Roll No.											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19
Course Code: EEE-212
Course Name: Transmission & Distribution
Programme & Sem: B.Tech & VI Sem

Date: 01 March 2019
Time: 1 Hour
Max Marks: 40
Weightage: 20%

Instructions:
(i) ***Answer all the questions.***

Part A

Answer **all** the Questions. **Each** question carries **one** mark. (12Qx1M=12)

1. Select the Appropriate Option/Options from the following Four Options:

a) The transmission Voltages are to be always higher than the Distribution Voltages due to:

[i] Increased Resistance Value of the line [ii] large transmission line Distance [iii] P.F.

[iv] Shorter Transmission line Distances

b) Step down Transformers are used in ----------

[i] Generating Stations [ii] Sub Stations [iii] Receiving Stations [iv] Distribution Stations

c) Power System Modeling is a challenging task as:

[i] The rate at which power is generated should be equal to rate at which it is consumed

[ii] It involves in huge mathematical computations

[iii] The system has large number of time constants with different values ranging from a Very small value to a large value.

[iv] All the variables associated in the model are closely interconnected.

d) The scope of the model decides:

[i] Order of the Model [ii] Cost of the model [iii] Assumptions &Approximations.

[iv] Solution Method.

e) Identify the Energy storing Elements considered for the Transmission line Model:

[i] Resistance, Inductance, Capacitance. [ii] Inductance &Capacitance

[iii] Resistance & Capacitance [iv] Resistivity, Conductivity & Permaibility.

f) The law used to compute the Magnetic Field Intensity external to the Conductor Surface is: [i] Gauss's Law [ii] Faraday's Law of Electro Magnetic Induction. [iii] Lenz's law [iv] Ampere's Circuital Law

g) Identify the factor which is not considered for deciding the Transmission System:

[i] Corona Loss [ii] Right –of –way requirements [iii] Sag &Stress Calculations [iv] System Frequency.

h) ----------&----------material is used in manufacturing A.C.S. R. Dog Conductor

[i] Aluminum & Steel [ii] Aluminum & Aluminum [iii] Aluminum & Alloy [iv] Aluminum &Copper

I) In case of stranded conductors the Radius to be used in computation of Inductance is ---------- Original value

[i] More than the [ii] Less than the[iii] Equal to the [iv] Very High than the

J) The Current Carrying Capacity of Rabbit Conductor is more than the current carrying capacity of the Squirrel conductor because:

[i] The area of Squirrel conductor is less than the Rabbit Conductor

[ii] The Resistance of the Squirrel conductor is less than the Rabbit Conductor.

[iii] The area of Rabbit conductor is less than the Squirrel Conductor

[iv] The Resistance of Rabbit conductor is less than the Squirrel Conductor.

K) Line Charging Current is Neglected in Short Transmission line and hence:

[i] The Resistance &Inductance values are assumed to be lumped

[ii] The Regulation is Zero

[iii] The line capacitance value is Zero

[iv] Sending Current is Equal to the Receiving End Current.

L) Consideration of effect of earth on computation of a line capacitance:

[i] Has no effect

[ii] Decreases the Value of the Capacitance

[iii] Increases the value of the Capacitance

[iv] Reduces to Zero Value

Part B

Answer **both** the Questions. **Each** question carries **six** marks. (2Qx6M=12)

2. Explain wise the step wise procedure to be followed to develop a mathematical Model of any Physical system.

3. Write a Brief Summary for the following:

   A] Basic structure of a Power System [3M]

   B] Steps to be followed to derive an expression for computation of Line Capacitance Between two conductors [3M]

Part C

Answer **both** the Questions. **Each** question carries **eight** marks. (2Qx8M=16)

4. It is required to mathematically model a 11 KV Primary distribution line to be erected from the Existing Yelahanka 66KV/11KV Substation to the Presidency University.

   A] List the parameters to be computed for developing the mathematical Model [2M]

   B] List all the data to be obtained from the Distribution company for computation of the Parameters. [4M]

   C] Write the appropriate mathematical expression used for computing the parameter. [HINT: suitably assume the line configuration] [2M]

5. A 2 wire line of 15 km length is having conductor of an equivalent Diameter of 3cm and conductors are separated horizontally by a distance of 4.5 Meters. The Ground clearance is found to be 8.5 Meters.

