(2½ hours) Total Marks: 60

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any two* of the following: 12

a. Explain the following:
i) Equal cost load sharing ii) Non-equal load sharing iii) Recursive table lookup

b. Explain the difference between Interior Gateway Protocol and Exterior Gateway Protocol.

c. What is routing protocol? What basic procedures should routing algorithm perform? Why do routing protocols use metrics?

d. What are sequence numbers? Explain Linear, Circular and Lollipop shaped sequence number spaces.

2. Attempt *any two* of the following: 12

a. Explain the two types of link state advertisements which are new in OSPFv3 and not in OSPFv2.

b. Explain the OSPF neighbourships over the following:
i) Frame Relay Point to Point Subinterfaces ii) MPLS VPN iii) Metro Ethernet

c. Explain how database exchange takes place with and without a designated router.

d. What are the different challenges when OSPF uses multipoint Frame relay subinterfaces?

3. Attempt *any two* of the following: 12

a. Explain the impact of network address translation on IPv4 address assignment.

b. Explain in detail the requirements for forming eBGP neighbourships.

c. Explain the different BGP path attributes that affect the best path algorithm.

d. What is policy based routing? What are the functions of policy based routing?

4. Attempt *any two* of the following: 12

a. Explain the features of dynamic trunking protocol and its encapsulation types.

b. Explain fast convergence in OSPF. What are the parameters that control the OSPF LSA propagation? Explain.

c. Enumerate the characteristics of multiprotocol label switching at Layer 2 and Layer 3. What are the considerations that must be taken into account when designing customer multiprotocol label switching virtual private networks?

d. What are the Quality of Service Considerations in Enterprise Campus Network Design?

5. Attempt *any two* of the following: 12

a. Discuss High availability and failover times in data centers.

b. Enumerate the benefits and drawbacks of Layer 3 access layer designs.

c. Explain the SAN protocol stack.

d. Explain IPSec virtual private networks.

(2½ hours) [Total Marks: 60

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1. Attempt *any two* of the following: **12**

a. Write a short note on i) Internet of Things (IOT) ii) Cyber-Physical System (CPS).
b. With the help of diagram, explain the Architecture of Computer Cluster and list the various issues while designing the Computer Cluster.
c. Define Cloud Computing and describe the three service models of Cloud.
d. State Amdahl's. Law. Explain the problem with fixed overload and how the fixed overload problem is solved.

2. Attempt *any two* of the following: **12**

a. What is Virtualization? State the different levels of virtualization implementation with the help of diagram.
b. Explain the middleware and support for virtualization.
c. Explain the public, private and hybrid cloud with an example.
d. Explain Infrastructure as a Service with an example.

3. Attempt *any two* of the following: **12**

a. With the help of diagram, Explain the architecture, functional modules and application of Google App Engine (GAE).
b. State the formal definition of MapReduce. Explain the logical Data flow in MapReduce with the help of diagram.
c. Explain the different data and software protection techniques used in cloud environment.
d. What is Hadoop? Explain the architecture of MapReduce in Hadoop.

4. Attempt *any two* of the following: **12**

a. With the help of diagram, explain the Google File System (GFS).
b. Explain the tablet location hierarchy in BigTable.
c. What is Amazon Simple Storage Service (S3)? Explain the execution environment of Amazon Simple Storage Service(S3)
d. What is Nimbus cloud? Explain the Nimbus cloud Architecture.

5. Attempt *any two* of the following: **12**

a. Explain the following i) Grid 5000 ii) Open Cirrus.
b. Explain how the quality of service is calculated in cloud computing.
c. State the different types of applications of Social networks.
d. What is Twitter? With the help of diagram explain the Twitter's Architecture.

(2½ hours)

Total Marks: 60

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1. Attempt *any two* of the following: 12

a. Construct an EER model for an Airline Database Company. Company database contains passengers, departures, employers of airline and aircraft, flight, departure, Employees for passengers Name, Address, Phone Number, Email and other related information to be stored. For Employees company wants to record Name, Address, Salary, Identification Number, Flight information.
Note: All employees can fly aircraft but just the pilots for all the employees are required to record qualification for example-kind of plane they fly. For plane it required to record model and manufacturers of the plane.
Airline has many aircraft of a certain type for flight the airlines need to keep the information like numbers, origin, destination, departure, arrival time.
Note: That for the same source, destination there can be many flight per week (you can have relevant assumptions)
   i. Convert above ER Diagram into Relational Scheme.
   ii. Write any of the 3 typical queries.
   iii. Design object oriented Database schema
   -Passenger, Plane, Employees , Department.

b. Explain the concept of inheritance with suitable example.
c. What are abstract data types? Give syntax for the same.
d. Discuss different constraints with suitable examples.

2. Attempt *any two* of the following: 12

a. What is *type constructor*? Explain how it is implemented.
b. Discuss type objects with an example.
c. Explain persistent and transient object. How are they implemented?
d. Explain the architecture of object oriented database management system.

3. Attempt *any two* of the following: 12

a. Give comparison between OODBMS and ORDBMS with RDBMS.
b. Explain the features of SQL3.
c. Explain the concept of optimization.
d. Explain concept of extended types with suitable examples.

4. **Attempt *any two* of the following:** 12

a. Explain with suitable example implementation of horizontal fragmentation.

b. Elaborate the conceptual difference between fragmentation and replication.

c. What is Data Transparency? Explain types of transparencies that distributed data should achieve.

d. Write the necessary steps used to perform joins in parallel database.

5. **Attempt *any two* of the following:** 12

a. What is XQuery? Give its structure. Explain the syntax and example of sorting and functions in XQuery.

b. Explain the general architecture of Web Database.

c. What is Active Database? Explain factors that affect Active Database.

d. What is temporal database? Discuss the different types used to support temporal database. Write its syntax.

(2½ hours) Total Marks: 60

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(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any two* of the following: 12

a. What are hidden and exposed terminals? How do we solve the problems caused by hidden and exposed terminals?
b. Differentiate between portability and mobility. Give examples of portable mobile devices.
c. Explain direct sequence spread spectrum with suitable example.
d. Explain advanced frequency shift keying technique with an example.

2. Attempt *any two* of the following: 12

a. Explain the GSM structuring of frame hierarchy.
b. How do the inclination and elevation determine the use of satellite for communication?
c. State the characteristics and system architecture of a DECT network.
d. What is roaming? List and explain the steps for roaming between access points.

3. Attempt *any two* of the following: 12

a. What is Hiperlan? Explain.
b. Explain Digital Audio Broadcasting .
c. Write a short note on MAC and Location management.
d. Compare IEEE802.11, Hiperlan and Bluetooth with regards to ad-hoc capabilities. What are the focus areas of these technologies?

4. Attempt *any two* of the following: 12

a. What are the reasons for the development of Wireless ATM? Why did it not succeed as a standalone technology?
b. Explain Agent advertisement, registration and discovery of a mobile network layer.
c. Explain the handover reference model and its different types.
d. Write a short note on Radio Access layer.

5. Attempt *any two* of the following: 12

a. Explain how the indirect TCP (I-TCP) isolates problems on the wireless link. What are the main drawbacks of this solution in mobile network?
b. List the entities of Mobile IP and describe the data transfer from a mobile node to fixed node and where is encapsulation needed.
c. Name the mechanisms to improve web access for hand held devices? What is the common problem that leads to the development of WAP?
d. Explain the Wireless transaction protocol.
