Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Performance Analysis of Electrical Equipment **Semester: VI**
Program: Int. B. Tech (ET) + LLB (IPR) **Time 03 hrs.**
Course Code: ETEG 322 **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Discuss in brief Tariff System.	**4**	**CO1**
Q 2	Explain the effect of Voltage fluctuation on performance of Induction motor	**4**	**CO2**
Q 3	Explain the effect of inlet air temperature on the performance of Compressed air system	**4**	**CO4**
Q 4	Explain the benefits & Challenges of LED over florescent Lamps	**4**	**CO5**
Q 5	Explain the procedure to measure Room Index.	**4**	**CO5**
	SECTION B		
Q 6	3- Phase, 415 V, 26 A, 4 pole, 50 Hz, Star connected squirrel cage induction motor has following recorded parameters: 1) Stator Resistance per Phase = 0.1 Ohm/Phase 2) Iron Losses = 2000 W 3) Friction & windage Losses = 25% of Iron Losses 4) Full load speed = 1440 RPM Calculate the Shaft Power Output	**10**	**CO3**
Q 7	A) Explain Energy Saving Opportunities in Refrigeration System B) A 5 Tonne refrigeration system creates a cooling effect of 25 kW and the corresponding input is 7.5 kw/tonne, calculate CoP	**5** **5**	**CO4**
Q 8	A) Explain the Power Stages through Sankey diagram in Compressed Air System B) In the leakage test in a process industry, following results were observed Compressor Capacity = 50 m^3/minute Average 'Load' time, T = 1.5 minutes Average 'Unload' time, t = 10.5 minutes Calculate the Leakage Quantity per day.	**5** **5**	**CO4**
Q 9	State and explain Fan Law (Variation of Flow, Pressure & Power w.r.t. Speed) OR Explain the Various Energy Saving Opportunities in Fans.	**10**	**CO4**
	SECTION-C		
	From the given Cooling Tower Parameters, Evaluate the following:	**20**	**CO4**

Q 10	A) Make up water requirement per Day B) Evaporation Loss C) Blowdown loss Cooling Water Circulation Rate= 1260 m^3/ hour. Cooling Water Temperature = 37 ^oC Outlet Water Temperature = 32 ^oC Drift Loss: 0.1 % No. of Concentrating Cycles : 3 OR Explain the procedure for performance assessment of Cooling Towers		
Q 11	An Engineering industry has lighting load of 60 kVA. The incoming supply voltage is 420 Volt during daytime and 433 V during nighttime. Lighting load during day time = 30 kVA…12 Hours Lighting load during night time = 60 kVA…..12 Hours Power factor of lighting feeder = 0.77 Energy cost = Rs. 5/kWh Energy manager has installed a 75 kVA lighting transformer. The lighting voltage is set to 200 V always. i) Find out the payback period if investment for transformer is Rs. 3,00,000 ii) Calculate the Percentage Energy Saving? **OR** A) Explain the good lighting practices. B) Explain the methodology for Lighting System Energy Efficiency Study.	**20**	**CO5**

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Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Discuss in brief, types of Consumers & their Priorities	**4**	**CO1**
Q 2	Explain the effect of Harmonics on Power System	**4**	**CO2**
Q 3	Discuss the Slip, Slip Speed, RMF & Torque related to IM	**4**	**CO3**
Q 4	Explain the importance of Energy Efficiency in Industries	**4**	**CO1**
Q 5	Explain the need and importance of Speed Control of IM	**4**	**CO3**
	SECTION B		
Q 6	3- Phase, 440 V, 75 A, 4 pole, 50 Hz, Star connected squirrel cage induction motor has following recorded parameters: 1) Stator Resistance per Phase = 80 mOhm/Ph at 27°C 2) Iron Losses = 1500 W 3) Friction & windage Losses = 500 W 4) Motor operating Temperature = 75°C Full load speed = 1430 RPM Calculate the operating Efficiency of Induction Motor	**10**	**CO3**
Q 7	A) Explain the factors affecting the performance of Refrigeration System B) A 10 Tonne refrigeration system creates a cooling effect of 45 kW and the corresponding input is 6.5 kw/tonne, calculate CoP	**10**	**CO4**
Q 8	A) Explain the Factors affecting Energy performance of Compressor System. **5** B) In the leakage test in a process industry, following results were observed Compressor Capacity = 60 m^3/minute Average 'Load' time, T = 2 minutes Average 'Unload' time, t = 13 minutes **5** Load Drawn = 225 kW Calculate the Specific Power Consumed.		**CO4**
Q 9	With neat diagram explain the performance variation of fans and affinity law. OR Explain the procedure to evaluate Energy Performance of Fans.	**10**	**CO4**
	SECTION-C		
Q 10	From the given Cooling Tower Parameters, Evaluate the following:	**20**	**CO4**

	A) Make up water requirement per Day B) Evaporation Loss C) Blowdown loss Cooling Water Circulation Rate= 1500 m^3/ hour. Cooling Water Temperature = 38 ^oC Outlet Water Temperature = 32 ^oC Drift Loss: 0.13 % No. of Concentrating Cycles : 4 OR Explain the Energy Saving Opportunities in Cooling Towers.		
Q 11	An Engineering industry has lighting load of 80 kVA. The incoming supply voltage is 415 Volt during daytime and 440 V during nighttime. Lighting load during day time = 40 kVA…12 Hours Lighting load during night time = 70 kVA…..12 Hours Power factor of lighting feeder = 0.8 Energy cost = Rs. 6/kWh Energy manager has installed a 100 kVA lighting transformer. The lighting voltage is set to 200 V always. A) Find out the payback period if investment for transformer is Rs. 4,00,000 B) Calculate the Percentage Energy Saving? **OR** A) Explain the possible energy potential in Lighting System B) Explain the methodology for good Lighting System design.	**20**	**CO5**