**Module 1**

1. Define cloud computing. Explain different notions used in cloud computing with help of a diagram. (7M)
2. What is the vision behind cloud computing? Show with the help of a diagram. (5M)
3. How Cloud computing is helping enterprises, governments, public, private institutions, and research organizations? (5M)
4. Explain a bird’s view in cloud computing with the help of a diagram. (3M)
5. Define major deployment models in cloud computing. How do they differ in their usage? (5M)
6. Illustrate cloud computing reference models in detail. (5M)
7. List characteristics of cloud computing. Explain at least five of them briefly. (7M)
8. Summarize the challenges involved in cloud computing. (3M)
9. Give an overview of the evolution of the distributed computing technologies that have influenced cloud computing. (7M)
10. What do you understand by virtualization in terms of cloud computing? (3M)
11. Explain web 2.0 in detail. (5M)
12. Label the services provided by the AWS. (3M)
13. What are the services provided by the Google Appengine? (3M)
14. Define Hadoop. Also list its services. (3M)
15. How Manjrasoft Aneka is helpful in cloud computing? (3M)
16. What are the benefits associated with the virtualization? Explain at least five of them. (5M)
17. Explain the virtualization reference model with the help of a diagram. (5M)
18. How emulation can be implemented with the help of virtualization? (3M)
19. List different taxonomy of virtualization technique. Explain it with the help of a diagram. (7M)
20. Illustrate hardware level virtualization with a diagram. (5M)
21. What is a hypervisor? Explain hypervisor reference architecture. (3M)
22. Distinguish between Full virtualization and Para virtualization. (3M)
23. Explain live migration and server consolidation with a diagram.
24. List the disadvantages of virtualization. Explain two of them. (3M)
25. What are the top threats to Cloud Computing as per Cloud Security Alliance? (3M)
26. With a neat diagram, explain full virtualization reference model. (5M)
27. What are the different parts of VMware workstation? Explain its architecture with a diagram. (5M)
28. Discuss the architecture of Microsoft Hyper-V in detail with the diagram. (7M)
29. What is parent partition? (2M)
30. Define cloud computing. Explain its characteristics and benefits. **(July 18, 5 Marks)**
31. List and explain pros and cons of virtualization. **(July 18, 5 Marks)**
32. Describe the main characteristics and benefits of cloud computing. (Jan 2020, 4 Marks)
33. With a neat diagram explain the cloud computing reference model. (Jan 2020, 6 Marks).
34. Explain the technologies on which cloud computing relies. (Jan 2020, 6 Marks)
35. Discuss classification or taxonomy of virtualization at different levels. (Jan 2020, 8 Marks).
36. Explain the architecture of Hyper V and discuss its use in cloud computing (Jan 2020, 08 Marks).

**Module 2**

1. What doestheacronym XaaS standfor? (2M)
2. What arethefundamentalcomponentsintroducedinthecloudreferencemodel? (5M)
3. Describe in a few words the main characteristics of Aneka. (3M)
4. What is the Aneka container and what is its use? (3M)
5. Which types of services are hosted inside the Aneka container? (3M)
6. Describe Aneka’s resource-provisioning capabilities. (5M)
7. Describe the storage architecture implemented in Aneka. (5M)
8. What is a programming model? (3M)
9. List the programming models supported by Aneka. (5M)
10. Which are the components that compose the Aneka infrastructure? (5M)
11. Discuss the logical organization of an Aneka Cloud. (5M)
12. Which services are hosted in a worker node? (3M)
13. Discuss the private deployment of Aneka Clouds. (3M)
14. Discuss the public deployment of Aneka Clouds. (3M)
15. Compare the characteristics of SaaS, PaaS and IaaS. (5M)
16. Explain IaaS in detail with the help of a diagram. (5M)
17. Discuss the three types of clouds in detail. (5M)
18. How does the hybrid cloud function? Show its architecture with the help of a diagram. (5M)
19. Explain the economy of the cloud. (3M)
20. What are the open challenges in the cloud computing? (3M)
21. Which is the lowest level of software stack in Aneka container? (2M)
22. List the different steps required to build Aneka clouds. (3M)
23. Discuss the different classes in Aneka application model. (5M)
24. Describe thereferencelifecycleofeachserviceinstanceintheAnekacontainer with a neat diagram. (5M)
25. Explain management tools with respect to the Aneka platform.
26. List the fundamental services in the Aneka middleware.
27. What is IaaS? Explain its reference implementation with a neat diagram**. (July 18, 8 Marks)**
28. Write a note on:
29. Community Cloud
30. Foundation Services in Aneka **(July 18, 8 Marks)**

29. With a neat diagram explain the PaaS reference model. 1. **(July 18, 8 Marks)**

1. Classify and explain various types of Clouds. (Jan 2020, 8 Marks)
2. Describe the fundamental features of the economic and business model behind cloud computing (Jan 2020, 08 Marks )
3. Explain three types of services that are hosted inside the Aneka Container. (Jan 2020, 8 Marks)
4. Describe the features of Aneka management tools in terms of infrastructures, platform and applications. (Jan 2020, 8 Marks).

**Module 3**

1. What isthroughputcomputingandwhatdoesitaimtoachieve? (5M)
2. What ismultiprocessing? Describethedifferenttechniquesforimplementingmultiprocessing. (5M)
3. What ismulticoretechnologyandhowdoesitrelatetomultiprocessing? (3M)
4. Briefly describethearchitectureofamulticoresystem. (3M)
5. What is multitasking in the cloud computing respect? (3M)
6. What ismulti-threadingandhowdoesitrelatetomultitasking? (5M)
7. Describe therelationshipbetweenaprocessandathread. (3M)
8. Does parallelismofapplicationsdependonparallelhardwarearchitectures? (2M)
9. Describe theprincipalcharacteristicsofathreadfromaprogrammingpointofviewandtheuses of threads for parallelizing application execution. (5M)
10. What is POSIX? (3M)
11. Describe the support given for programming with threads in new-generation languages such as Java or C#. (3M)
12. What dotheterms logical thread and physical thread refer to? (2M)
13. What are the common operations implemented for a thread? (3M)
14. Describe the two major techniques used to define a parallel implementation of computer algorithms. (3M)
15. What isan embarrassinglyparallel problem? (2M)
16. Describe how to implement a parallel matrix scalar product by using domain decomposition. (5M)
17. How does communication impact design and the implementation of parallel or distributed algorithms? (3M)
18. Which kind of support does Aneka provide for multithreading? (2M)
19. Describe the major differences between Aneka threads and local threads. (3M)
20. What are the limitations of the Thread Programming Model? (3M)
21. Design a parallel implementation for the tabulation of the Gaussian function by using simple threads and then convert it to Aneka threads. (5M)
22. What is a task? How does task computing relate to distributed computing? (3M)
23. List and explain the computing categories that relate to task computing. (3M)
24. What are the main functionalities of a framework that supports task computing? (3M)
25. List some of the most popular frameworks for task computing. (3M)
26. What doestheterm bag oftasks mean? (2M)
27. Give an example of a parameter sweep application. (3M)
28. What is MPI? What are its main characteristics? (2M)
29. Define thread. Explain the process and thread with a neat diagram. **(July 18, 5 Marks)**
30. List out differences between Aneka Thread and common thread. Explain any two of them in detail. **(July 18, 6 Marks)**
31. Explain PSA model with example. **(July 18, 5 Marks)**
32. Explain Aneka thread model with a simple application. **(July 18, 6 Marks)**
33. Describe the two major techniques used for parallel computing with threads. (Jan 2020, 8 Marks)
34. Explain the major differences between Aneka threads and local threads. (Jan 2020, 8 Marks).
35. List and explain popular frameworks for task computing. (Jan 2020, 8 Marks)
36. Explain the features provided by Aneka for the execution of parameter sweep applications. (Jan 2020, 8 Marks).

**Module 4**

1. What is a data-intensive computing? Describe the characteristics that define this term. (5M)
2. Provide an historical perspective on the most important technologies that support data- intensive computing. (3M)
3. What arethecharacterizingfeaturesofso-calledBigData? (3M)
4. List some of the important storage technologies that support data-intensive computing and describe one of them. (3M)
5. Describe the architecture of the Google File System. (3M)
6. What does the term NoSQL mean? (3M)
7. Describe the characteristics of Amazon Simple Storage Service (S3). (5M)
8. What is Google Bigtable? (2M)
9. What are the requirements of a programming platform that supports data-intensive computations? (3M)
10. What is MapReduce? Explain in detail. (5M)
11. Describe the kinds of problems MapReduce can solve and give some real examples. (5M)
12. List some of the variations on or extensions to MapReduce. (3M)
13. What are the major components of the Aneka MapReduce Programming Model? (3M)
14. How does the MapReduce model differ from the other models supported by Aneka and discussed in this book? (3M)
15. Describe the components of the Scheduling and Execution Services that constitute the runtime infrastructure supporting MapReduce. (5M)
16. Describe the architecture of the data storage layer designed for Aneka MapReduce and the I/O APIs for handling MapReduce files. (5M)
17. Design and implement a simple program that uses MapReduce for the computation of Pi. (5M)
18. Explain MapReduce scheduling service architecture. (3M)
19. List and briefly explain the Aneka MapReduce data file format with the help of a diagram. (5M)
20. Explain reducer design and its implementation. (3M)
21. What is data intensive computing? Describe the open challenges in the same**. (July 18, 5 Marks)**
22. Discuss the feature of GFS and Amazon Storage services**. (July 18, 5 Marks)**
23. Explain google map programming model. **(July 18, 5 Marks)**
24. What is data intensive computing? Explain the open challenges in data intensive computing. (Jan 2020, 8 Marks)
25. Explain IBM general parallel file system (GPFS), Google file system (GFS), and Amazon Simple Storage Service (S3). (Jan 2020, 8 Marks)
26. Explain the major components of the Aneka Map-Reduce programming model. (Jan 2020, 8 Marks)
27. Describe the architecture of the data storage layer designed for Aneka –Map-Reduce and I/O APIs for handling Map-Reduce Files. (Jan 2020, 8 Marks).

