

Question 1 (Compulsory) (20 Marks)

- (a) Highlight any four things in cloud computing that help in reducing the expenditure of an organization. *Size storage, Cost, Human expertise* [4 Marks]
- (b) Technologies that led to the evolution of Cloud computing include *cluster computing, grid computing, utility computing and autonomic computing*. Briefly describe each of the technologies and discuss the contribution of each technology towards the evolution of cloud computing. [16 Marks]

Question 2 (15 Marks)

- (a) Explain the *national institute of science and technology (NIST)* reference architecture of cloud computing in detail. [10 Marks]
- (b) List and briefly describe any three *cloud clients* that you know of. [5 Marks]

Question 3 (15 Marks)

- (a) Explain the roles of a *cloud service provider (CSP)*. *Providing services of cloud, Accessing of resources remote* [3 Marks]
- (b) List and describe four *security issues* in the cloud. *Sharing, Abuse of cloud* [4 Marks]
- (c) Briefly describe at least four basic *cloud security mechanisms* to counter the *security threats* that may be encountered in cloud services. *Hashing, Encryption* [8 Marks]

Question 4 (15 Marks)

- (a) What is *abstraction* and why is it important in cloud computing? [3 Marks]
- What is *virtualization* and why is it important in cloud computing? [6 Marks]

(c) Describe a *virtual machine monitor (VMM)*.

[3 Marks]

(d) List the requirements of a VMM.

[3 Marks]

Question 5 (15 Marks)

(a) What are *agents* and why are they important in cloud computing?

[3 Marks]

(b) The following are three common agent-based forms: *Monitoring agent*; *Resource agent*; *Polling agent*. Explain the roles of each of them.

[9 Marks]

(c) List any three of the five main *cloud infrastructures*.

[3 Marks]

logical Network Infrastructure