

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: EEE**

**SEMESTER: VII
SESSION: MO/2023**

SUBJECT: EE605R1 MICROGRID OPERATION AND CONTROL

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Enumerate the different types of microgrid structures. What are the control and protection requirements in a microgrid system?	[5] 1	1
Q.1(b)	Draw the generalized layout of AC microgrid and explain its architecture.	[5] 1	1,2
Q.2(a)	Draw the electrical model of a PV cell and derive its governing equations. How do I_{sc} and V_{oc} depend on I_p ? Justify.	[5] 5	2
Q.2(b)	With proper mathematical equations and flow chart explain the incremental conductance method of MPPT. What are the factors that affect MPPT algorithm?	[5] 3	2
Q.3(a)	Draw the simple schematic of frequency and voltage droop controller. Also draw the frequency and voltage droop characteristics in grids with dominant inductive behavior. How will these characteristics be modified for resistive grids?	[5] 4	2
Q.3(b)	With the help of block diagram showing input, output, objective, and constraint, explain the process of energy management system (EMS). Enlist the objective functions used for EMS in microgrids.	[5] 3	2
Q.4(a)	Draw the conceptual structure of the virtual synchronous generator. Why there is low inertia in a microgrid system? What are its negative impacts.	[5] 4	3
Q.4(b)	Write the equations used for developing the state-space model of the VSG. Also, draw the general block diagram of the VSG system.	[5] 4	2
Q.5(a)	Define non-detection zone in Islanding detection? Discuss any three passive islanding detection techniques in brief.	[5] 5	2
Q.5(b)	Justify the requirement of load shedding in emergency control of microgrid? Discuss any two load shedding algorithms with the help of flowchart.	[5] 5	4,2

:::23/11/2023 M:::