PVP 23

Code: 23EE3401

II B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2026

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

		BL	CO
1.a)	What are the types of water turbines used in hydroelectric power plants?	L1	CO1
1.b)	Define the thermal efficiency of a steam power plant.	L1	CO1
1.c)	Mention the main components of a nuclear power plant.	L1	CO1
1.d)	State the harmful effects of nuclear radiation.	L1	CO1
1.e)	List the components of a 33/11 kV substation.	L1	CO1
1.f)	Define Gas Insulated Substation (GIS).	L1	CO1
1.g)	List the advantages of underground cables.	L1	CO1
1.h)	What are the basic requirements of a good distribution system?	L1	CO1
1.i)	Define the load curve.	L1	CO1
1.j)	Mention the types of tariffs used for domestic and commercial consumers.	L1	CO1

PART – B

			BL	CO	Max. Marks
		UNIT-I			
2	a)	Enumerate and briefly explain the factors to be considered while selecting the site for a hydroelectric plant.	L2	CO1	5 M
	b)	With a neat sketch, explain the arrangement of components in a hydroelectric power station.	L3	CO2	5 M
		OR			
3	a)	What is the function of a condenser in a steam power plant? Describe with a neat sketch any one type of condenser commonly used in power plants.	L3	CO2	5 M
	b)	The overall efficiency of a 100 MW thermal power station is 30%. If the load factor of the station is 40% and the coal consumption is 0.9 kg/kWh, find the annual coal bill if the cost is Rs. 50 per tone	L3	CO2	5 M
		UNIT-II			
4	a)	What is nuclear fusion? How does it different from nuclear fission?	L3	CO2	5 M
	b)	What is a moderator? Name commonly used moderators and discuss their merits and limitations.	L2	CO1	5 M
		OR			
5	a)	Interpret the working of a PWR (pressurized water reactor). What are its advantages and disadvantages?	L3	CO2	5 M

	b)	Interpret the classification of nuclear waste and the disposal methods adopted for each type.	L3	CO2	5 M
UNIT-III					
6	a)	What is a substation? Explain the factors that should be taken care of while designing and erecting a substation.	L4	CO3	5 M
	b)	Explain the merits and demerits of indoor and outdoor substations for urban and rural installations.	L2	CO1	5 M
OR					
7	a)	Draw and explain the double bus bar with one circuit breaker system? List out its merits and demerits.	L4	CO3	5 M
	b)	Compare air insulated substations and Gas insulated substations.	L4	CO3	5 M
UNIT-IV					
8	a)	What do you understand be the term grading of cable? Interpret briefly any one method of grading.	L3	CO4	5 M
	b)	A 33kV, 3-phase, 2.5 km-long feeder consists of single-core cables with a conductor radius of 12mm and an insulation thickness of 8mm. The dielectric has a relative permittivity of 3, and the unloaded cable's power factor is 0.3. Determine the following (i) capacitance per phase (ii) charging current per phase.	L3	CO4	5 M
OR					
9	a)	Explain the radial distribution system with a neat diagram and list out its merits and demerits.	L3	CO4	5 M

	b)	Explain the classification of distribution systems in detail.	L2	CO1	5 M
		UNIT-V			
10	a)	Define the following (i) maximum demand (ii) demand factor (iii) load factor	L2	CO1	5 M
	b)	A generating station supplies four feeders with the maximum demands (in MW) of 16 MW; 10 MW; 12 MW and 7 MW. The overall maximum demand on the station is 20 MW and the annual load factor is 45%. Find the diversity factor and the number of units generated annually.	L4	CO5	5 M
		OR			
11	a)	What are the desirable characteristics of a tariff method?	L2	CO1	5 M
	b)	A factory has a maximum load of 240 kW at 0.8 p.f. lagging with an annual consumption of 50,000 units. The tariff is Rs 50 per kVA of maximum demand plus 10 paise per unit. Calculate the flat rate of energy consumption. What will be annual saving if p.f. is raised to unity?	L4	CO5	5 M