Visvesvaraya Technological University

"Jnana Sangama", Belagavi - 590 018

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Ref No. VTU/Aca/A9/2019-20/ 266

Date: 9 APR 2019

Circular

Sub: Blow up syllabus & Model Question Paper for VIII Semester subject **15EE833 – Integration of Distributed Generation**

Ref: Proceedings of the BOS meeting in Electrical & Electronics Engineering held on 27-3-2019 at VTU, Belagavi

With reference to the above, please find enclosed herewith Blow up syllabus & Model Question Paper for VIII Semester subject **15EE833 – Integration of Distributed Generation, for your information and reference.**

Further, it is requested to bring this circular to the notice of the concerned teaching faculty of your college and inform to follow the same.

By order,

Encl: as above

Registrar (I/c)

09.4.19

To
The Principals of all Engineering Colleges affiliated and the constituent Engineering College, VTU, Belagavi

Copy to:
1. The Registrar (Eval.), VTU, Belagavi
2. The Special Officer, VTU's Regional Offices at Bengaluru, Belagavi, Kalaburagi and Mysuru.
3. In-Charge CNC, 'Jnana Sangama', VTU, Belgaum for uploading in the website.

Integration of Distributed Generation(15EE833)
BLOW UP SYLLABUS

Topics as per Syllabus	Contents to be covered	Hours	Remarks
Module 1 (Distributed Generation)			
Introduction, Sources of Energy Wind Power	1 Introduction 2.1.1 status 2.1.2 Properties of wind power 2.1.6 Power Distribution as a function of wind speed	1	➢ Power system units ➢ Reasons for introducing new type of production ➢ Meaning of Distributed Generation
Solar Power	2.2.1 Status 2.2.2 Properties 2.2.3 space requirements 2.2.4 Photovoltaic's 2.2.7 Seasonal variation in production capacity	2	
Combined Heat-and-Power	2.3.1 Status 2.3.2 Options for space Heating 2.3.3 Properties	2	
Hydropower	2.4.1 Properties of Large Hydro 2.4.2 Properties of small Hydro 2.4.3 Variation with time	1	
Tidal Power	2.5 Tidal Power	1	
Wave Power	2.6 Wave Power	1	
Geothermal Power	2.7 Geothermal Power		
Thermal Power Plants.	2.8 Thermal Power Plants		
Module-2(Distributed Generation, Power System Performance & Overloading and Losses)			
Distributed Generation (continued) Interface with the Grid.	2.9.1 Direct Machine Coupling with the Grid 2.9.2 Full Power Electronics Coupling with the Grid 2.9.3 Partial power electronics coupling to grid 2.9.4 Distributed Power Electronics Interface 2.9.5 Impact of the Type of Interface on the Power System 2.9.6 Local Control of Distributed Generation	2	
Power System Performance: Impact of Distributed Generation on the Power System Aims of the Power System, Hosting Capacity Approach	3.1Impact of distributed generation on the power system 3.1.1 Changes Taking Place 3.1.2 Impact of the Changes 3.2 AIMS of the power system 3.3 Hosting capacity approach	1	
Power Quality	3.4 Power quality 3.4.1 Voltage Quality 3.4.2 Current Quality	1	

