4TH SEM./ELEECTRICAL./ELE. & MECH/ELE. AND ETC./EE(I & C)/ 2024(S)

Th-4 Generation, Transmission and Distribution

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q. No.1& 2
Figures in the right-hand margin indicate marks

1. Answer **All** questions 2 x 10

a. Name the important components of an overhead transmission line.

b. State the types of conductor materials used in overhead lines.

c. Define voltage regulation and state the expression for the same.

d. Write down the important components of the thermal power station.

e. What is feeder and distributor?

f. Define demand factor.

g. Define transmission efficiency.

h. What do you understand by tariff?

i. What is strain insulator? Where it is used?

j. What is the function of spillways and surge tank?

2. Answer **Any Six** Questions 6 x 5

a. What is corona? State the factors affecting corona.

b. Discuss the factors for the choice of site for a nuclear power plant.

c. State and prove Kelvin's law for size of conductor for transmission.

d. Explain advantages and limitations of HVDC transmission system.

e. A consumer has maximum demand of 200kw at 40% load factor. If the tariff is Rs.100 per kW of maximum demand plus 10 paisa per kwH. Find the overall cost per kwh.

f. Explain the ring main distribution system.

g State the causes of low power factor. What are the methods to improve the low power factor?

3 Draw a schematic diagram of a thermal power plant and discuss its operation. 10

4 A 3-phase, 50 Hz transmission line 100 km long delivers 20MW at 0.9 pf lagging and at 110KV. The resistance and reactance of the line per phase is 0.2Ω and 0.4Ω respectively, while capacitive admittance is 2.5×10^{-6} siemen/km/phase. Evaluate

(i) Sending end voltage, 2

(ii) sending end current 4

(iii) Transmission efficiency. Use nominal T method. 4

5 The towers of height 30m and 90m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 600m. If the tension in the conductor is 1600 kg, find the minimum clearance of the conductor and water and clearance mid-way between the supports. The weight of the conductor is 2 kg/m. Bases of towers can be considered to be at water level. 10

6 Describe the Varley loop test for the location of the earth fault in an underground cable. 10

7 A 2-wire D.C. ring distributor is 300 m long and is fed at 240 V at point A. at point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of 80 A is taken. If the resistance per 100 m of single conductor is 0·03 Ω, find : 10

(i) Current in each section of distributor

(ii) Voltage at points B and C

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4TH SEM./ EEE /ELECTRICAL /ELECTRICAL(I & C) /EME / 2022(S)

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1. Answer **All** questions 2 x 10

a. What is photovoltaic effect?
b. Why transmission of electric power by high voltage DC is superior to that of high voltage AC system?
c. State Kelvin's law.
d. What are the factors affecting sag in an overhead line?
e. Write the methods of reducing corona effect?
f. What is a booster transformer?
g. Write the characteristics of Tariff.
h. Define diversity factor.
i. What do you mean by Ferranti effect?
j. Define voltage regulation.

2. Answer **ANY SIX** questions 6 x 5

a. Describe the working of Nuclear power plant with proper sketch.
b. Differentiate between EHVAC and HVDC system.
c. Explain different connection schemes of distribution system.
d. A two wire distribution AD is 225m long. The various loads and their positions are given below

At point	Distance from A in meters	Concentrated load in A
B	75	12
C	175	15
D	225	20

The cross sectional area of each conductor is 0.27 cm^2. The end A is supplied with 250 V. Resistivity of the wire is 1.78μΩ cm. Calculate the current in each section of the conductor, the two core resistance of each section and the voltage at each tapping point.

e. Describe Murray loop test for localization of earth fault in underground cables.
f. Explain different types of insulator.

g A generating station has following data
Installed capacity= 300 MW, capacity factor= 50%, Annual load factor=60%, Annual cost of fuel, oil, etc= Rs. 9×10^7, capital cost= Rs. 10^9, annual interest & depreciation= 10%. Calculate minimum reserve capacity of the station and the cost per kWh generated?

3 a. Define Sag. 02
b. A transmission line has a span of 250m between supports, the supports being at same level. The conductor has a cross-sectional area of 1.29 cm^2. The ultimate strength is 4220 kg/cm^2 and factor of safety is 2. The wind pressure is 40 kg/cm^2. Calculate the height of the conductor above ground level at which it should be supported if a minimum clearance of 7m is to be kept between the ground and the conductor. 08

4 A 3 phase, 50 Hz overhead transmission line has following constants 10
Resistance/phase=9.6 ohm, Inductance/phase= 0.097mH, Capacitance/phase=0.765μF
If the line is supplying a balanced load of 24000 KVA 0.8 p.f lagging at 66 KV, using nominal π method Calculate
i. Sending end current
ii. Line value of sending end voltage
iii. Sending end power factor
iv. Percentage regulation
v. Transmission efficiency.

5 A three phase ring main ABCD fed at A at 11 KV supplies balanced loads of 10
50A at 0.8 p.f lagging at B, 120A at unity p.f at C and 70A at 0.866p.f lagging at D, the load currents being referred to the supply voltage at A. The impedances of the various sections are:
Section AB=(1+j0.6)Ω ; Section BC=(1.2+j0.9)Ω ; Section CD=(0.8+j0.5)Ω ; Section DA=(3+j2)Ω. Calculate the currents in various sections and station bus-bar voltages at B, C & D.

6 a. State different type of Bus-bar arrangements in substation. 03
b. Draw the layout of 66/11 KV substation. 07

7 Write short notes on 5×2
a. Necessity of EHVAC Transmission.
b. Laying of Underground cables.