

Code: 23EE3401

**II B.Tech - II Semester – Supplementary Examinations
DECEMBER 2025**

**POWER SYSTEMS - I
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

 Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

PART – A

1.a)	What are the factors taken into account while selecting the site for a steam power station?
1.b)	Infer How various devices protect the penstock.
1.c)	Analyse the difference between Pressurized Water Reactor, Boiling water Reactor.
1.d)	Infer the functions of moderators, control rods, reflectors and coolants in Nuclear power station.
1.e)	Sketch the substation layout of 33/11 kV system.
1.f)	Compare indoor & outdoor Air Insulated Substations.
1.g)	A single core cable has a conductor diameter of 1 cm and internal sheath diameter of 1.8 cm. If impregnated paper of relative permittivity 4 is used as the insulation, calculate the capacitance for 1 km length of the cable.
1.h)	Illustrate the functions of Feeder, Distributor and service mains of a distribution system.

1.i)	Infer the methods used for determining depreciation.
1.j)	Analyse the desirable characteristics of Tariff.

PART – B

			Max. Marks
UNIT-I			
2	a)	Discuss the advantages and disadvantages of thermal power station.	5 M
	b)	Brief about various turbines employed in thermal power plants.	5 M
OR			
3		Draw a neat schematic diagram of a hydroelectric plant and explain the functions of various components.	10 M
UNIT-II			
4		With the schematic diagram of Nuclear power plant, describe its operation.	10 M
OR			
5	a)	Brief about radiation hazards and shielding, nuclear waste disposal.	5 M
	b)	Analyse the advantages and disadvantages of Nuclear power plant.	5 M
UNIT-III			
6		With relevant sketch examine the single bus bar, sectionalized single bus bar, double bus bar with circuit breakers arrangements.	10 M
OR			

7	Interpret the advantages of gas insulated substations and constructional aspects of GIS.	10 M
UNIT-IV		
8	a) Analyse the types of insulating materials used in cables.	5 M
	b) Obtain the equation for Maximum and Minimum dielectric stress subjected to a cable.	5 M
OR		
9	Illustrate the primary and secondary AC distribution systems with relevant sketch.	10 M
UNIT-V		
10	The capital cost of a hydro power station of 50MW Capacity is Rs.1000 per kW. The annual depreciation charges are 10% of the capital cost. A royalty of Rs. 1 per kW per year and Rs.0.01 per kWh generated is to be paid for using the river water for generation of power. The maximum demand on the power station is 40 MW and annual load factor is 60%. Annual cost of salaries, maintenance charges etc. is Rs.7 ,00,000/-. If 20% of this expense is also chargeable as fixed charges, calculate the generation cost in two part form.	10 M
OR		
11	A generating station has a maximum demand of 75 kW and a yearly load factor of 40%. Generating costs inclusive of station capital costs are Rs.60 per annum per kW demand plus 4 paise per kWh transmitted. The annual capital charges for transmission system are	10 M

<p>Rs.20,00,000 and for distribution system Rs.15,00,000, the respective diversity factors being 1.2 and 1.25. The efficiency of transmission system is 90% and that of the distribution system inclusive of substation losses is 85%. Find the yearly cost per kW demand and cost per kWh supplied:</p> <p>i) at the Substation ii) at the Consumer's premises.</p>	
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