement in TCP with a suitable example. 4  
Explain mentioning all the steps how a TCP connection is terminated. 3

- C (i) Write the constraint to ensure that the TCP is not permitted to overflow the receive buffer. 2  
Also write the expression for receive window using the variables used in the above constraint. 3  
(ii) Explain briefly the flow control mechanism provided by the TCP mentioning the constraint on the receive window size. 2  
(iii) In a TCP session, a situation is faced when the receiving TCP peer has advertised RcvWindow=0 and the sender TCP has data remaining to be sent. What problem is faced in this scenario and what mechanism is adopted to overcome it? 2

OR

- D (i) Write the constraint imposed by congestion window and receive window on the amount of unacknowledged data at a sender. 2  
(ii) Explain briefly the following: (a) additive-increase, multiplicative-decrease, (b) slow start 5

- Q.4. A (i) Describe the five areas of network management defined by ISO. 3  
(ii) Describe in brief the seven message types used in SNMP. 4

OR

- B (i) What is meant by TLV encoding? What is its use? Explain with a suitable example. 4  
(ii) Briefly describe the four parts of the Internet-Standard Management Framework. 3

- C (i) What are the two ways in which communication occurs between a managing entity and a managed device? What are the pros and cons of these two approaches, in terms of the following:  
(a) overhead,  
(b) notification time when exceptional events occur, and  
(c) robustness with respect to the lost messages between the managing entity and the device?  
(ii) Why is UDP chosen for SNMP rather than TCP? 2

OR

- D. Describe in brief the following:  
(a) SNMP Engine, (b) RMON 7

- Q.5. A Explain the scheduling mechanisms – FIFO, RR and WFQ. 7

OR

- B With the help of a suitable diagram explain the working of a leaky bucket. How leaky bucket can be used to police burst-size and average rate? 7

- C Explain SIP call establishment, name translation and user location with example. 7

OR

- D Write short notes on:  
(a) Routing in MPLS, (b) RSVP protocol 7

Nov.- Dec.' 2013 EXAMINATION

IV B.E.(4YDC) EXAM

IT 4825; ADVANCED COMPUTER NETWORKS

Time Duration :03 Hrs.

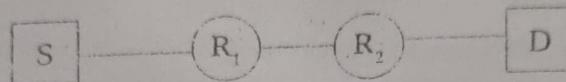
Max. Marks: 70

Min. Passing Marks: 22

TOTAL NO. OF QUESTIONS IN THIS PAPER : 05

Note : Attempt all the questions. Each question contains four parts (a), (b), (c) and (d). Attempt any one part from (a) and (b) & similarly attempt any one part from (c) and (d).

- Q.1 a) i) Explain the TCP/IP protocol stack. 3  
 ii) Assume that source S and destination D are connected through two intermediate 4 routers labeled R<sub>1</sub> & R<sub>2</sub>. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D?



OR

- b) i) Explain the use along with syntax of listen() & accept() system calls used in 3 Socket Programming.  
 ii) What happens if a TCP server never calls accept()? What happens if a TCP 4 client sends data on a socket that has not yet been accept()ed at the server?

- c) Compare and contrast the IPv4 and the IPv6 header fields. Do they have any 7 fields in common? 7

OR

- d) Explain various approaches used for transitioning from IPv4 to IPv6. 7

- Q.2 a) Discuss Synchronous Optical Network (SONET) and Wavelength routing 7 network in detail.

OR

- b) Compare and contrast the advertisement used by RIP and OSPF routing 7 protocols.

- c) Explain when each of the following attributes can be used in BGP:- 7  
 i) LOCAL-PREF ii) AS-PATH iii) NEXT-HOP

OR

- d) List all the approaches used for broadcast communication. Explain any one of 7 them.

Q.3 a) Explain TCP three-way handshake mechanism between two TCP hosts.

OR

- b) Suppose Host A sends two TCP segments back to back to Host B over a TCP connection. The first segment has sequence number 90; the second has sequence number 110.
- How much data is in the first segment? Explain
  - Suppose that the first segment is lost but the second segment arrives at B. In the acknowledgement that Host B sends to Host A, what will be the acknowledgement number? Explain.

- c) Explain TCP state transition diagram in detail.

OR

- d) What do you mean by IP fragmentation? Also Explain Path MTU discovery.

Q.4 a) i) What are the five areas of Network management defined by ISO?

ii) What are the seven message types used in SNMP?

OR

- b) Explain SNMP protocol and its operations in detail.

- c) What is the purpose of ASN.1 object identifier tree? Explain with the help of hierarchical tree.

OR

- d) Explain SMI and MIB in detail.

Q.5 a) List various scheduling mechanisms used to provide QoS. Explain any two of them.

OR

- b) Discuss the working of Leaky bucket. Also explain, how leaky bucket is used to achieve burst size and average rate?

- c) Discuss the important policing criteria in detail over which the packet flow is policed.

OR

- d) Write short note on the following: (Any Two)

- RSVP
- SIP
- Intserv and Diffserv model
- RTP

Harion

**SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE**  
**DEPARTMENT OF INFORMATION TECHNOLOGY**  
**B.E. (Information Technology) – VII SEM**  
**IT – 4825 Advanced Computer Networks**

Class Test – 1  
 August 12, 2016

Time: 1 Hour

**Max Marks: 20**

Attempt all the **FIVE** questions. Make suitable assumptions and state them, where ever necessary.  
 The symbols and abbreviations used in this paper have their usual meanings.

**Q1.** Indicate true/false for each of the following, also give brief explanation for your claim:

- (i) Polling in SNMP is associated with request-response mechanism. (1x10 = 10 marks)
- (ii) MIB is a collection of hierarchically organised information which define the properties of the managed object within the device to be managed.
- (iii) RTP packets are limited to unicast applications only.
- (iv) Controlled-load service in the Intserv architecture makes no quantitative guarantees about performance.
- (v) RSVP is a sender oriented protocol.
- (vi) MPLS can provide more than one route for a given destination at the same time.
- (vii) Routers can distinguish between datagrams which carry RTP packets and those that do not.
- (viii) RTCP packets do not carry RTP data.
- (ix) Trap is not at all an essential mechanism in SNMP.
- (x) In priority queuing, the choice among packets in the same priority class is typically done in FIFO manner.

**Q2.** Match the following pairs, giving briefly the reason for your doing so:

- |  |               |                 |
|--|---------------|-----------------|
| (i) Monitoring the network                       | MPLS          | (1x5 = 5 marks) |
| (ii) Scalable, flexible service classes          | RMON          |                 |
| (iii) Faster forwarding of packets by the router | Diffserv      |                 |
| (iv) Current user location                       | RSVP          |                 |
| (v) Bandwidth reservation protocol               | SIP registrar |                 |

**Q3.** A packet of RTP is to be framed from 40-ms chunk of 32-kbps PCM encoded audio stream. What will be the total packet size? (1kb = 1000 bits) 2 marks

**Q4.** Write the algebraic expressions for the following in terms of b, the bucket size and r, the token generation rate:

- (i) the maximum burst size for a leaky-bucket flow, 2 marks
- (ii) the maximum number of packets that can be sent to the network in any time interval t, using the leaky-bucket-policer.

**Q5.** State the two sets of functional elements of the diffserv architecture. 1 mark