



R22 Regulation

Subject code: 4E3BB

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

(Autonomous, Accredited by NAAC with 'A+' Grade)

**B.Tech III Semester Regular/Supplementary Examinations, December 2024**

**POWER SYSTEMS-I**

(EEE)

Maximum Marks: 60

Date:04.12.2024

Duration: 3 hours

- Note:
- 1.This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A		CO	Bloom Tx
All the following questions carry equal marks (10X1M=10 Marks)			
1.a)	What are different conventional sources of Electric power generation?	1	2
b)	Brief the significance of Energy conservation?	1	2
c)	Distinguish between Base load and Peak load Plants?	2	2
d)	Define Diversity factor?	2	1
e)	List out the advantages of bundled conductors?	3	1
f)	Give the classification of insulators?	3	2
g)	Draw the arrangement of substation with sectionalized single bus bar arrangement?	4	2
h)	Mention the advantages of Gas Insulated Substations?	4	1
i)	Compare and contrast DC and AC distribution systems?	5	2
j)	Which factors effect the selection of site for substations?	5	2
Part-B		CO	Bloom Tx
Answer All the following questions. (5X10M=50Marks)			
2	a) Explain 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. [5M] b) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant. [5M]	1	3 4
OR			
3	Explain with neat diagram: a) Solar Energy [5M]                      b) Wind Energy. [5M]	1	3
4	a) Compare different types of tariffs commonly used in practice. [5M] b) The equipment in a power station costs Rs 15,50,000 and has a salvage value of Rs 60,000 at the end of 25 years. Determine the depreciated value of the equipment at the end of 20 years on the following methods. i) Diminishing value method ii) Sinking fund method at 5% compound interest annually. [5M]	2	3 4
OR			
5	a) Explain the significance of the following terms with illustrations. (i) Demand factor, (ii) Load factor, (iii) Utilization factor and (iv) Plant factor . [5M]	2	3

	<p>b) The load on a power plant on a typical day is as under Plot the chronological load curve and load duration curve.</p> <table border="1"> <tr> <td>Time</td> <td>12-5AM</td> <td>5-9AM</td> <td>9-6PM</td> <td>6-10PM</td> <td>10-12 Midnight</td> </tr> <tr> <td>Load (MW)</td> <td>50</td> <td>60</td> <td>75</td> <td>100</td> <td>10</td> </tr> </table> <p>Find the load factor of the plant and energy supplied by the plant in 24 hours. [5M]</p>	Time	12-5AM	5-9AM	9-6PM	6-10PM	10-12 Midnight	Load (MW)	50	60	75	100	10		4
Time	12-5AM	5-9AM	9-6PM	6-10PM	10-12 Midnight										
Load (MW)	50	60	75	100	10										
6	<p>Derive the expression for Sag on overhead transmission lines with equal spacing between the towers. [10M]</p> <p style="text-align: center;">OR</p>	3	4												
7	<p>a) Discuss the methods to improve string efficiency. [5M]</p> <p>b) A 132kV transmission line has a span of 220m, the conductor weighing 604kg/km. find the maximum sag if the ultimate tensile strength of conductor is 5,758 kg. Assume a factor of safety = 2. [5M]</p>	3	4												
8	<p>a) Draw the schematic diagram of main and transfer bus arrangement? Explain. [5M]</p> <p>b) Distinguish different types of gas insulated substations. [5M]</p> <p style="text-align: center;">OR</p>	4	3 4												
9	<p>a) Construct the main equipment in a sub-station. Draw layout of a sub- station. [5M]</p> <p>b) Construct the key diagram of a typical 11kV/ 400V indoor substation. [5M]</p>		3 4												
10	<p>The Figure shows a 1-phase line having resistance and reactance (ground and return) as 0.06 and 0.1 ohm/km. The length of section AM and MB are 500 m each. The voltage at the far end is 230V. Calculate the voltage at the sending end and the phase angle difference between the voltages of two ends, if</p> <p>a) Power factors of the loads are with reference to farther end voltage [5M]</p> <p>b) Power factors of the loads are with reference to the voltages at the load points. [5M]</p>	5	4												
11	<p style="text-align: center;">OR</p> <p>a) Compare the 3-phase 3-wire and 4-wire transmission in overhead transmission system? [7M]</p> <p>b) Two wire distributors are fed at F1 and F2 at 230 V and 220 V respectively. Loads of 150 A and 100 A are taken at points P and Q. Resistance of both the conductors between F1 P is 0.03 Ω, between PQ is 0.05 Ω and between QF2 is 0.02 Ω. Determine the current in each section of the distributor and voltage at each load point. [3M]</p>	5	4 4												