QPC: RN20BTECH705 AR 20 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Seventh Semester – Regular) Examinations, November – 2023

BPCEL7010 - Power Station Engineering and Economy

(EE & EEE)

Time: 3 hrs Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions		[CO#]	[PO#]
a.	Which of the following is the essential requirement of peak load plant? (i) It should run at high speed (ii) It should produce high voltage (iii) It should be small in size (iv) It should be capable of starting quickly	CO1	PO1
b.	Which of the following energy sources is considered the most cost-effective for power generation in terms of levelized cost of electricity (LCOE)? (i) Coal ii) Solar (iii) Natural gas iv) Nuclear	CO1	PO3
c.	What is the primary source of energy in a nuclear power plant? (i) Fossil fuels (ii) Solar energy (iii) Nuclear fission (iv) Wind power	CO2	PO1
d.	Which of the following is not a byproduct of nuclear fission in a reactor? (i) Electricity (ii) Neutrons (iii) Heat (iv) Radioactive waste	CO2	PO2
e.	Francis and Kaplan turbines fall under the category of..... (i) Impulse turbine (ii) Reaction turbine (iii) Impulse & reaction combined (iv) Axial flow	CO3	PO2
f.	The function of Trash rack is ……. (i) To stop the debris (ii) To protect the penstock (iii) To protect the generator (iv) To protect the dam	CO3	PO2
g.	Which of the following enters the super heater of a boiler? (i) Cold water (ii) Hot water (iii) Wet steam (iv) Super-heated steam.	CO4	PO1
h.	What is the primary factor that determines the location of a thermal power plant? (i) Proximity to water sources (ii) Proximity to urban areas (iii) Availability of wind (iv) Solar radiation levels	CO4	PO2
i.	Load factor of a power station is generally (i) Equal to unity ii) Less than unity (iii) More than unity iv) Equal to Zero	CO1	PO3
j.	The area under a load curve gives (i) Average demand (ii) Energy consumed (iii) Maximum demand (iv) None of the above	CO2	PO2

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks**

Q.2. Answer ***ALL*** questions		[CO#]	[PO#]
a.	What do you understand by (i) base load and (ii) peak load of a power station?	CO1	PO2
b.	Describe the concept of demand factor and provide some examples.	CO1	PO3
c.	What are the main disadvantages of PWR plants.	CO2	PO2
d.	What are the main components of a nuclear reactor?	CO2	PO2

e.	Describe the classification of hydraulic turbines in different categories.	CO3	PO2
f.	What are the environmental advantages of hydro power compared to fossil fuel-based energy generation?	CO3	PO2
g.	What type of fuel is commonly used in thermal power plants, and why?	CO4	PO2
h.	Explain the main function of Super heater.	CO4	PO2
i.	What is the different between load curve and load duration curve	CO1	PO3
j.	Explain about Nuclear Fission.	CO2	PO1

PART – C: (Long Answer Questions) **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions		Marks	[CO#]	[PO#]
3. a.	What is depreciation and explain any one method to calculate the depreciation value of a plant.	5	CO 1	PO 3
b.	A 100 MW power station delivers 100 MW for 2 hours, 50 MW for 6 hours and is shut down for the rest of each day. It is also shut down for maintenance for 45 days each year. Calculate its annual load factor.	5	CO 1	PO 3
	(OR)			
c.	A power supply is having the following loads: Type of load Max. Demand (kW) Diversity of group Demand factor Domestic : 1500 1·2 0·8 Commercial : 2000 1·1 0·9 Industrial : 10,000 1·25 1 If the overall system diversity factor is 1·35, determine (i) the maximum demand and (ii) connected load of each type.	10	CO 1	PO 3
4. a.	A transformer costing Rs 90,000 has a useful life of 20 years. Determine the annual depreciation charge using straight line method. Assume the salvage value of the equipment to be Rs 10,000.	5	CO 2	PO 3
b.	Explain about PWR with neat diagram	5	CO 2	PO 2
	(OR)			
c.	Describe the Cost of Electric energy in terms of Fixed cost and running cost	5	CO 2	PO 3
d.	A distribution transformer costs Rs 2,00,000 and has a useful life of 20 years. If the salvage value is Rs 10,000 and rate of annual compound interest is 8%, calculate the amount to be saved annually for replacement of the transformer after the end of 20 years by sinking fund method.	5	CO 2	PO 3
5. a.	A hydro-electric generating station is supplied from a reservoir of capacity 5×10^6 cubic meters at a head of 200 meters. Find the total energy available in kWh if the overall efficiency is 75%.	5	CO 3	PO 3
b.	Explain the operation of Surge tank with neat diagram.	5	CO 3	PO 2
	(OR)			
c.	Water for a hydro-electric station is obtained from a reservoir with a head of 90 meters. Calculate the electrical energy generated per hour per cubic meter of water if the hydraulic efficiency be 0·80 and electrical efficiency 0·90.	5	CO 3	PO3
d.	What are the advantages and disadvantages of Hydro power plants?	5	CO 3	PO 1
6. a.	Draw the Schematic diagram of a Thermal power station and explain about the steam circuit.	5	CO 4	PO 2
b.	Explain about the differences between Fire tube and water tube boilers	5	CO 4	PO 2
	(OR)			
c.	Write short notes on i) Artificial draught ii) Natural draught .	5	CO 4	PO 2
d.	Explain the advantages and disadvantages of Thermal power plants .	5	CO 4	PO 1

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