



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION- JAN 2023

Course Code: EEE 212

Course Name: Transmission & Distribution

Program : B. Tech

Date: 30-JAN-2023

Time: 01:00 PM to 04.00 PM

Max Marks: 100

Weightage: 50%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts
 - (iii) Scientific and Non-programmable calculators are permitted.
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Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx2M=20M)

1. Choose the appropriate answer for the following questions;
 - i. The power system is a network which is consists of Generation, Transmission and Distribution System. It uses energy like (Coal, Diesel etc) and converts into the electrical energy. The Power system includes the devices connected to the system such as.....

(C.O. No. 1) [Knowledge]

a. Synchronous Generator	b. Transformer, Motors
c. Switchgear Components	d. All of the above
 - ii. The large network of conductors between the power station and the consumers can be broadly divided into two parts viz., transmission system and distribution system. Each part can be further sub-divided into two ...

(C.O. No. 1) [Knowledge]

a. Primary transmission & secondary transmission	b. Primary distribution & secondary distribution
c. Both A and B	d. Either A or B
 - iii. & material is used in manufacturing of ACSR Dog Conductor. ACSR dog conductor is the British standards, and it belongs to ACSR cable, which is having Approx. Current Carrying Capacity Amp at 450C amb. temp is 300 Amps.

(C.O. No. 2) [Knowledge]

a. Aluminum & Steel	b. Aluminum & Aluminum
c. Aluminum & Alloy	d. Aluminum & Copper
 - iv. To increase the tensile strength of the conductor, one or more central conductors are used, which have tensile strength. In the overhead transmission systems, bare aluminum conductors are used.

(C.O. No. 2) [Knowledge]

a. True	b. False
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- v. The voltage applied across the string of suspension insulators is not uniformly distributed across various units or discs. The disc nearest to the conductor has much higher potential than the other discs. This unequal potential distribution is undesirable and is usually expressed in terms of..... (C. O. No. 3) [Knowledge]
- String efficiency
 - Voltage regulation
 - Receiving end power
 - Efficiency
- vi. In actual practice, a conductor may have ice coating and simultaneously subjected to wind pressure. The weight of ice acts vertically downwards i.e., in the same direction as the weight of conductor. The force due to the wind is assumed to act horizontally i.e., at right angle to the projected surface of the conductor. Hence, the total force on the conductor is the vector sum of horizontal and vertical forces. When the conductor has wind and ice loading the following points may be noted; (C. O. No. 3) [Knowledge]
- The conductor sets itself in a plane at an angle θ to the vertical is given by $\tan \theta = (W_w / (W_w + W_i))$
 - The sag in the conductor is given by $S = \frac{W_t l^2}{2T}$
 - The vertical sag = $S \cos \theta$
 - All of the above
- vii. An overhead line may be used to transmit or distribute electric power. The successful operation of an overhead line depends to a great extent upon the mechanical design of the line. While constructing an overhead line, it should be ensured that mechanical strength of the line is such so as to provide against the most probable weather conditions. The main components of an overhead line are: (C. O. No. 4) [Knowledge]
- Conductors & Supports
 - Insulators & Cross arms
 - Miscellaneous items like phase plates, , anti-climbing wires etc
 - All of the above
- viii. The electric power can be transmitted or distributed either by overhead system or by underground cables. The underground cables have several advantages such as..... (C. O. No. 4) [Knowledge]
- Less liable to damage through storms or lightning
 - Low maintenance cost
 - Less chances of faults
 - All of the above
- ix. The voltage used for primary distribution depends upon the amount of power to be conveyed and the distance of the substation required to be fed. The most commonly used primary distribution voltages are 11 kV, 6.6 kV and... (C. O. No. 5) [Knowledge]
- 3.3 kV
 - 33 kV
 - 22 kV
 - 132 kV
- x. Now-a-days electrical energy is generated, transmitted and distributed in the form of alternating current. One important reason for the widespread use of alternating current in preference to direct current is the fact that alternating voltage can be conveniently changed in magnitude by means of a (C. O. No. 5) [Knowledge]
- Motor
 - Transformer
 - Generator
 - None of the above

