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

CLASS: M.TECH **SEMESTER : II**
BRANCH: EEE **SESSION : SP/2025**

SUBJECT: EE567 SMART GRID TECHNOLOGY

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.

			CO	BL
Q.1(a)	Define a Smart Grid. What are the major differences between a traditional power grid and a smart grid?	[5]	1	2
Q.1(b)	Describe the evolution of Smart Grids and explain the key components of a Smart Grid with a neat diagram.	[5]	1	2
Q.2(a)	A number of 100Ah, 5V lead acid batteries are available in the c-rates of C20, C10, C5, and 2C. For the given load pattern of Load 1: 60 W day and night continuous at 40 V DC. Load 2: water pump: 5 times daily for 1 hr. duration each time, the slots are: two times before sunrise, one at noon and 2 times after sunset. The load has an average running current of 4 A at 40 V DC. Depending upon the load profile, determine the suitable PV array size and c-rate of the battery.	[5]	2	4
Q.2(b)	Design a Boost Converter based current controlled battery charging system.	[5]	2	5
Q.3(a)	Explain the role and working of Phasor Measurement Units (PMUs) in a Wide Area Monitoring System.	[5]	3	4
Q.3(b)	Consider a current signal having 50Hz fundamental frequency sampled at 1000 Hz sampling frequency. Estimate the digital relay operation to identify the 3rd order harmonic component using half cycle DFT based phasor estimation.	[5]	3	4

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12
i(n)	0	3.82	7.07	9.23	10	9.23	7.07	3.82	0	-3.82	-7.07	-9.23

Q.4(a)	Discuss Wireless Personal Area Network and all its components in brief. Explain OFDM based multiband approach of spectrum distribution used for UWB.	[5]	4	4
Q.4(b)	Discuss the UHF narrow band technology used in IEEE802.11. Also, compare I-TCP, snooping TCP and M-TCP.	[5]	4	4
Q.5(a)	What is Demand Response (DR)? Explain various types of DR programmes and their benefits to utilities.	[5]	5	3
Q.5(b)	Analyze the operation of a Boost converter-based dc-dc power interface used for MPPT control of a PV module with suitable sketch and waveforms with their limitations.	[5]	4	5

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