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Integration of Distributed Generation(15EE833) **BLOW UP SYLLABUS**			
Topics as per Syllabus	**Contents to be covered**	**Hours**	**Remarks**
	3.4.3 Multiple generator tripping		
Design of Distributed Generation	3.5 Voltage quality and design of distributed generation 3.5.1 Normal Operation; Variations 3.5.2 Normal Events 3.5.3 Abnormal Events	1	
Hosting Capacity Approach for Events	3.6 Hosting capacity approach for events	1	
Increasing the hosting capacity	3.7 Increasing the hosting capacity		
Overloading and Losses: Impact of Distributed Generation	4.1 Impact of distributed generation		
Overloading: Radial Distribution Networks, Overloading: Redundancy and Meshed Operation	4.2.1 Active Power Flow Only 4.2.2 Active and Reactive Power Flow 4.3.1 Redundancy in Distribution Networks 4.3.2 Meshed Operation	1	Excluding numericals
Losses	4.4 Losses	1	Excluding case study&numericals
Module-3 (Overloading and Losses & Voltage Magnitude Variations)			
Overloading and Losses (continued): Increasing the Hosting Capacity.	4.5.1 Increasing the Loadability 4.5.2 Building New Connections 4.5.3 Intertrip Schemes 4.5.4 Advanced protection Schemes 4.5.5 Energy Management Systems 4.5.6 Power Electronics approach 4.5.7 Demand Control 4.5.9 Prioritizing Renewable Energy 4.5.10 Dynamic Loadability	2	Excluding numericals
Voltage Magnitude Variations: Impact of Distributed Generation	5.1 Impact of Distributed Generation	1	
Voltage Margin and Hosting Capacity	5.2.1 Voltage Control in Distribution Systems 5.2.2 Voltage Rise Owing to Distributed Generation 5.2.3 Hosting Capacity 5.2.6.Estimating hosting capacity without Measurements 5.2.8 Sharing hosting capacity	2	Excluding numericals
Design of Distribution	5.3.1 Basic Design Rules 5.3.2 Terminology	1	Excluding numericals

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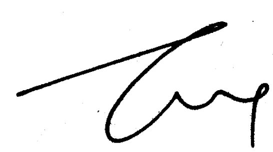
Integration of Distributed Generation(15EE833) **BLOW UP SYLLABUS**			
Topics as per Syllabus	**Contents to be covered**	**Hours**	**Remarks**
Feeders	5.3.3 An Individual Generator Along a Medium-Voltage Feeder 5.3.4 Low voltage feeders 5.3.5 Series and Shunt Compensation		
A Numerical Approach to Voltage Variations	5.4.1 Example for Two-stage Boosting 5.4.2 General Expressions for Two-Stage Boosting	1	
Tap Changers with Line-Drop Compensation	5.5.1 Transformer with One Single Feeder 5.5.2 Adding a Generator		
Probabilistic Methods for Design of Distribution Feeders.	5.6.1 Need for Probabilistic Methods 5.6.2 The System Studied 5.6.8 Generation with Constant Production 5.6.9 Adding Wind Power	1	
Module-4 (Voltage Magnitude Variations & Power Quality Disturbances)			
Voltage Magnitude Variations (continued): Statistical Approach to Hosting Capacity	5.7 Statistical approach to Hosting Capacity	1	
Increasing the Hosting Capacity.	5.8.1 New or Stronger Feeders 5.8.2 Alternative Methods for Voltage Control 5.8.3 Accurate Measurement of the Voltage Magnitude Variations 5.8.4 Allowing Higher Overvoltage's 5.8.6 Overvoltage Protection 5.8.7 Over Voltage Curtailment 5.8.9 Compensating the generators voltage variations 5.8.10 Distributed generation with voltage control 5.8.11 Coordinated voltage control	4	Excluding numericals
Power Quality Disturbances: Impact of Distributed Generation	6.1 Impact of Distributed Generation	1	
Fast Voltage Fluctuations, Voltage Unbalance.	6.2 Fast Voltage Fluctuations 6.2.1 Fast Fluctuations in Wind Power 6.2.2 Fast Fluctuations in Solar Power 6.2.3 Rapid Voltage Changes 6.2.4 Very Short Variations 6.3 Voltage Unbalance 6.3.1 Weaker Transmission System 6.3.2 Stronger Distribution System 6.3.3 Large Single-Phase Generators	2	Excluding numericals

Integration of Distributed Generation(15EE833)

