

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

CLASS: M.Tech.
BRANCH: ALL

SEMESTER : III
SESSION : MO/2025

SUBJECT: EE595 SMART GRID

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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Q.1(a)	Define Smart Grid concept and discuss the different qualities that it brings to the power system operation.	[5] 1	1
Q.1(b)	Discuss and explain that solar current is a drift current. Explain the PV characteristics of a solar cell.	[5] 1	2
Q.2(a)	Discuss in detail the wind energy conversion system and prove that mechanical power $P_m = \frac{1}{2}\rho AV_\alpha^3 C_p$ which is transmitted to the shaft.	[5] 2	2
Q.2(b)	Explain the control strategies of changing power from a wind turbine. Also discuss the way of extracting maximum electrical power from wind turbine system.	[5] 2	2
Q.3(a)	Explain the responsibilities of the source connected to the grid using proper equations and figures while the voltage and frequency of the grid change.	[5] 3	2
Q.3(b)	Discuss the current controller required to vary the active and reactive power of the grid-tied source. Explain the necessities of the $\alpha\beta$ and dq conversion in controlling the power.	[5] 3	3
Q.4(a)	Explain the working of the Transmission Control Protocol (TCP), describing its connection establishment, reliability, and flow/congestion control mechanisms. Also discuss its role and importance in Smart Grid communication systems.	[5] 4	2
Q.4(b)	Differentiate between a Piconet and a Scatternet in Bluetooth networks. Explain the role of master and slave devices in each.	[5] 4	2
Q.5(a)	Discuss the advantages of Demand Response Programs implemented in power systems.	[5] 5	2
Q.5(b)	Discuss Different Demand Response Programs.	[5] 5	2

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