



QUESTION BANK

Year / Semester: **II B.Tech IV Semester**

Regulation: **R23**

Subject and Code: **Power System-1 and 23EEE243T**

SYLLABUS

UNIT-I: HYDROELECTRIC AND THERMAPOWER STATIONS:

Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation. Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

UNIT-II: NUCLEAR POWER STATIONS:

Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal

UNIT-III: SUBSTATIONS:

Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the substations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

UNIT-IV: DISTRIBUTION SYSTEMS:

Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of Distribution system, Requirements of Distribution system, Design considerations in Distribution system.

Underground Cables:

Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables. Grading of cables: capacitance grading and inter sheath grading.

UNIT-V: ECONOMIC ASPECTS & TARIFF:

Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants. Tariff Methods– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two- part, three-part, and power factor tariff methods, Time of Day (TOD) tariff and Time of Use (TOU) tariff



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

QUESTION BANK

Year / Semester: **II B.Tech IV Semester**

Regulation: **R23**

Subject and Code: **Power System-1 and 23EEE243T**

Max Marks: 10

S.No.	CO	Questions	BT
UNIT-I: HYDROELECTRIC AND THERMAPOWER STATIONS			
1	1	Explain in detail the selection of site for a hydroelectric power plant, highlighting technical, environmental, and economic factors?	L4
2	1	With a neat diagram, explain the general layout of a hydroelectric power plant and briefly describe the major components?	L3
3	1	Describe the principle of operation of a hydroelectric power plant with the help of an energy conversion process?	L4
4	1	Explain the selection of site for a thermal power plant?	L3
5	1	Discuss the fuel, water supply, transportation, and environmental considerations for thermal power plant?	L5
6	1	With a neat sketch, explain the general layout of a thermal power plant?	L4
7	1	Explain the construction and working of boilers used in thermal power plants?	L3
8	1	Describe the function and working of superheaters and economizers in a thermal power station?	L5
9	1	Explain the working principle of electrostatic precipitators and discuss their importance in pollution control?	L4
10	1	Compare impulse turbines and reaction turbines with respect to construction, working principle, and applications?	L3
11	1	Explain the steam-water cycle in a thermal power plant, describing steam turbine, condenser, feed water circuit, cooling tower, and chimney?	L3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

QUESTION BANK

Year / Semester: **II B.Tech IV Semester**

Regulation: **R23**

Subject and Code: **Power System-1 and 23EEE243T**

S.No.	CO	Questions	BT
UNIT-II: NUCLEAR POWER STATIONS			
1	2	Explain the location requirements of a nuclear power plant with suitable reasons.	L4
2	2	Explain the working principle of a nuclear power plant with a neat diagram.	L3
3	2	Describe the process of nuclear fission and explain how energy is released.	L4
4	2	Explain nuclear chain reaction and discuss its controlled and uncontrolled forms.	L3
5	2	Describe nuclear fuels used in reactors and explain their properties.	L5
6	2	Explain the construction and working of a nuclear reactor with neat sketch.	L4
7	2	Explain the functions and types of reactor components? o Moderator o Control rods o Reflectors o Coolants	L3
8	2	Classify types of nuclear reactors and briefly explain their features?	L5
9	2	With neat diagrams, explain the construction and working of: o Pressurized Water Reactor (PWR) o Boiling Water Reactor (BWR)	L4
10	2	Explain radiation hazards, methods of radiation shielding, and nuclear waste disposal techniques.	L3



SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

QUESTION BANK

Year / Semester: **II B.Tech IV Semester**

Regulation: **R23**

Subject and Code: **Power System-1 and 23EEE243T**

S.No.	CO	Questions	BT
UNIT-III: SUBSTATIONS			
1	3	a) Explain the construction and features of indoor and outdoor Air Insulated Substations (AIS). b) Draw a neat diagram and compare their suitability for different voltage levels and locations.	L4
2	3	a) With a neat single-line diagram, explain the layout of a 33/11 kV Air Insulated Substation. b) Clearly indicate the location and function of transformer, circuit breaker, isolator, CT, PT, lightning arrester and bus bars.	L3
3	3	a) Describe the single bus bar arrangement used in substations with a neat diagram. b) Discuss its advantages, disadvantages and typical applications in distribution substations.	L4
4	3	a) Explain the sectionalized single bus bar arrangement with the help of a neat diagram. b) How does sectionalization improve reliability and operational flexibility?	L3
5	3	a) With suitable diagrams, explain the double bus bar arrangement with one circuit breaker. b) Discuss its operational procedure, merits and limitations.	L5
6	3	a) Describe the double bus bar arrangement with two circuit breakers using a neat labeled diagram. b) Explain its reliability, cost implications and areas of application.	L4
7	3	a) Explain the main and transfer bus bar system with a neat schematic diagram. b) Discuss how this arrangement facilitates maintenance without interruption of supply.	L3
8	3	a) Discuss the advantages of Gas Insulated Substations (GIS) over Air Insulated Substations (AIS). b) Explain why GIS is preferred in urban and space-constrained areas.	L5
9	3	a) Describe the constructional aspects of a Gas Insulated Substation (GIS). b) Explain the components such as SF ₆ gas chamber, circuit breaker, bus duct, disconnect switch and gas monitoring system with neat sketches.	L4



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)**

QUESTION BANK

Year / Semester: II B.Tech IV Semester

Regulation: R23

Subject and Code: Power System-1 and 23EEE243T

10	3	a) Compare Air Insulated Substations (AIS) and Gas Insulated Substations (GIS) in detail. b) Present the comparison in terms of space requirement, reliability, maintenance, cost, safety and environmental impact.	L3
----	---	--	-----------

S.No.	CO	Questions	BT
UNIT-IV: DISTRIBUTION SYSTEMS			
1	4	Classify distribution systems based on nature of supply, construction and connection scheme, and explain each type with suitable diagrams.	L4
2	4	Explain the structure and operation of A.C distribution systems, clearly distinguishing between primary and secondary distribution networks.	L3
3	4	Compare overhead and underground distribution systems in terms of cost, reliability, maintenance, safety and application suitability.	L4
4	4	Describe radial, ring main and interconnected distribution systems, and evaluate their performance with respect to voltage regulation and reliability.	L3
5	4	Discuss the requirements and design considerations of a good distribution system, including load estimation, voltage drop and loss minimization.	L5
6	4	Classify underground cables based on voltage rating and construction, and explain the constructional details of single-core and three-core belted cables.	L4
7	4	Derive the expression for insulation resistance of a single-core cable and explain the factors affecting insulation resistance.	L3
8	4	Explain the distribution of electric stress in cable insulation, and derive expressions for maximum and minimum dielectric stress.	L5
9	4	Derive the expression for capacitance of a single-core cable and a three-core belted cable, and discuss the factors affecting cable capacitance.	L4
10	4	Explain the principle of grading of cables, and describe capacitance grading and inter-sheath grading with suitable diagrams and advantages.	L3



**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)**

QUESTION BANK

Year / Semester: II B.Tech IV Semester

Regulation: R23

Subject and Code: Power System-1 and 23EEE243T

S.No.	CO	Questions	BT
UNIT-V: ECONOMIC ASPECTS & TARIFF			
1	5	Explain load curve, load duration curve and integrated load duration curve with neat sketches and discuss their significance in power system planning.	L4
2	5	Define and explain connected load, maximum demand, demand factor, load factor and diversity factor, and discuss their importance in economic operation of power systems.	L3
3	5	Explain plant capacity factor and plant use factor, and distinguish between them with suitable numerical illustration.	L4
4	5	Discuss the economic significance of base load and peak load plants, and explain their selection criteria in power system operation.	L3
5	5	Explain the various components of cost of electrical energy generation and classify them into fixed, semi-fixed and running costs with examples.	L5
6	5	Discuss the desirable characteristics of a good tariff system and explain how tariff design influences consumer behavior and utility revenue.	L4
7	5	Explain simple rate, flat rate and block rate tariff methods, and compare their advantages and limitations.	L3
8	5	Describe two-part and three-part tariff methods, and derive the expressions used for calculating consumer charges.	L5
9	5	Explain power factor tariff methods, and discuss how they encourage improvement of consumer power factor.	L4
10	5	Discuss Time of Day (TOD) and Time of Use (TOU) tariff methods, and explain their role in load management and peak load reduction.	L3

Note: L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating