Time : 3.00 Hrs. **Marks : 80**

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Attempt any **three** questions out of the remaining **five** questions.
(3) Assumptions made should be clearly stated.
(4) **Figures** to the **right** indicate **full** marks.
(5) **Assume** suitable **data** whenever required but **justify** the same.

1. a) Differentiate between NFA and DFA. 5
b) Compare and contrast Moore and Mealy machines. 5
c) Explain variants of Turing Machine. 5
d) Show that the following grammer is ambiguous :
S --> aSbS | bSaS | ε . 5

2. a) Convert the following RE into NFA with ϵ- moves and hence obtain the DFA :
RE = (0 + ϵ) (1 0)*(ϵ + 1) . 10
b) Consider the following grammer G = { V , T , P , S) , V = { S , X } , T = { a , b } and productions P are : S --> aSb | aX
X --> Xa | Sa | a .
Convert the grammer in Greibach Normal Form. 10

3. a) Construct PDA accepting the language L = { $a^{2n}b^n$ | n >= 0 } . 10
b) Construct TM to check well formedness of parenthesis. 10

4. a) Design Mealy machine to recognize r = (0 + 1) * (00 + 11) and then convert it to Moore machine. 10
b) Consider the following grammer :
S --> i C t S | i C t S e S | a
C --> b .
For the string " ibtaeibta" , find the following :
i) Left most derivation ,
ii) Right most derivation ,
iii) Parse tree ,
iv) Check if the above grammer is ambiguous or not. 10

5. a) Design a Turing machine that computes a function f(m,n) = m + n , the addition of two integers. 10
b) Give the formal definition of pumping lemma for regular language and then prove that the following language is not regular :
L = { 0^m1^{m+1} | m > 0 } . 10

6. Write short note on following (Any two) : 20
a) Chomsky Hierarchy.
b) Decision properties of regular languages.
c) Rice's theorem.
d) Definition and working of PDA.

Time: 3 Hours **Marks: 80**

Note: Q.N. 1 is compulsory. Solve any three from Q.N, 2 to Q.N. 6

Q1. Solve any Four out of Five **(5*4=20 marks)**

a. Explain the need of layering in reference model for communication and networking?
b. Explain one bit sliding window protocol.
c. Explain IPv4 header format with diagram.
d. Differentiate between TCP and UDP.
e. What is the need of DNS? Explain DNS Name Space.

Q2. Attempt the following **(10*2=20 marks)**

a. Explain following transmission medias - Twisted Pair, Coaxial Cable (baseband and broadband), Fiber Optic.
b. What is channel allocation problem? Explain CSMA/CD protocol. Consider building a CSMA/CD network running at 1Gbps over a 1-km cable with no repeaters. The signal speed of the cable is 200,000 km/sec. What is the minimum frame size?

Q3. Attempt the following **(10*2=20 marks)**

a. Explain Classful and Classless IPv4 addressing.
b. Explain TCP connection establishment and TCP connection release.

Q4. Attempt the following **(10*2=20 marks)**

a. Explain Selective Repeat Protocol for flow control.
b. Explain shortest path (Dijkastra's Algorithm) routing algorithm.

Q5. Attempt the following **(10*2=20 marks)**

a. A large number of consecutive IP address are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation.
b. Explain Slow-Start algorithm for TCP's congestion handling policy.

Q6. Attempt the following **(10*2=20 marks)**

a. Explain DHCP message format and its operation in detail.
b. Explain ARP protocol in detail.

****

Duration: 3hrs **[Max Marks: 80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly

Q.1 Solve **any FOUR**

a. What are the features of React? **(5)**

b. What are benefits of using JSON over XML **(5)**

c. List and Explain Session Tracking Techniques **(5)**

d. Differentiate between HTML and HTML5 **(5)**

e. Give Characteristics of RIA **(5)**

Q.2 a. Write a JavaScript to check password and confirm password are same or not. **(10)**

b. Explain Servlet Life Cycle with neat diagram. **(10)**

Q.3 a. What is AJAX? Explain AJAX Web Application model with neat diagram. **(10)**

b. What is JSX? Write JSX attributes with example. **(10)**

Q.4 a. Explain the structure of XML Documents with example. **(10)**

b. What is inheritance in CSS? Explain CSS Animation properties. **(10)**

Q.5 a. Explain the steps to connect Java Application to Database using JDBC. **(10)**

b. Explain the features of PHP and Write a PHP Program to print Factorial of number. **(10)**

Q.6 a. Explain Document Object Model in detail **(10)**

b. Explain <audio> and <video> elements in HTML5 with example **(10)**

****

Time: 3 Hours **Marks: 80**

Note: 1. Question No. 1 is compulsory
2. Attempt any Three Questions Out of remaining five questions.
3. Draw neat diagrams wherever necessary.

Q1. Solve any Four 20
a. Explain the CMM model
b. Explain the Requirements model.
c. Explain the LOC.
d. What are the design principles.
e. Explain the software testing process.
f. Discuss the different level of DFD.

Q2. A. Explain Risk and its types? Explain the steps involved in setting up or generating RMMM plan. 10
B. Explain the Spiral model of software development. 10

Q3. A. Explain the general format of SRS. 10
B. Explain the FP Estimation techniques in details. 10

Q4. A. Explain cohesion and Coupling. Explain different types with detailed example. 10
B. Explain the different techniques in white box testing. 10

Q5. A. Explain steps in version and change control. 10
B. Explain software reverse engineering in detail. 10

Q6. Solve any Four 20
a. Compare FTR and Walkthrough
b. What are the different types of maintenance?
c. What are the design Principles.
d. Explain the tracking and scheduling.
e. Explain the Scenario based model.
f. Compare Scrum and Kanban