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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST 1**

**Winter Semester:** 2021 - 22

**Course Code:** EEE 223

**Course Name:** Introduction to Smart Grid Technology (OE-1)

**Program & Sem:** B. Tech & VI Sem

**Date:** 27<sup>th</sup> April 2022

**Time:** 10:00 AM to 11:00 AM

**Max Marks:** 30

**Weightage:** 15%

**Instructions:**

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each Question carries TWO marks.**

**(5Qx 2M=10M)**

1. In smart grid technology, give any one primary analysis tool of EMS. (C.O.No.1) [Knowledge]
2. During Interfacing the communication networks in smart grid, which is the hardware interface between SCADA master station and field devices? (C.O.No.1) [ Knowledge]
3. which of the following feature the smart grid is used for distributed generation  
(a) Self-healing  
(b) Open Architecture  
(c) Plug and Play  
(d) Wide area management (C.O.No.1) [Knowledge]
4. Give any two key drivers of Indian customers for smart grid initiatives. (C.O.No.1) [Knowledge]
5. State any two objectives of power distribution reforms of Indian utilities. (C.O.No.1) [ Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each Question carries FOUR marks.**

**(3Qx 4M=12M)**

6. In network communication in the smart grid, which is the critical field device in the Implementation of EMS? Indicate where it is placed ? (C.O.No.1) [Comprehension]
7. In smart grid technology, explain the level of adoption of microprocessor based device for the communication in smart grid. (C.O.No.1) [Comprehension]
8. Smart grid plays an important role in modern smart technologies. Put yourself as an expert of smart grids, summarize the characteristics and challenges you will take into consideration for the formation of smart grid. (C.O.No.1) [Comprehension]

### Part C [Problem Solving Questions]

**Answer the Question. Question carries EIGHT marks.**

**(1Qx 8M=8M)**

9. In the process of formation of the smart grid, there are always pros and cons of a solution. Distinguish those as related to the smart grid? (C.O.No.1) [Comprehension]



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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST 2**

**Winter Semester:** 2021 - 22

**Course Code:** EEE 223

**Course Name:** Introduction to Smart Grid Technology

**Program & Sem:** B. Tech & VI Sem

**Date:** 2<sup>nd</sup> June 2022

**Time:** 10:00 AM to 11:00 AM

**Max Marks:** 30

**Weightage:** 15%

**Instructions:**

- (i) *Read the all questions carefully and answer accordingly.*
- (ii) *Question paper consists of 3 parts.*
- (iii) *Scientific and Non-programmable calculators are permitted*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each Question carries TWO marks.**

**(5Qx 2M=10M)**

1. For the 3-bit ADC, the voltage range is 1.6 V (-0.8 to 0.8). Calculate the resolution of the ADC. (C.O.No.2) [Knowledge]
2. In communication topologies of smart grid, calculate the ratio of signal power to noise power for a given Signal to Noise Ratio (SNR) of 30db. (C.O.No.2) [ Knowledge]
3. In smart grid technology, give any two key components of the performance of communication channels. (C.O.No.2) [Knowledge]
4. Give any two roles of Phase measurement unit in smart grid technologies. (C.O.No.2) [Knowledge]
5. In smart grid, Demand source Integration is used for the purpose of
  - (a) peak load power generation
  - (b) power loss minimization
  - (c) Network layer
  - (d) Session layer(C.O.No.2) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer both the Questions. Each Question carries FOUR marks.**

**(2Qx 6M=12M)**

6. In network communication in the smart grid, Switching techniques are used to establish a link between a Source and a Destination and to transmit data across a shared medium communication channel. Differentiate the virtual and datagram packet switching technique. (C.O.No.2) [Comprehension]

7. In smart grid technology, explain the level of adoption and type of communication through the smart metering. Tabulate the benefits in short and long term of the advanced metering clearly.

(C.O.No.2) [ Comprehension]

**Part C [Problem Solving Questions]**

**Answer the Question. Question carries EIGHT marks.**

**(1Qx 8M=8M)**

8. Electrical engineer has to suggest the implementation of DSI to calculate the percentage reduction in energy loss for the transmission line of  $5+j10 \Omega$  as shown in Fig.1. The 33/11 kV transformer has a non-load tap changer which maintains the load voltage at 11 kV if load shifting shown in Fig.2 is managed.

