Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE403

Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Compare smart grid with conventional utility grid.	(5)
2		Explain how the real and reactive powers are controlled in a power electronic inverter based energy source.	(5)
3		What is a smart meter, used in smart grid? List the features.	(5)
4		List any five key features of smart energy efficient end use devices.	(5)
5		Write short note on the design considerations of Sensor and Actuator Networks (SANET).	(5)
6		Describe the characteristics of AMI?	(5)
7		Write short notes on Distortion Index (DIN).	(5)
8		How Cloud computing is useful in a smart grid?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9		Draw and explain the typical configuration of an AC microgrid.	(10)
10		With the help of block diagrams, explain the classification and working of micro turbines.	(10)
11	a)	Explain the components of an Ultra capacitor. Mention its advantages and disadvantages.	(5)
	b)	Explain the working flywheel energy storage (FES) system.	5

PART C

Answer any two full questions, each carries 10 marks.

12		Draw and explain the National Institute of Standards and Technology (NIST) Smart grid reference architecture. Explain its various domains.	10
13	a)	What do you mean by islanding of microgrid? List the different islanding scenarios in microgrid.	5

b) What is load shaping? What are the advantages? 5

14 A power station has the following daily load cycle 10

Time(Hr)	0-5	5-11	11-13	13-16	16-22	22-24
Load(MW)	15	25	40	30	35	25

Draw the load curve and determine (i) Maximum demand (ii) Total energy units generated per day (iii) Average load (iv) Load factor

PART D

Answer any two full questions, each carries 10 marks.

15 What is Feeder Automation? List and explain the different components of Feeder Automation. 10

16 a) Explain with neat sketches the basic architecture of smart substation. 7

b) Enumerate various advantages of smart substation 3

17 List and explain various power quality issues with smart grids. 10

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: EE403

Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		What is a microgrid? List the characteristics.	(5)
2		Explain the merits and demerits of a solar PV plant.	(5)
3		Why conventional over current relays may slowly respond or fail to operate in stand-alone Microgrid with significant number of microsources and power electronic interfaces? Justify.	(5)
4		A power generating station has a connected load of 80MW and maximum demand of 52MW. The total energy generated annually is 90×10^6kWh. Calculate the demand factor and load factor.	(5)
5		List various components of Advanced Metering Interface (AMI).	(5)
6		Describe the challenges and benefits of Home Area Network(HAN).	(5)
7		List the advantages of cloud computing.	(5)
8		What are the various sources of harmonics in a smart grid?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	Explain with diagram, the working of energy router based interconnecting frame work for the microgrid system.	(7)
	b)	What is the function of Energy Management module in a microgrid configuration?	(3)
10	a)	With help of a neat sketch, explain a typical microgrid configuration.	(6)
	b)	Discuss the factors which necessitate the development of smart grid technology.	(4)
11	a)	Explain the voltage control method in a microgrid with a Q-V diagram.	(5)
	b)	Explain the load frequency control in micro grid with a P-f diagram.	(5)

PART C

Answer any two full questions, each carries 10 marks.

12 a) Write a short note on the Plug in Hybrid Electric Vehicle Technology describing the architectures. (5)

b) What is a Phasor Measurement Unit(PMU)? How PMUs improve the operational efficiency of smart grid? (5)

13 Explain in detail, the load shaping objectives and methodologies. (10)

14 a) Illustrate the role of technology in demand response. (6)

b) What are the challenges in implementing demand side management in smart grid? (4)

PART D

Answer any two full questions, each carries 10 marks.

15 a) Explain with diagram, about IEC 61850 substation architecture. (5)

b) Write down the transmission protocol of IEC 61850. (5)

16 a) Explain the role of NAN in smart grid technology. (5)

b) Draw the cloud architecture of a smart grid. (5)

17 Briefly explain various harmonic indices. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EE403

Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		What is an active distribution network? Explain its relevancy in microgrid system.	(5)
2		Explain the operation of a lead acid battery and mention its merits and demerits.	(5)
3		Draw the block diagram of an Automated Meter Reading(AMR) system and write the functions of each block.	(5)
4		Define Energy management. What is the significance of energy management?	(5)
5		Explain briefly the benefits AMI?	(5)
6		What are the different advantages of smart substations over conventional substations?	(5)
7		What are the various types of clouds?	(5)
8		List the various power quality disturbances in the grid.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9		Draw and explain the typical configuration of a DC microgrid.	(10)
10	a)	Explain the role of central controller in stand-alone and grid connected mode of operation of microgrids.	(5)
	b)	Explain the control functions of micro-resource controller (MC).	(5)
11		Explain the working and operation of different Wind Energy Conversion Systems. Also mention the advantages and disadvantages.	(10)

PART C

Answer any two full questions, each carries 10 marks.

12	a)	Draw the block diagram and explain the working of Phasor Measurement Unit(PMU).	5
	b)	What is a smart sensor? Using block diagram, explain the different components	5

of a smart sensor.