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(4Qx10M=40M)

2. The main function of a Transmission line is to transfer the bulk amount of power to load centers and industrial users up to primary distribution. A transmission system consists of Structures, wires, switching, and conversion stations. It forms a bone of the power system which connects generating station with the load points. Transmission systems are interconnected due to economic, security, and reliability reasons. Identify and list the various factors to be considered while deciding the better transmission systems to transfer electric power effectively. (C.O. No. 1) [Comprehension]
3. A transmission line has three constants R, L and C distributed uniformly along the whole length of the line. The resistance and inductance form the series impedance. The capacitance existing between conductors for 1-phase line or from a conductor to neutral for a 3-phase line forms a shunt path throughout the length of the line. Therefore, capacitance effects introduce complications in transmission line calculations. Depending upon the manner in which capacitance is taken into account; the overhead transmission lines are classified as a. Short transmission lines, b. Medium transmission lines, & c. Long transmission lines. It is proposed to transfer electrical power from Karnataka Power Corporation Ltd., (KPCL) Gas Power plant Yelhanka to Presidency university, identify and suggest what type of transmission line can be used and also show the mathematical model for the suggest system with necessary diagram. (C.O. No. 2) [Comprehension]
4. An overhead line may be used to transmit or distribute electric power. The successful operation of an overhead line depends to a great extent upon the mechanical design of the line. While constructing an overhead line, it should be ensured that mechanical strength of the line is such so as to provide against the most probable weather conditions. List out the various components that are associated with overhead transmission line construction. Identify and list out the desirable properties of Insulators, insulator materials and also list the various types of insulators used in transmission & distribution of electrical power. (C.O. No. 3) [Comprehension]
5. The cable generally comprises of the conductor, insulation material, bedding, beading/armoring, and outer sheath etc. Although, the armoring and outer sheath takes care of the physical safety of cable, adequate care has to be taken by cable manufacturers during manufacturing of the cable. With neat diagram explain the construction details of 3 core underground cable. (C.O. No. 4) [Comprehension]
6. The electrical energy produced at the generating station is conveyed to the consumers through a network of transmission and distribution systems. The part of power system which distributes electric power for local use is known as distribution system. In general, the distribution system is the electrical system between the sub-station fed by the transmission system and the consumer's meters. It generally consists of feeders, distributors and the service mains. List out and explain in brief the various connection of schemes of distribution system with necessary diagram. (C.O. No. 5) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Question. The question carries TEN marks.

(4Qx10M=40M)

7. Power is transferred from Mysuru to Bengaluru through a 3-phase, which is having line length is 250 km long; supply frequency is 60-Hz. The transmission line has following line constants:

$$\text{Resistance/phase/km} = 0.1 \, \Omega$$

$$\text{Reactance/phase/km} = 0.5 \, \Omega$$

$$\text{Susceptance/phase/km} = 10 \times 10^{-6} \, \text{S}$$

If the line supplies load of 80 MW at 0.8 p.f. lagging at 66 kV at the receiving end. Identify the unknown parameters and that could be found from the given data and compute the same. Assume it's proposed to transfer power by using medium transmission line (nominal T method). (C.O. No. 2) [Comprehension]

8. Two towers of height 90 m and 50 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 250 m. If the tension in the conductor is 1800 kg, find the clearance of the conductor at a point mid-way between the supports. Weight of conductor is 0.9 kg/m. Bases of the towers can be considered to be at the water level. (C.O. No. 2) [Comprehension]

9. In a 66 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 14% of self-capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency. (C.O. No. 3) [Comprehension]

10. The various blocks of presidency university are connected with DC distributor line from the main distribution point to meet the load requirements. The distributor wire consists of 2-wire AS which is having 200 meters long. It is fed at point A. If the maximum permissible voltage drop is not to exceed 15 V, What could be the cross-sectional area of the distributor conductor? Take $\rho = 1.8 \times 10^{-7} \, \Omega\text{m}$. The various loads of the blocks and their positions are given below; (C.O. No. 5) [Comprehension]

At point	Distance from A in meters	Concentrated load in amperes
P	40	20
Q	80	35
R	150	80
S	200	40