Name: Enrolment No:	UPES

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

Progra	**: M.Tech. – Energy System**	**Semester**	**: II**
Course	**: Electrical Utilities**	**Time**	**: 03 hrs**
Course Code	**: EPEC 7015**	**Max. Marks**	**: 100**
Nos. of page(s)	**: 3**		

SECTION A

S. No.		Marks	CO
Q 1	A process plant consumes of 150000 kWh per month at 0.9 Power Factor (PF). What is the percentage reduction in distribution losses per month if PF is improved up to 0.96 at load end? (Write only Answer)	**5**	**CO2**
Q 2	Calculate the transformer total losses for a transformer loading at 60% and with no load and full load losses of 2 kW and 25 kW respectively. (Write only Answer)	**5**	**CO1**
Q 3	The waste heat potential for a 1100 kVA set at 800 kW loading and with 480 °C exhaust gas temperature is ____	**5**	**CO4**
Q 4	List down ten factors that need to be considered for DG set selection.	**5**	**CO4**
Q 5	The ILER of a room is 0.7. If the lighting load is 990W, calculate the annual energy wastage? Assume the Lights for room are ON for 8hrs/day for 300 days. (Write Only Answer)	**5**	**CO5**
Q 6	Give five advantages of new high frequency (28-32 kHz) electronic ballasts over the traditional magnetic ballasts.	**5**	**CO5**

SECTION B

Q 7	Explain in detail the different components of tariff structure.	**10**	**CO1**

Q 8	A 7.5 kW, 415 V, 14.5 A, 4 pole, 50 Hz, 3 phase rated squirrel cage induction motor has a full load efficiency and power factor of 89% and 0.88 respectively. An energy auditor measures the following operating data of the motor (a) Supply voltage = 410 V (b) Current drawn = 9.5 A (c) PF = 0.8 (d) Supply frequency = 49.8 Hz (e) RPM = 1480 Find out the following at the motor operating conditions: 1. Power input in kW 2. % motor loading 3. % slip	**10**	**CO3**
Q 9	Explain the function of Soft Starters in case of Induction Motor. Also explain its starting current and stress profile during starting with the help of diagrams.	**10**	**CO3**
Q 10	Discuss why maximum demand need to be controlled. Also, describe the options for controlling maximum demand.	**10**	**CO2**
Q 11	Discuss in detail step-by-step approach for assessing energy efficiency of lighting system.	**10**	**CO5**
	Section C		
Q 12	A Cooling Tower cools 1565 m^3/hr of water from 44º C to 37.6º C at 29.3º C wet bulb temperature. The cooling tower fan flow air rate is 989544 m^3/hr (air density =1.08 kg/m^3) and operates at 2.7 cycles of concentration. Find a) Range, b) Approach, c) % CT Effectiveness d) L/G Ratio in kg/kg e) Cooling Duty Handled in TR f) Evaporation Losses in m^3/hr g) Blow down requirement in m^3/hr h) Make up water requirement/cell in m^3/hr **OR** From the given cooling tower parameters, evaluate the following: i) Make up water requirement per day ii) Evaporation loss iii) Blow down loss Parameters: Cooling water temperature : 37^{O}C, Water flow rate through CT : 1260 m^3/h Outlet water temperature : 32 °C, Drift losses : 0.1 %, No. of concentrating cycles : 3	**20**	**CO4**