

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

**CLASS: BTECH  
BRANCH: EEE**

**SEMESTER: VII  
SESSION: MO/2025**

**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)	Draw the electrical circuit representation of AC, DC and AC/DC hybrid microgrid. Enumerate different technologies for distributed generation and mention their typical available size range.	[5] 1	2
Q.1(b)	Describe the interconnection of renewable energy sources with microgrids and discuss the key challenges involved. Also discuss the technical and economical advantages of microgrid.	[5] 1	3
Q.2(a)	What is MPPT? Discuss its algorithm. Draw the electrical model of a PV cell and derive its governing equations. How does $I_{sc}$ and $V_{oc}$ depends on $i_p$ ? Justify	[5] 2	3
Q.2(b)	Discuss the complete modelling of Entire PV energy conversion system with the help of average modelling and governing equations.	[5] 2	4
Q.3(a)	Differentiate between primary, secondary, and tertiary control in hierarchical microgrid control architecture.	[5] 3	2
Q.3(b)	Discuss Droop control method in inverter based DG connected system when the grid is inductive, resistive and general case.	[5] 3	3
Q.4(a)	Discuss the major issues faced if unintentional islanding remains undetected?	[5] 3	4
Q.4(b)	Explain the conceptual structure of the virtual synchronous generator. Why there is low inertia in a microgrid system? What are its negative impacts?	[5] 3	4
Q.5(a)	What is the purpose of Emergency control in a microgrid? Discuss any two load shedding algorithms with the help of flowchart.	[5] 4	2
Q.5(b)	Define non-detection zone in Islanding detection? Discuss any three islanding detection techniques in brief.	[5] 4	3

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