(03 Hours) Total Marks:- 80

N.B: (1) Question no 1 is compulsory.
(2) Attempt any three out of remaining five questions.
(3) Figures to the right indicate full marks.
(4) Illustrate your answers with sketches wherever necessary.

K. G. C. E. EXAM KARJAT, RAIGAD

Q.1		Attempt any four from following Six	20
	a.	Classify and explain energy resources in detail.	05
	b.	What are the points taken in to consideration while selecting site for Hydro Electric Power Plant?	05
	c.	Explain the operation of thermodynamic cycle which governs operation of Gas Turbine Power Plant	05
	d.	What are the advantages of combined cycle power plants over Simple Cycle Power Plants?	05
	e.	Explain the difference between Nuclear Fusion and Nuclear Fission.	05
	f.	Explain the load curve and load duration curve with neat sketches.	05
Q.2			
	a.	Discuss Rankine cycle with help of (T-S) and (h-S) diagram. Write expression for Work Ratio, Efficiency , Heat Rejected.	10
	b.	Explain the advantages of fluidized Bed Combustion and also explain PFBC in detail with neat sketch.	10
Q.3			
	a.	Explain PWR with neat sketch stating its advantages and Limitation in detail.	10
	b.	Annual cost of operating a 15 MW thermal power plant are given below. Capital cost of plant = Rs.1500/kW Interest , Insurance and depreciation = 10 percent of plant cost Capital cost of primary and secondary distribution = Rs. 20×10^6 Interest , Insurance and depreciation on the Capital cost of primary and secondary distribution = 5% the capital cost Plant Maintenance Cost = Rs. 100×10^3 /year Maintenance Cost of Primary and secondary equipment = Rs. 2.2×10^5 /year Salaries and Wages = Rs. 6.5×10^5 /year Consumption of coal = 40×10^4 kN /year Cost of Coal = Rs. 9/kN Dividend to stake holders = Rs. 1.5×10^6 /year Energy loss in transmission = 10 Per Cent Diversity Factor = 1.5 Load Factor = 0.75 Maximum Demand = 12 MW (i) Devise Two Part Tariff (ii) Find average cost per Kwh	
Q.4			
	a.	With help of neat diagram explain pulverized coal system with its Advantages and disadvantages.	10
	b.	The run off data for a plant is as given as below:-	10

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Week	Discharge(m^3/s)	Week	Discharge(m^3/s)
1	40	7	75
2	25	8	100
3	20	9	110
4	10	10	60
5	0	11	50
6	50	12	40

Draw:-

i. Hydrograph & find the mean flow
ii. Flow duration curve
iii. Mass curve

If the available head is 80 m at the site and find the power available. Take overall efficiency of generation as 85% and generator efficiency as 95%. Consider 30 days a month cycle.

Q.5

a. A 5400 kW gas turbine generating set operates with two compressor stage; the overall pressure ratio is 9:1. A high pressure turbine is used to drive the compressor, a low pressure turbine drives the generator. The temperature of gases at the entry of high pressure turbine is 625°C and the gases are reheated to 625°C after expansion in first turbine. The exhaust gases leaving the low pressure turbine are passed through the heat exchanger to heat the air leaving the high pressure stage compressor. The compressors have equal pressure ratios and intercooling is complete between the stages. The air inlet temperature to unit is 20°C. Isentropic efficiencies of each stage of compression is 0.8 and for each stage of turbine is 0.85, the heat exchanger thermal ratio is 0.8.Mechanical efficiency of 95% can be assumed for both the power shaft and compressor turbine shaft. Neglecting all pressure losses and change in kinetic energy Calculate:- 14

i. The thermal efficiency
ii. Work ratio of the plant
iii. The mass flow in kg/s

For air Cpa= 1.005kJ/kgK and r= 1.4

For the gases in combustion chambers, turbines and heat exchanger, Cpg = 1.15kJ/kgK and r= 1.333

b. What do understand by term tariff? Explain Block Meter Rate and Hopkinson's Demand Rate. 06

Q.6 a. What is radioactivity and radioactive decay? Prove that halftime is inversely proportional to decay constant Π. 10

b. Dust Collectors 5

c. Rainfall measurements 5

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