Name: Inzamam  
ID# 12998  
Paper: Cloud Computing  
  
Question No.1:  
a. Explain essential characteristics of cloud computing.  
  
Ans:  
1. Cost Reduction: If we use cloud computing, cost must be reduced because we will contact a cloud provider and get some resources on rent. It results in saving time, reduce hard work, you will get well attention on your business. If we do not use cloud computing, we will need to buy softwares and hardwares and to maintain them and to think about their security risks, it will be so burden.

2. Device and Location Independence: If we are present anywhere in the world and if we have high speed internet connection we can access cloud computing on any device we have. Cloud computing removes restrictions, you can use it on any type of device.  
  
3. On-demand Self Service: In on-demand self service we borrow resources from cloud computing on rent. We will pay according to how much time we need or use those resources.  
  
4. Security: If we use private cloud, we will be provided by high security. If we use public cloud, it will also provide security but comparatively low because public cloud is open enough and there is much sharing in it.

5. Reliability: If there is an error or failure occurs than cloud environment will automatically enhanced it because cloud is a modular structure.

b.  
  
Ans:  
Key Properties Of Cloud Computing  
1. Cloud Computing Is User Centric: Everything that is present or available in the cloud you can access them once you are connected to the cloud, for example, messages, photos, applications etc. You can also share those with others.  
  
2. Task Centric: Cloud computing is becoming popular and traditional applications like spreadsheets, email etc are now less important as compared to the documents that cloud creates.  
3. Accessible: Cloud is always working, users can access the data present in the cloud at any time anywhere. Users are not restricted to cloud, cloud is unlimited source of data.  
  
4. Programmable: In order to protect data, the information that is present on one computer must be present on other computers in a cloud so that if one computer disconnect, cloud will automatically reallocate that computer’s data to another new computer in the cloud.  
  
5. Intelligent: The data that is present on the computer in a cloud, to access that data, data mining and analysis are required in an intelligent manners.  
  
Question No.2:  
a.   
  
Ans: Service Models Of Cloud Computing:  
1.Infrastructure as a Service(IaaS):  
Suppose there is an owner of a flat and he want to give it on rent. That owner is the cloud provider and the man he want to give the flat on rent is the customer and for how much time he use the flat, he will give rent to the owner. The flat that the owner wants to give to the customer is an infrastructure. The owner told him its on you, how you shape it, how you use it. He will get freedom of how to utilize it, how to maintain it. IaaS will provide you an operating system, either you choose windows or linux etc. It also have a virtual storage in which data is stored. Whenever you demand an IaaS, you will be provided by an IP address. Enhanced scalability and flexibility is the features of cloud and IaaS is the model of cloud so these two will be also provided during IaaS.  
  
2. Software as a Service(SaaS): Lets take a real life example, we order food from the cafe, you do not need to worry about the how the food is been cooked, who is cooking and what is been cooked. You just have to order the food and wait for the delivery and you don’t need to have details of the delivery man, you just have to give the payment. All the service are provided by them you just have to utilize the resources. SaaS is just used by the end-users. The users are not given much control and access to the operating system, nor networking etc. The users are not given details about how the data stored, where and when, how many servers are used, how many machines are used. The users will just use the service.

3. Platform as a Service(PaaS): lets take the above example, instead of ordering the food you will need to go to the café by yourself. The café is now your platform. SaaS used by the developers. It will provide us a runtime environment, developing tools, programming languages and to use all of these we can develop an application and can deploy it. In PaaS you do not have access to operating system but have access to user interface.

b.  
Ans: Deployment Models Of Cloud Computing

1. Public Cloud: Public cloud is open to everyone. Everyone can access it, there is much openness in public cloud. Everyone has freedom to utilize it. It is deployed globally. It is not much secure and is not costly.  
For example: Facebook, Google etc.  
  
2. Private Cloud: Private cloud is for a specific or particular institute or organization, it is not for public use. Private cloud is deployed locally. Private cloud is well secure but expensive.  
For example: Datacenter.  
  
3. Hybrid Cloud: Hybrid cloud is the combination of public and private cloud. Critical activities that you won’t share publicly are performed using public cloud and non-critical activities that can be shared with others are performed using public cloud.  
For example: Amazon Web Services.

* Question No. 3:  
  a.  
    
  Ans: Roles and Boundaries in Cloud  
    
  1. Cloud Provider: An organization or institute that provide cloud resources is the cloud provider.  
    
  2. Cloud Consumer: A cloud consumer is firm or a person that has a contract or agreement with a cloud provider to use their resources provide by the cloud provider.  
    
  3. Cloud Service Owner: The organization or a person that owns services of cloud legally is the cloud server owner.  
    
  4. Cloud Resource Administrator: An organization or the person that administrate cloud services or resources.  
    
  Additional roles in cloud are,  
  .Cloud Auditor  
  .Cloud Broker  
  .Cloud Carrier  
    
  5.Organizational Boundary: It represents a physical perimeter that has a bunch of resources nearby it, that are owned by the organization.  
    
  6. Trust Boundaries: Trust boundaries represents logical perimeter that spill around physical boundaries to know which resources of the cloud are trusted.  
    
    
  b.  
  Challenges:  
    
  Ans: Risks and Challenges in Cloud  
  1. Security and Privacy: Our data that is stored on the cloud is the responsibility of the cloud service provider to provide the security to our data. Cloud provider should secure three things, that is data integrity, data availability and data confidentiality . If the cloud provider secure these things so you can say that your data is secured. The next thing, the cloud provider’s IP address should not be revealed to the outer world as well as the operating system that is used by the end-user should not be known by the third party.  
    
  2. Reliability and Availability: Availability means the data that is stored by the user on the cloud should be available 24/7, the software on the cloud should be available 24/7, and resources that demand by the user should also be available 24/7. Reliability means, if something bad happens to your data on the cloud, it is not your concern, you just have to pay for it for a specific time. It is the service provider’s responsibility to make reliable the service you used and secure it.  
    
  3. Portability: Portability means the ability to migrate something from one place to another. Suppose you have a Google platform and you stored GBs of data there than you can migrate the data to other service like Amazon Web Service.  
    
  4. Service Quality: In service quality if you are a paid user of cloud service than you deserve to have a good service, like if you demand a resource it should be available for 24/7. The service provider should provide you a good Graphical User Interface(GUI).  
    
  Risks:
* You will need a high speed internet connection to access cloud otherwise your server might be timed out.
* If the data that you stored on the cloud get errors than you might lost your data.
* If your server is not well secure than it might be hacked and in result you will lost data.