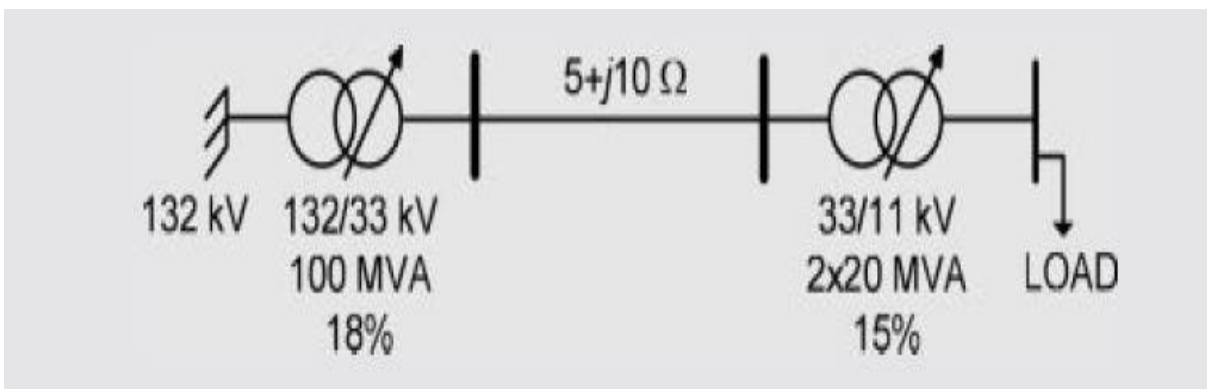


Fig.1

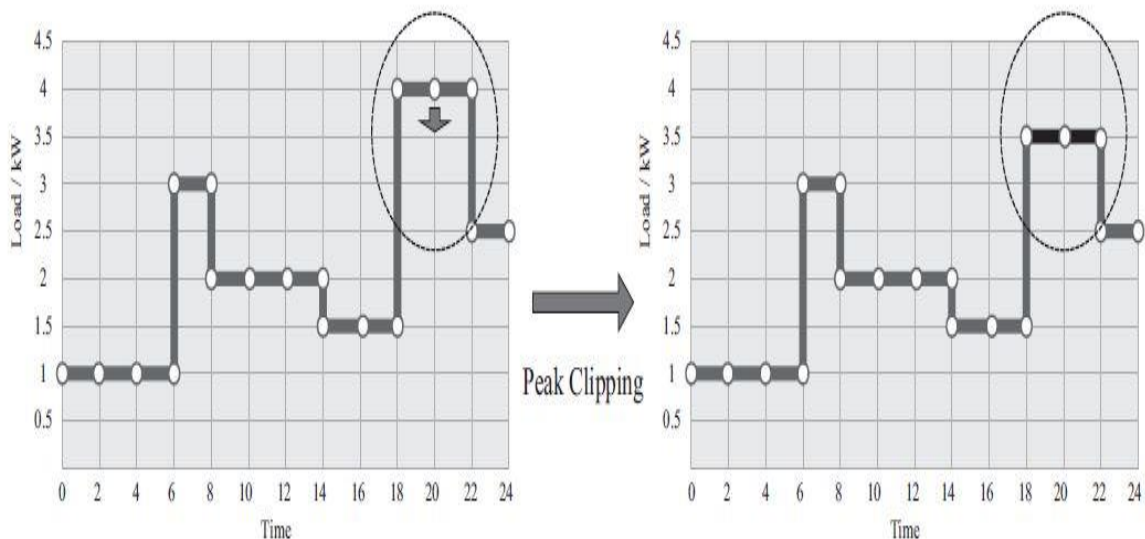


Fig.2

(C.O.No.2) [Comprehension]



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BENGALURU**

**SCHOOL OF ENGINEERING**

**END TERM EXAMINATION**

**Winter Semester:** 2021 - 22

**Course Code:** EEE 223

**Course Name:** Introduction to Smart Grid Technology (OE-1)

**Program & Sem:** B. Tech & VI Sem

**Date:** 1<sup>st</sup> July 2022

**Time:** 9:30 AM to 12:30 PM

**Max Marks:** 100

**Weightage:** 50%

**Instructions:**

- (i) *Read the all questions carefully and answer accordingly.*
- (ii) Scientific and Non-programmable calculators are permitted

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each Question carries FOUR marks.**

