

**School of Electrical, Electronics and Communication Engineering**

**Course Code : BEEE4001**

**Course Name: Smart Grid and Energy Mngement**

# **UNIT V**

## **Cloud Computing**

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**Name of the Faculty: Dr. Shagufta Khan**

**Program Name: B.Tech**

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## Contents

1. Introduction
2. Assistance from Cloud Computing
3. **Real Time power quality monitoring**
4. References

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## INTRODUCTION

- Smart grid is a technological innovation that improves efficiency, reliability, economics, and sustainability of electricity services. It plays a crucial role in modern energy infrastructure.
- The main challenges of smart grids, are how to manage different types of front-end intelligent devices such as smart meters efficiently.

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Course Code : BEEE4001

Course Name: Smart Grid and Energy Mngement

- How to process a huge amount of data received from these devices.
- Cloud computing, a technology that provides computational resources on demands, is a good candidate to address these challenges.
- It has several good properties such as energy saving, cost saving, agility, scalability, and flexibility.

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Course Code : BEEE4001

Course Name: Smart Grid and Energy Mngement

- There are several challenges that prevent smart grids deployment at a larger scale one of which is
  - Information management that is related to information gathering, information storing, and information processing.
  - The estimation of amount of data required to process transactions of 2 million customers could reach 22 gigabytes per day.
  - Any delay may cause a serious consequence in the whole system which has to be avoided as much as possible.

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Assistance from Cloud Computing

- Cloud computing has become popular recently due to several advantages over traditional computing models.
- By employing cloud computing in smart grids, we not only address the issue of large information management but also provide a high energy saving platform.
- Our basic idea is to build the framework at three hierarchical levels: top, regional, and end- user levels in which the first two levels consist of computing centres while the last level contains end-user smart devices

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Course Code : BEEE4001

Course Name: Smart Grid and Energy Management

- The top cloud computing center takes responsibility of managing general devices and accumulation of data across the regional cloud computing centers
- The regional cloud computing centers are in turn in charge of managing intelligent devices smart meters.
- In each of these cloud computing centers, the following cloud computing services could be deployed, which are
  - Infrastructure-as-a-service (IaaS).
  - Software-as-a-service (SaaS).
  - Platform-as-a-service (PaaS).
  - Data-as-a-service (DaaS).

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Course Code : BEEE4001

Course Name: Smart Grid and Energy Management

- Infrastructure-as-a-service (IaaS)

This type of service forms the backbone of the system. It helps to provide resources on demand for all applications and services deployed in the system.

Main tasks of information management in smart grids such as information gathering, information processing, and information storing, are all executed inside this layer of service.

- Platform-as-a-service (PaaS)

PaaS provides tools and libraries to develop cloud computing applications and services.

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## REAL TIME (POWER QUALITY) MONITORING SYSTEM

This permanent monitoring system has the following components :

### 1) Measurement instruments

- Involves both the voltage recorder and disturbance analyser.
- Has a trigger circuit to detect events.
- Includes a data acquisition board to acquire all the triggered and sampled data.

### 2) Monitoring workstation

- Used to gather all information from the measuring instruments.
- Periodically send information to a control workstation.

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