Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2019

Course: Energy Conversion **Semester: IV**

Program: B. Tech - Power System Engineering **Time 03 hrs.**

Course Code: EPEG 2009 **Max. Marks: 100**

Instructions: All questions are compulsory

SECTION A

S. No.		Marks	CO
Q 1	Name the common liquid fuels used in Power Plants. Explain four important characteristics of fuel oil.	**4**	**CO1**
Q 2	State the properties of Control rods used in Nuclear Reactor	**4**	**CO2**
Q 3	Enumerates the methods to improve thermal efficiency of a gas turbine power plant.	**4**	**CO2**
Q 4	Mention the essential major components of a typical Diesel Power Plant.	**4**	**CO2**
Q 5	A reaction turbine is supplied with 112 cu m of water per second and works under a maximum head of 135 m at 350 rpm. Assuming overall efficiency of the plant 80 % and specific weight of water 1000 kg/m^3; calculate the horse power developed and power in kW.	**4**	**CO3**

SECTION B

Q 6	A power plant supplies the following loads to the consumers . Time in hours 0-6 6-10 10-12 12-16 16-20 20-22 22-24 Load in MW 30 70 90 60 100 80 60 (i) Draw the load curve and estimate the load factor of the plant . (ii) What is the load factor of a standby equipment of 30 MW capacity if it takes up all loads above 70 MW. (iii) What is its use factor.							**10**	**CO3**
Q 7	Explain with the help of neat line diagram Air and Flue Gas circuit of modern steam plant .							**10**	**CO3**

Q 8	Explain the systems of pulverized coal firing system used in Thermal Power Plants .	**10**	**CO3**
Q 9	What is M.H.D. generator . With the help of schematic diagram Explain the working of open cycle M.H.D. generator.	**10**	**CO4**
OR			
Q 9	Explain the term Combined Cycle Power Plant . With the help of neat line Diagram Explain CCGT (Combined Cycle Gas Turbine Plant)	**10**	**CO4**
SECTION-C			
Q 10	(a) A generating station has the following data : Installed capacity = 300 MW ; Capacity factor = 50 % ; Annual load factor = 60 % Annual cost of fuel , oil etc. = Rs 135 X 10^7 ; capital cost = Rs 15.5 X 10^9 ; annual interest and depreciation = 10 % . Calculate (i) the minimum reserve capacity of the station and (ii) the cost per kWh generated. (b) What are the applications of Diesel electric Power Plants ?	**12+8**	**CO4, CO3**
OR			
Q 10	(a) For a hydro -electric power station the following data is available : Head = 350 m Discharge = 4.5 m^3/sec. Efficiency of turbine = 80 % Generator efficiency = 90 % Generator frequency = 50 Hz Determine the following : (i) Output (ii) Type of turbine (iii) speed of turbine Take the specific speed of turbine to be 28 (metric unit) (b) Explain the function of following in Hydro-electric Power Plant (i) Spillway (ii) Surge Tanks	**12+8**	**CO4, CO3**
Q11	(a) Categorize Ash on the basis of Particle size . Accordingly Design Ash Handling system . (b) What considerations have to be kept in view in siting nuclear power plants ?	**12+8**	**CO4, CO3**

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SECTION A

S. No.		Marks	CO
Q 1	What is the proximate and ultimate analysis of coal? How quality of coal is ascertained from the analysis?	**4**	**CO1**
Q 2	What is a nuclear reactor Name the main parts of a nuclear reactor.	**4**	**CO2**
Q 3	Explain the important functions of a condenser in steam power plant.	**4**	**CO2**
Q 4	What are the advantages of Combined Cycle Gas Turbine Plant(CCGT)	**4**	**CO3**
Q 5	Calculate the total energy in kWh which can be generated from a hydro power station having following data : Reservoir area = 3.5 sq.km Capacity = 7.5 X 10^6 m^3 Net head of water at turbines = 95 m Turbine efficiency = 80 % Generator efficiency = 93 %	**4**	**CO3**

SECTION B

Q 6	The yearly duration curve of a certain plant can be considered a straight line from 30,000 kW to 10,000 kW . To meet this load , three turbine generator units , two rated at 15,000 kW and one at 7,500 kW are installed . Evaluate (i) installed capacity (ii) Plant factor (iii) maximum demand (iv) load factor (v) Utilization factor .	**10**	**CO2**
Q 7	Explain with the help of neat line diagram Cooling Water Circuit of modern steam plant .	**10**	**CO2**

Q 8	Sketch and describe the principle of thermo electric conversion system .	**10**	**CO4**
Q9	What are the essential components of a simple open cycle gas turbine plants ? Explain with neat diagram .		**CO3**
OR			
Q 9	Give the Layout of a Diesel Engine Power Plant .	**10**	**CO3**
	SECTION-C		
Q10	(a) A 120 MW hydro-electric plant costs Rs 5.5 X 10^4 per kW of installed capacity . The total annual charges consists of 5 % as interest ; depreciation as 2 % ; operation and maintenance as 2 % and insurance, rent etc. 1.5% . Determine a suitable two-part tariff if the losses in transmission and distribution are 12.5 % and diversity of load is 1.25 . Assume that maximum demand on the station is 80 % of the capacity and annual load factor is 40 % . What is the overall cost of Generation per kWh ? (b) What are the considerations to be made while selecting the suitable site for a Nuclear Power Plant ?	**12+8**	**CO4 CO2**
OR			
Q 10	(A) The run off data of a river is as under : Jan 75 million m^3/month — July 210 million m^3/month Feb 50 million m^3/month — Aug 180 million m^3/month March 40 million m^3/month — Sept 150 million m^3/month April 20 million m^3/month — Oct 120 million m^3/month May 0 million m^3/month — Nov 100 million m^3/month June 75 million m^3/month — Dec 80 million m^3/month (i) Plot hydrograph and flow duration curve . Find mean flow . (ii) Find the power available at mean flow if head is 120 m and efficiency of generation is 82 % . Take each month of 30 days . (B) Explain the ways of increasing Thermal Efficiency of a Steam Power Plant.	**12+8**	**CO4 CO2**
Q11	Describe Briefly (a) Pressurized water reactor (P.W.R) (b) Principle of M.H.D generator (c) Electrostatic Precipitator (ESP) (d) Peak Load Power Plants.	**4X5**	**CO4 CO2**