BLOW UP SYLLABUS

Topics as per Syllabus	Contents to be covered	Hours	Remarks
Module-5 (Power Quality Disturbances Continued)			
Low-Frequency Harmonics	6.4 Low-Frequency Harmonics 6.4.1 Wind Power: Induction Generators 6.4.2 Generators with Power Electronics Interfaces 6.4.3 Synchronous Generators 6.4.4 Measurement Example 6.4.5 Harmonic Resonances 6.4.5.1 Parallel & Series resonance 6.4.5.2 Practical example 6.4.5.3 Induction generator 6.4.6 Weaker Transmission Grid 6.4.7 Stronger Distribution Grid		Excluding numericals
High-Frequency Distortion	6.5 High-Frequency Distortion 6.5.1 Emission by Individual Generators 6.5.2 Grouping Below and Above 2 kHz 6.5.3 Limits Below and Above 2 kHz	2	Excluding numericals
Voltage Dips	6.6 Voltage Dips 6.6.1 Synchronous Machines: Balanced Dips 6.6.2 Synchronous Machines: Unbalanced Dips 6.6.3 Induction generators and unbalanced dips.	2	Excluding numericals
Increasing the Hosting Capacity	6.7 Increasing the Hosting Capacity 6.7.1 Strengthening the Grid 6.7.2 Emission Limits for Generator Units 6.7.3 Emission Limits for Other Customers 6.7.4 Higher Disturbance Levels 6.7.5 Passive Harmonic Filters 6.7.6 Power Electronics Converters 6.7.7 Reducing the Number of Dips 6.7.8 Broadband and High-Frequency Distortion	2	
END			

Textbook				
1	Integration of Distributed Generation in the Power System	Math Bollen	Wiley	2011



Dr. G. H. Kulkarni
Chairman BOS(EEE)
VTU Belagavi

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USN | | | | | | | | | | **15EE833**

Eighth Semester B.E. Degree Examination, XX/XX2018-19

Integration of Distributed Generation

Time: 3 Hours **Max. Marks: 80**

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module - 1

1 a. List the different reasons for new type of power production in the power system **(08 Marks)**

b. Explain persuasively how power is produced from wind list out the properties of wind power **(08 Marks)**

OR

2 a. Enumerate the main barriers to the wide scale use of renewable energy **(08 Marks)**

b. Briefly explain the different MPPT algorithms incorporated within the interface technology **(08 Marks)**

Module –2

3 a. With a neat figure explain two possible schemes of interfacing distributed generation to grid. **(08 Marks)**

b. Discuss four different approaches to prevent DG interfering with the ability of power system to fulfill its primary aims. **(08 Marks)**

OR

4 a. Explain direct machine coupling with the grid **(08 Marks)**

b. Write a note on power quality concerned to distributed generation **(08 Marks)**

Module –3

5 a. Outline Intertrip schemes used during connecting large generator unit into the network **(08 Marks)**

b. Briefly explain, how voltage magnitude variations impacts the design of distributed generation **(08 Marks)**

OR

6 a. Explain Knowledge Server for Controllers (KSC) used in energy management system **(08 Marks)**

b. Explain basic design rules of distribution feeders **(08 Marks)**

Module - 4

7 a. Discuss how strong feeders increase the hosting capacity. **(08 Marks)**

b. List the various power quality disturbances developed due to distributed generation **(08 Marks)**

OR

8 a. Explain the dynamic voltage control used for increasing the hosting capacity **(08 Marks)**

b. Explain two main sources of unbalanced voltage at transmission level **(08 Marks)**

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Module –5

9 a. What is the maximum permissible voltage distortion according to IEEE standard and briefly explain low frequency harmonics in distributed generation

(08 Marks)

b. Summarize high frequency distortion as power quality disturbance

(08 Marks)

OR

10 a. List the causes of voltage dips in distributed generation

(08 Marks)

b. Outline the measures required to increase the hosting capacity when power quality disturbance sets the limit to distributed generation interconnection

(08 Marks)