**MODULE 5**

1. What is AWS? What types of services does it provide? (5M)
2. Describe Amazon EC2 and its basic features. (3M)
3. What is a bucket? What type of storage does it provide? Explain in detail. (5M)
4. What are the differences between Amazon SimpleDB and Amazon RDS? (5M)
5. What type of problems does the Amazon Virtual Private Cloud address? (3M)
6. Introduce and present the services provided by AWS to support connectivity among applications. (5M)
7. What is the Amazon CloudWatch? (2M)
8. What type of service is AppEngine? (2M)
9. Describe the core components of AppEngine. (2M)
10. What are the development technologies currently supported by AppEngine? (3M)
11. What is DataStore? What type of data can be stored in it? (3M)
12. Discuss the compute services offered by AppEngine. (3M)
13. What is Windows Azure? (2M)
14. Describe the architecture of Windows Azure. (5M)
15. What is a role? What types of roles can be used? (5M)
16. What is AppFabric, and which services does it provide? (3M)
17. Discuss the storage services provided by Windows Azure in detail. (5M)
18. What is SQL Azure? (2M)
19. Illustrate the architecture of SQL Azure. (5M)
20. What is the Windows Azure Platform Appliance? For which kinds of scenarios was this appliance designed? (5M)
21. What are the types of applications that can benefit from cloud computing? (3M)
22. What fundamental advantages does cloud technology bring to scientific applications? (3M)
23. Describe how cloud computing technology can be applied to support remote ECG monitoring. (5M)
24. Describe an application of cloud computing technology in the field of biology. (5M)
25. What are the advantages cloud computing brings to the field of geoscience? Explain with anexample. (5M)
26. Describe some examples of CRM and ERP implementations based on cloud computing technologies. (3M)
27. What is Salesforce.com? (2M)
28. What are Dropbox and iCloud? Which kinds of problems do they solve by using cloud technologies? (3M)
29. Describe the key features of Google Apps. (3M)
30. What are Web desktops? What is their relationship to cloud computing? (3M)
31. What is the most important advantage of cloud technologies for social networking applications? (3M)
32. Provide some examples of media applications that use cloud technologies. (3M)
33. Describe an application of cloud technologies for online gaming. (3M)
34. With a neat diagram explain the google app engine platform architecture. **(July 18, 6 Marks)**
35. Describe how cloud computing can be applied to support ECG monitoring. **(July 18, 5 Marks)**
36. Explain Microsoft windows azure platform architecture with a neat diagram. **(July 18, 5 Marks)**
37. Explain Amazon S3 key concepts. (Jan 2020, 8 Marks)
38. Describe the core components of Google AppEngine. (Jan 2020, 8 Marks).
39. Describe how cloud computing technology can be applied to support remote ECG monitoring. (Jan 2020, 8 Marks)
40. Describe three examples of CRM and ERP implementations based on cloud computing technologies. (Jan 2020, 8 Marks )

**Some additional questions**

1. Explain the security risks associated with Cloud computing. (3M)
2. What are the top threats to Cloud Computing as per Cloud Security Alliance. Explain (5M)
3. Explain the surfaces of attacks in a cloud computing environment. (3M)
4. Discuss the top concerns for cloud users w.r.t security. (3M)
5. Define privacy? What are the main aspects of privacy? (5M)
6. Explain the four widely accepted fair information practices for preserving privacy (5M)
7. Discuss the challenges associated in establishing trust in the Internet (3M)
8. What are the benefits of  capturing sharing the state of an OS in a Virtual Machine (3M)
9. Explain the direct implications of virtualization on security (5M)
10. Analyze the three types of security risks posed by shared images (3M)
11. Explain the design of a trusted virtual machine monitor (5M)
12. Explain the different IP addresses of a virtual machine running under Amazon EC2 (5M)
13. Illustrate the step by step process to launch an EC2 Linux instance from a Linux Platform (3M)
14. What are the benefits of a cloud based service for trust management (3M)
15. Mention the challenges associated with Cloud Computing (3M)
16. Discuss the different categories of Cloud applications with examples. (5M)
17. Comment on the different Architectural styles for cloud applications (3M)
18. What are tasks and workflows? Explain the attributes of a task. (5M)
19. Explain different Workflow patterns (5M)
20. What are the differences between cloud workflows and traditional transaction oriented systems? (3M)
21. What are the policies and mechanisms for Resource Management? Explain. (5M)
22. Justify the usage of control theory to perform Resource Management. (3M)
23. Explain SQF algorithm with an example. (5M)
24. Diagnose optimization of power consumption through coordination among managing modules. (5M)
25. Explain low theory dispatching algorithm for real time applications (5M)
26. Explain two-level control architecture for Resource Management. (5M)
27. Illustrate the two workload partitioning rules in detail. (3M)
28. Explain distributed algorithm for CRN in detail (5M)
29. Write a note on virtualization (3M)
30. Explain layering and virtualization using suitable diagrams (5M)
31. Differentiate between virtual machines and virtual machine monitors (5M)
32. Write a note on performance and security violation (3M)
33. Differentiate between virtualization and para virtualization.(3M)
34. Write a note on hardware support for virtualization (3M)