**(5Qx 4M=20M)**

- Q.NO.1. The traditional electrical power grid is unidirectional in nature, where the electricity flows from power generation facilities to end users. This system has served well for the last hundred years. Write about the challenges of the modern smart grid.  
(C.O.No.1) [ Knowledge]
- Q.NO.2. In smart grid, communication protocols provide the means to exchange data electronically and can be viewed as electronic languages. Write about the smart grid communication protocols.  
(C.O.No.2) [ Knowledge]
- Q.NO.3. Describe the phase measurement unit (PMU) used in the smart energy systems with neat diagram.  
(C.O.No.4) [Knowledge]
- Q.NO.4. In smart metering Analog to digital converter (ADC) is used for converting digital data to analog data. For the 8-bit ADC, the voltage range is 8V (-4 to 4). Calculate the resolution of the ADC.  
(C.O.No.2) [Knowledge]
- Q.NO.5. Describe the compressed air energy storage (CAES) energy storage system for smart grid energy Technology.  
(C.O.No.3) [ Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each Question carries EIGHT marks.**

**(5Qx 8M=40M)**

- Q.NO.6. As control system architecture plays an increasingly important role in critical infrastructure, the importance of the role of Supervisory Control and Data Acquisition (SCADA) technicians will increase in the coming years as well. Write the importance of SCADA in the modern smart grid.  
(C.O.No.1) [Comprehension]

Q.NO.7. A smart meter uses the same 16-bit analogue to digital converter for both current and voltage measurements. It uses a 200 : 5 A CT for current measurements and 415: 10V potential divider for voltage measurements. When the meter shows a current measurement of 50 A and a voltage measurement of 400 V, what is the maximum possible error in the apparent power reading due to the quantisation of the voltage and current signals? (C.O.No.2) [Comprehension]

Q.NO.8. In smart grid technology, explain the level of adoption and type of communication through the smart metering. Tabulate the benefits in short and long term of the advance metering clearly. (C.O.No.3) [Comprehension]

Q.NO.9. In network communication in the smart grid, switching techniques are used to establish a link between a Source and a Destination and to transmit data across a shared medium communication channel. Differentiate the virtual and datagram packet switching technique. (C.O.No.1) [Comprehension]

Q.NO.10. In india for smart grid development, several smart energy resources are developed. Write the different smart energy storage Techniques with pros and cons. (C.O.No.3) [Comprehension]

### Part C [Problem Solving Questions]

Answer both the Questions. Each question carries TWENTY marks. (2Qx 20M=40M)

Q.NO.11. Electrical engineer has to suggest the implementation of DSI to calculate the percentage reduction in energy loss for the transmission line of  $5+j10 \Omega$  as shown in Fig.1. The 33/11 kV transformer has a non-load tap changer which maintains the load voltage at 11 kV if load shifting shown in Fig.2 is managed.

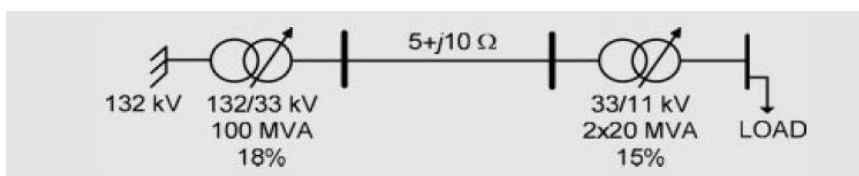


Fig.1

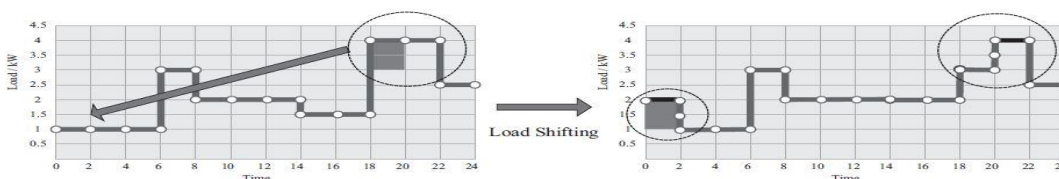


Fig.2

(C.O.No.2) [Comprehension]

Q.NO.12. For the power system shown in Fig.3, draw the network diagram giving all reactance's on 100 MVA base. Calculate the fault current in pu and in amperes for three-phase short-circuit fault at C. All pre-fault voltages are at 1.0 pu. Ignore any effect of system loads.

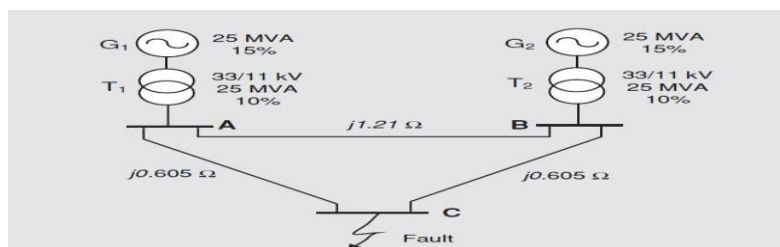


Fig.3

(C.O.No.4) [Comprehension]