Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(CST)/SEM-1/CST-1101/2012-13

2012

ADVANCED OPERATING SYSTEMS

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Election algorithm is used for

      a) Deadlock detection

      b) Deadlock prevention

      c) Deadlock avoidance

      d) None of these.

   ii) Shell is the exclusive feature of

      a) UNIX b) DOS

      c) System software d) Application software.

iii) A scheduler which selects processes from secondary storage device is called

a) Short term scheduler

b) Long term scheduler

c) Medium term scheduler

d) Process scheduler.

iv) Which of the following approaches do not require knowledge of the system state ?

a) Deadlock detection b) Deadlock prevention

c) Deadlock avoidance d) None of these.

v) Which among the following is not an advantage of Distributed systems ?

a) Reliability b) Incremental growth

c) Resource sharing d) none of these.

vi) Asymmetric Key Cryptography is also called ..... Cryptography.

a) Secret Key b) Private Key

c) Public Key d) Both (a) and (b).

vii) The key size DES algorithm is

a) 56 bits b) 64 bits

c) 72 bits d) 80 bits.

viii) Commit protocols enforce

a) Conditional guarantee

b) Global atomicity

c) Autonomous reassignment

d) All of these.

ix) Static voting scheme is proposed by

a) Dasser b) Barbara et al

c) Hydra d) Gifford.

x) GSM is an example of ..... generation cellular networks.

a) First b) Second

c) Third d) Fourth.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is event ordering ? How the logical clock is implemented for that ? 2 + 3

3. Prove that presence of a cycle in general resource allocation graph is a necessary but not a sufficient condition for the existence of deadlock. 5

4. In RSA, Let P = 7, Q = 17 and Cipher Text (CT) = 15. Calculate Encryption key (E), Decryption key (D) and Plain Text (PT). 5

5. How authentication and confidentiality are ensured by 2-key Digital Signature ? 5

6. Write down the desirable features of a good message passing system. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is an idempotent operation ? Which of the following operations are idempotent and why ?

   (i) read_next_record (filename)

   (ii) read_record (filename, record_no)

   (iii) append_record (filename, record)

   (iv) write_record (filename, after_record_no, record)

   (v) seek (filename, position)

   (vi) increment (variable name). 6

b) Which of the following statements concerning the total ordering relation $\Rightarrow$ are true ? Briefly justify your answer.

(i) An event a that happened before event b in physical time will always satisfy $a \Rightarrow b$.

(ii) If each process increments its logical clock by a different number, the total ordering relation $\Rightarrow$ will not hold.

(iii) If the delay of message transfer varies from time to time, the total ordering relation $\Rightarrow$ will not hold. 6

c) In IPC by message passing define the header of each message. 3

8. a) What is stub ? How stub is generated ? 3

b) What are the main issues to design a transparent RPC model ? 2

c) A server is designed to perform simple integer arithmetic operations : addition, subtraction multiplication and division. Client interacts with the server by using an RPC mechanism. In case of an error such as division by zero or arithmetic overflow, the server must suitably inform the client about the type of error. Describe the content of the call and reply the messages of this RPC application. Explain the purpose of each component. 6

d) Differentiate between stateless and state full server. Why some distributed application uses stateless server in spite of the fact that state full server provide more efficiency than stateless server ? 4

9. a) Design a finite state automata illustrating 3-phase commit protocol. 7

b) Consider a system with three sites employing two-phase commit protocols. Illustrate a situation where in a site may not be able to arrive at a consistent decision concerning the outcome of the transaction in the event of site failures. Assume that a site can communicate with any other operating site to check the outcome of transaction. 8

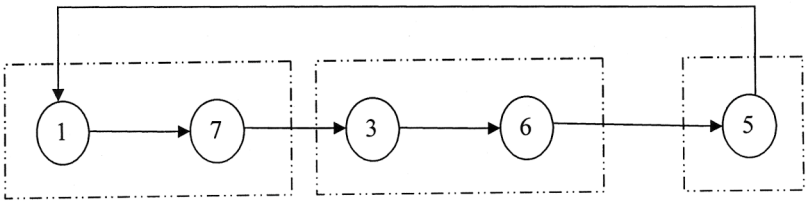
10. a) What are the approaches are taken for improving the efficiency of access matrix ? 3

b) What are the advantages and disadvantages of capabilities ? 7

c) Explain the state transitions and restrictions in Bel LaPadula model. 5

11. a) Why is detection of deadlock in distributed system more involved than in a centralized system ? What is a pantom deadlock ? 3 + 2

b) Describe the distributed deadlock detection algorithm and so how it can be applied to the following system to detect the deadlock. 10



12. Write short notes on any *three* of the following : 3 × 5

a) Bully Algorithm

b) Difference between network system and distributed system.

c) Necessary and desirable properties of Mutual exclusion algorithm.

d) Atomic action

e) Embedded System.