

Name:	
Enrolment No:	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**Online End Sem Examination, June 2021**

<b>Course: Smart &amp; Micro Grid</b>	<b>Semester: II</b>
<b>Programme: M.Tech Energy System &amp; M.Tech REE</b>	<b>Max Marks:100</b>
<b>Course Code: EPEC 8005</b>	<b>Duration : 3 Hrs.</b>

S. No.		Marks	CO
	<b>Section A</b>		
	Short Answer Question. Each Question carries 5 marks		
Q.1	a) Which parameters are defined for Load Bus b) Which parameters are defined for Generator Bus c) What is property of Slack Bus	<b>1+1+3</b>	<b>CO1</b>
Q.2	List any five constrains associated with Load Dispatch.	<b>5</b>	<b>CO1</b>
Q.3	Match the pair for Lithium Ion Batteries: A) CT                      P) Isolating Circuit                      (A) = (?) B) PT                      Q) Successive Approximation                      (B) = (?) C) Opto-coupler        R) Secondary Short Circuited                      (C) = (?) D) ADC                    S) Variable Gain                      (D) = (?) E) Modulation        T) step Down Transformer                      (E) = (?)	<b>1*5</b>	<b>CO2</b>
Q.4	Choose the correct relationship, related to load curve (P=Good Utilization factor, Q=Load Factor, R=Energy Consumed, S=Load Curve, T=Peak Load) A) Area under curve B) Flat curve C) Attentive Part D) Ratio of avg load to peak load: E) Reference tool for DSM (A=?, B=?, C=?, D=?,E=?)	<b>1*5</b>	<b>CO2</b>
Q.5	List five objective of IT infrastructure in Smart Grid.	<b>5</b>	<b>CO3</b>
Q.6	Comment on why PSK is most preferred mode of digital modulation in the area of Cellular Mobile phone.	<b>5</b>	<b>CO3</b>
	<b>Section B</b>		
	<b>Each Question carries 10 marks</b>		
Q.1	With neat block diagram, explain 132kV/33kV sub station automation system with the major equipment.	<b>10</b>	<b>CO4</b>
Q.2	Describe in details with associated diagram, the communication infrastructure used for AMI in Smart Grid	<b>10</b>	<b>CO2</b>

Q.3	'Smart Grid can be an effective and precise technological solution' justify the statement with associated challenges with present distribution system in India								10	CO1	
Q.4	A) With the help of a general load curve, write various challenges with Peak Load B) Explain the various types of ways of ToD metering and pricing.								5 5	CO4	
Q.5	Describe the need of cyber security for smart grid and basic encryption mechanism.								10	CO3	
<b>Section 'C'</b>											
<b>Long Answer Question (20 Marks)</b>											
Q 1	A textile industry with contract demand of 500 kW has the daily load curve as following:								20 M	CO5	
	Duration	0-3	3-5	5-9	9-12	12-15	15-18	18-22			22-24
	kW	160	185	215	300	250	290	320			300
	The Electricity tariff is flat tariff rate of Rs. 5/- Per unit, however the ToD rate varies as follows:										
	Time	% Rate Variation			Remark						
	0 to 6.00	Discount of 20%			Please note: Premium charges are 'Zero' if company is operating at below 50 % of Contract demand.						
	5.00 to 10.00	Premium of 5%									
10.00 to 16.00	Flat Rate										
16.00 to 18.00	Premium of 20%										
18.00 to 20.00	Critical Premium of 30%										
20.00 to 24.00	Premium of 10%										
The industry has various equipment and processes which requires Hot Water (28 kW for 20 hours a day), Compressor (45 kW for 09 hours a day), Spinning Spindles (55 kW, for 24 Hours), Power Looms (90 kW, 24 Hours), Bleaching Machines (20 kW for 12 hours a day), Cloth dryers (45 kW for 12 hours a day), Coloring equipment (20 kW for 4 hours a day), Lighting load (30 kW for 24 hours) etc. Company also have potential of 'possible waste heat recovery system', which can produce 30 kW (Maximum availability for 6 hours) @ cost of Rs. 5,00,000/-.(Neglect maintenance cost)											
Company has recruited you minimize of paying extra premium and possible bill minimization.											
Draft a Hypothetical proposal for same to be presented in front of management.											
Note: Graphpaper is not mandatory for load curves, use normal paper											
For reference the prevailing market rates are:											
1) Solar Power plant: Rs. 45,000/- Per kWp for grid interactive											

	<p>2) Solar Power Plant: Rs. 70,000/- per kWp with battery backup (Max. full load backup for 4 hours).</p> <p>3) The wind mill cost: Rs. 75,00,000/- for 50 kW machine.</p> <p>4) The diesel generation will cost Rs. 6,00,000/- for 100 kW, Cost of Generation will be Rs. 11.00 per unit.</p>		
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