

Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, May 2023			
Course: Performance Assessment of Electrical Equipment Program: B.Tech. – Renewable and Sustainable Energy Engg Course Code: EPEG 2023		Semester: IV Time: 03 hrs. Max. Marks: 100	
Instructions: All the questions are to be attended. The corresponding marks are mentioned.			
SECTION A (5Q x 4M = 20Marks)			
S. No.		Marks	CO
Q 1	Describe the role of electricity act 2003 for power reform in India	04	CO1
Q 2	Justify the power transmission at very high voltage.	04	CO1
Q 3	Calculate the transformer total losses for an average loading of 80%. Assume no load and full load losses as 0.9 kW and 7.3 kW respectively.	04	CO1
Q 4	Describe the effect of adding Capacitors for power factor improvement in a distribution network having Harmonics.	04	CO2
Q 5	Illustrate the reasons of Harmonic generation in a circuit.	04	CO2
SECTION B (4Q x 10M = 40 Marks)			
Q 6	<p>The contracted demand of a chemical plant is 1000 KVA. The average monthly MD recorded is 800 KVA only. The average monthly energy consumption is 1.6 lakhs unit. The utility bill analysis provides the following billing components.</p> <p>Minimum monthly billing demand is 80% of contracted MD or the actual recorded MD whichever is higher.</p> <p>Minimum power factor may be maintained is .9</p> <p>0.5% of unit charge for every .01 point below the .90 PF will be charged additionally as penalty.</p> <p>0.5% of the unit charge for every .01 point above the .95 PF will be given as an incentive for maintaining higher power factor.</p> <p>MD charge is Rs.300 per KVA.</p> <p>Energy charges are Rs. 4 per KWH</p> <p>Energy Manager of the plant has proposed to improve the power factor from 0.86 to 0.96 by adding capacitors in the distribution system.</p> <p>Determine the MD reduction in KVA</p>	10	CO1
Q 7	Provide the solutions for mitigating the harmonics in a circuit	10	CO2
Q 8	A fan operates at 900 RPM developing a flow of 3000 Nm ³ /hr. at a static pressure of 600 mmWC. What will be the flow and static pressure if the speed is reduced to 600 RPM.	10	CO4

Q 9	Explain the effect of Improved power factor on a DG set. OR Illustrate the energy saving opportunities in operation of a DG set	10	CO4
SECTION-C (2Q x 20M = 40 Marks)			
Q 10	Explain the mandatory requirements of the Energy Conservation Building Code. Also specify the Whole building performance method and role of EPI ratio.	20	CO5
Q 11	A centrifugal pump delivers 60 m ³ /s of water at a discharge pressure of 3 kg/cm ² g. The pump suction is 2 meters below the pump center line. Find out the power drawn by the motor if the pump efficiency is 70% and motor efficiency is 90%. OR Make detailed comparison of various starters (DoL, Star-Delta, Soft starter) for induction motor and highlight the special features / characteristics of soft starter.	20	CO3