13		Explain different scenarios related to the islanding of microgrid?	10
14	a)	A power station has a maximum demand of 35MW, a plant capacity factor of 50%, a plant use factor of 70% and load factor of 60%. Determine (i) Reserve capacity (ii) Daily energy produced (iii) Maximum energy that can be produced daily if the plant runs as per the schedule.	7
	b)	Justify the statement 'Greater the diversity factor, the lesser is the cost of generation of power'.	3

PART D

Answer any two full questions, each carries 10 marks.

15	a)	Explain the application of SANET in Smart Grid	5
	b)	List the SANET actors and explain the requirements of these for different Smart Grid applications.	5
16		List and explain the various harmonic sources in grid.	10
17	a)	Explain cloud computing infrastructure.	5
	b)	Explain with neat sketch cloud computing architecture	5

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Reg No.:_____ **00000EE403121903** Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech degree examinations (S), September 2020

Course Code: EE403

Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Discuss the technical and economical advantages of microgrid.	(5)
2		Discuss the working principle and operation of ultra capacitor with necessary diagram.	(5)
3		Comment on the impact of DG integration on electricity market and distribution system.	(5)
4		Discuss the significance and characteristics of load curve.	(5)
5		Discuss the role of Sensor and Actuator Networks (SANETs) in smart grid implementation.	(5)
6		With a neat block diagram explain the Home Area Network (HAN) and its scope in successful implementation of smart grid.	(5)
7		Classify cloud computing based on its deployment and service.	(5)
8		Discuss the various harmonic sources and its effect on power quality.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9		Draw the layout of typical micro grid and explain the components in detail.	(10)
10	(a)	Explain the functions of Central Controller in microgrid.	(5)
	(b)	Explain how active and reactive power control is performed in Microgrid.	(5)
11	a)	What is distributed generation? Explain how it enhances the performance of utility grid.	(5)
	b)	Elaborate the concept of load sharing through power-frequency control in microgrid.	(5)

PART C

Answer any two full questions, each carries 10 marks.

12		Give the layout and explain in detail the NIST architecture of smart grid and discuss the role of various domains and actors.	(10)

13		Explain the various objectives and methodologies of load shaping with relevant waveforms.	(10)
14	a)	Discuss various electricity tariff schemes employed in utility grid.	(5)
	b)	Define (i) Maximum demand (ii)Diversity factor (iii) Plant Capacity factor (iv) Load Factor and (v) Utilization factor	(5)

PART D

Answer any two full questions, each carries 10 marks.

15		Explain the key components and architecture of smart substation.	(10)
16		Explain with suitable diagram (i) Private (ii) Public and (iii) Hybrid cloud computing	(10)
17	(a)	Explain various components of Feeder Automation.	(5)
	(b)	Elaborate the characteristics of Cloud Computing.	(5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

Course Code: EE403

Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Discuss the opportunities, challenges and benefits of smart grids.	(5)
2		Draw the conceptual diagram of Combined Heat Power system and list any two advantages and disadvantages.	(5)
3		Elaborate the impact of increased penetration of distributed generation in distribution system.	(5)
4		Illustrate role of technology in demand response in DSM.	(5)
5		Discuss the role of Sensor and Actuator Networks (SANETs) in smart grid implementation.	(5)
6		Discuss the features of Advanced Metering Infrastructure.	(5)
7		Draw and explain the architecture of cloud computing.	(5)
8		Explain how transients affect the power quality.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9		With neat sketches, explain the various interconnection configurations of DC microgrid in detail.	(10)
10		List the various Distributed Energy Resources and explain the operation of any two types with relevant diagrams.	(10)
11	a)	Explain the technical and economical advantages of Microgrid.	(5)
	b)	Explain the function of Central Controller (CC) in microgrid.	(5)

PART C

Answer any two full questions, each carries 10 marks.

12	(a)	List the advantages and disadvantages of integration of Plug-In hybrid EV into the utility grid.	(5)
	(b)	Discuss the Intelligent Electronic Devices and their application for monitoring and protection.	(5)

13	(a)	With a neat block diagram, elaborate working of smart sensors. Discuss the various deployment schemes with typical examples for each.	(5)
	(b)	How demand side management can be implemented in smart grid?	(5)
14	a)	With a neat block diagram explain the features of smart meter. Elaborate the features that can play an important role in smart grid implementation.	(5)
	b)	A power station supplies the following loads to various consumers Industrial Consumer =1500kW, Commercial establishment = 750kW, Domestic power =100kW and Domestic Lighting = 450kW. If the maximum demand on the station is 2500kW and the units of kWh generated per year is 45x105, determine (i) the diversity factor, (ii) average load and (iii) annual load factor.	(5)

PART D

Answer any two full questions, each carries 10 marks.

15		With neat diagram, discuss in detail the various components of a smart substation.	(10)
16		Classify cloud computing based on its deployment and service. Propose suitable cloud architecture for smart grid.	(10)
17	(a)	Describe the challenges and benefits of Home Area Network (HAN).	(5)
	(b)	Discuss the short duration and long duration power quality events with neat illustrations.	(5)

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