Name:

Enrolment No:

UPES
UNIVERSITY WITH A PURPOSE

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

Course: Techno Economics of Energy Systems **Semester: II**
Program: M.A. Energy Economics **Time: 03 Hours**
Course code: ECON 7012 **Max. Marks: 100**
Instructions:

SECTION A **(5 * 4 = 20 Marks)**

	Attempt Any Five Questions	Marks	CO
Q 1	Describe and explain all the Four Laws of Thermodynamics.	**4**	**CO1**
Q2	Write the names of all O.P.E.C member countries, and explain the advantages and procedures how Natural gas is utilized for energy purpose by various procedures (N.G., L.N.G, C.N.G, and P.N.G).	**4**	**CO1**
Q3	Draw the diagram of essentials of a Hydro-electricity power generating plant and explain them in brief.	**4**	**CO1**
Q4	Explain the classification of Hydro power plants depending upon Capacity of the plant and other factors.	**4**	**CO1**
Q5	Explain with diagram the working of a pump storage hydro power plant.	**4**	**CO1**
Q6	Conceptually explain the Heat balance diagram showing losses in a thermal power plant.	**4**	**CO2**

SECTION B **(4 * 5 = 20 Marks)**

	Attempt Any Four Questions		
Q7	Analyze the future of Oil industry and explain Hubbert Peak Oil theory.	**5**	**CO2**
Q8	Analyze with diagram Open cycle Gas turbine power plants and explain its functions.	**5**	**CO2**
Q9	Analyze the fundamentals of Wind power and explain the formula of Wind power generation in Watts and write down all the 15 No. parts of a Wind turbines.	**5**	**CO2**
Q10	Draw the diagram of Distributed (parabolic) trough Solar power plant and explain its working.	**5**	**CO3**
Q11	Explain the working of Rankine cycle with block diagram and other P-V diagram.	**5**	**CO2**

SECTION-C **(3 * 10 = 30 Marks)**

	Attempt Any three Questions		
Q12	Explain with block diagram of essentials of Steam thermal power plants with all its functions for electricity power generation.	**10**	**CO3**
Q13	Explain the working of a combined cycle (co-generation) power plant with diagram.	**10**	**CO3**

Q14	Explain and analyze all the three Geo-thermal power plants principles of electricity generation and explain with diagrams the working of schematic of the Dry steam power plant.	**10**	**CO3**
Q15	Analyse the advantages and disadvantages of Underground Hydro power stations.	**10**	**CO3**
	SECTION-D **(2 * 15 = 30 Marks)**		
	Attempt Any Two Questions		
Q16	a) A turbine generator unit has output of 150 mW and efficiency of 0.80. Calculate Energy supplied per hours by steam generator. b) A 100 mW geothermal power plant is operated for 11 months in a year. 1 month is for maintenance shutdown. The cost of electrical energy supplied is Rs. 2.5/- per kW-hr. calculate the total earning by the power plant neglecting losses. c) Determine the thermal efficiency of a steam power plant and its coal bill per annum using the following data. Maximum demand = 24000 kW Load factor = 40% Boiler efficiency = 90% Turbine efficiency = 92% Coal consumption = 0.87 kg/Unit Price of coal = Rs. 280 per tone	**15**	**CO4**
Q17	a) How a Solar Cell works. Explain with diagram and describe the challenges in the solar power industry. b) What are 6 No's. Solar PV key points and explain with diagram the Solar PV System. c) Explain the Solar PV Cost breakup as per C.E.R.C- FY 2016-17guidelines	**15**	**CO4**
Q18	a) Analyze and explain the Renewable Energy options flow-chart. How the Biomass can be converted into, Heat, Methane, Bio-diesel and Ethanol. b) Enumerate the stages of Photosynthesis process to show that the maximum efficiency under ideal conditions from input radiations to plant energy storage is 6.6%.	**15**	**CO4**
	The End		

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SECTION A **(5 * 4 = 20 Marks)**

	Attempt Any Five Questions	Marks	CO
Q1	Conceptually explain the various methods used for heat energy transfer in thermal engineering.	**4**	**CO1**
Q2	Draw the diagram of Brayton Gas Cycle and explain its working for electricity power generation.	**4**	**CO1**
Q3	Analyze the advantage and disadvantages of gas power plants.	**4**	**CO1**
Q4	Analyze the steam power plants with hydro power plants.	**4**	**CO1**
Q5	Analyze and explain co-generation and tri-generation principles for electricity, heat and cooling in power generation technologies.	**4**	**CO1**
Q6	Describe with facts and figures of world energy production primary energy resources and their distribution in different countries of the world in percentage figures.	**4**	**CO2**

SECTION B **(4 * 5 = 20 Marks)**

	Attempt Any Four Questions		
Q7	Analyze and explain the working of high head hydro plants with diagram.	**5**	**CO2**
Q8	Analyze the engineering points of selection of a hydro power plant turbines.	**5**	**CO2**
Q9	Analyze and compare the impulse and rejection hydro power plant turbines.	**5**	**CO2**
Q10	Analyze the major thrust areas in the field of environment conservation and management for developing hydro power projects.	**5**	**CO3**
Q11	Analyze and describe with diagrams the flash (liquid domain system) of Geo-thermal Energy Power Plants.	**5**	**CO2**

SECTION-C **(3 * 10 = 30 Marks)**

	Attempt Any three Questions		
Q12	Analyze and explain with diagram the working principles of distributed (parabolic) through solar power plants.	**10**	**CO3**
Q13	Analyze and explain bio-mass and bio-fuels, describe their role in conversion of heat energy, methane, ethanol and bio-diesel conversion production etc.	**10**	**CO3**
Q14	Analyze the major calculations of availability of hydro power in watts. And explain how the total costs of a hydro power projects is divided in various segments of power project construction percentage wise, also explain overall efficiency calculations also of a hydro power projects.	**10**	**CO3**

Q15	Analyze and explain the various mechanical energy and electrical energy storage systems particularly electricity storage in batteries, an electro-chemical storage method and its charging and discharging procedures with diagrams.	**10**	**CO3**
	SECTION-D **(2 * 15 = 30 Marks)**		
	Attempt Any Two Questions		
Q16	c) Draw the diagram of co-relations of energy science with other science and explain the energy technologies for raising the human standards of living. d) Analyze the binary cycle (liquid dominated) of geo-thermal energy power plants with their diagrams.	**15**	**CO4**
Q17	d) How a Solar Cell works. Explain with diagram and describe the challenges in the solar power industry. e) What are 6 No's. Solar PV key points and explain with diagram the Solar PV System. f) Explain the Solar PV Cost breakup as per C.E.R.C- FY 2016-17.guidelines	**15**	**CO4**
Q18	a) A turbine generator unit has output of 150 mW and efficiency of 0.80. Calculate Energy supplied per hours by steam generator. b) A 100 mW geothermal power plant is operated for 11 months in a year. 1 month is for maintenance shutdown. The cost of electrical energy supplied is Rs. 2.5/- per kW-hr. calculate the total earning by the power plant neglecting losses. c) Determine the thermal efficiency of a steam power plant and its coal bill per annum using the following data. Maximum demand = 24000 kW Load factor = 40% Boiler efficiency = 90% Turbine efficiency = 92% Coal consumption = 0.87 kg/Unit Price of coal = Rs. 280 per tone	**15**	**CO4**
	The End		