   A] Identify the unknown quantities that could be computed from the above data With respect to the energy storing element [Hint: Stores energy in the form of Electro Static Field] [3M]

   [B] Compute all the identified Unknown. [5M]

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19 | **Date**: 13 April 2019

Course Code: EEE 212 | **Time**: 1 Hour

Course Name: Transmission & Distribution | **Max Marks**: 40

Program & Sem: B.Tech & VI Sem | **Weightage**: 20%

Instructions:

(i) ***ANSWER ALL QUESTIONS.***

(ii) ***MISSING DATA MAY BE SUITABLY ASSUMED***

(iii) ***BASIC DATA TABLE ATTACHED WITH QUESTION PAPER***

Part A

Answer **all** the Questions. **Each** question carries **one** mark. (12Qx1M=12)

1. Transmission Line Modeling & Analysis Helps in ----------

   [a] Erection of the Line
   [b] Assessing the Performance of the line
   [c] Identifying the Line Route
   [d] All the above.

2. The Performance Parameters of a Transmission lines are----------

   [a] %ge Regulation & %ge Efficiency
   [b] Losses &Efficiency
   [c] Line Inductance &Capacitance.
   [d] Sending End Voltage and Sending End Current

3. The Primary Transmission line from Raichur Thermal Station to Bangalore Receiving Station is found to have circuit distance of 347 Km. For accurate analysis this line should be modelled as ---

   [a] Short Line
   [b] Long Line
   [c] Medium T Model
   [d] Medium PAI Model

4. Select the assumption which is not relevant to the Medium Line Model.

   [a] Line resistance is assumed to be lumped.
   [b] Sending End Current = Receiving End Current
   [c] Line Inductances are assumed to be lumped.
   [d] Line Charging Current is considered.

5. The Indian Electricity Rule specifies ---------- for design of Transmission line

   [a] Span
   [b] Sag
   [c] Minimum Ground Clearance.
   [d] Tower Height.

6. ---------- Insulators are used as a string of Insulators for Higher Voltages.

   [a] Pin
   [b] Stay
   [c] Rubber
   [d] Disc

7. Improper Voltage Distribution among the parts of the string Insulators ----------

[a] Causes Increased String Efficiency [b] Causes Decreased string Efficiency
[c] has no effect on string efficiency [d] Causes the Regulation to Increase.

8. In a primary transmission Line form Kaiga Power House to

Bangalore receiving station, it is found that in span number 15, both the towers are at the same level with the same height. Select the correct Statement among the four statements provided:

[a] Overall length of the conductor in the span is less to the span
[b] Maximum Deflection (Sag) is a function of weight of the conductor, span length and he Tension at the Maximum deflection point.
[c] Span length is equal to the conductor length.
[d] Maximum Deflection is equal to Zero

9. Identify which of the property is not the essential property of an insulating material used in U.G. Cable:

[a] High- Insulation Resistance. [b] High-dielectric strength
[c] Non-Hygroscopic [d] High Conductivity.

10. Insulation Resistance of U.G. Cable is ----------
[a] Inversely Proportional to the length of the cable.
[b] Equal to the Resistance of the Conductor used in cable
[c] Directly Proportional to the length of the cable
[d] always to be Zero.

11. Grading of U.G. Cable as in the case of string insulators helps in----------
[a] Balancing the Insulation Resistance
[b] Uniform Electric Stress distribution
[c] Balancing of Overall weight of the cable
[d] Decreasing the cost of the cable.

12. Faults in U.G Cables are----------
[a] Very Frequent than in Over Head Lines & easy to locate.
[b] Never located accurately.
[c] Very insignificant
[d] Very Rare & Needs a special test to LOCATE

Part B

Answer **both** the Questions. **Each** question carries **six** marks. (2Qx6M=12)

13. A passive, Linear &Bilateral Transmission Line is represented as a Two-Port Network. Write Voltage and Current Relationship in terms of Generalized Network Parameters and Express the Parameters in terms of Voltages &Currents [6 Marks]

14. A 400 KV Transmission line from Maiduguri to Yelahanka is found to have tower location number 21 and 22 are at two different levels. The Lowest conductor point In the span [L] is found to be at distance X1 Meters from tower number 21[which is at lower level] and is X2 distance from tower number 22[which is at higher level].Draw the diagram for this span and mark all the distances including deflections. [6 Marks]

Part C

Answer **both** the Questions. **Each** question carries **eight** marks. (2Qx8M=16)

15. Following data refers to a Single phase line having circuit distance of about 20 KM.:
    Total Load transmitted 50 MW at 0.8 P.F.[lag]
    Receiving End Voltage = 1400KV
    Resistance of the Line per conductor = 0.048 Ohms
    Reactance of the Line Per conductor = 0.052 Ohms
    a) Identify the quantities that could be computed from the above data. [2 Marks]
    b) Compute the same with the help of phasor diagram taking Receiving Current phasor as the reference. [2+2+2=6 Marks]

16. Following data refers to a design of transmission line tower for a new 400 KV transmission line. With the help of the data and the necessary conductor table Help the designer in computing the Maximum deflection and the overall length of the conductor.
    Span between tower number 32 and 33 =300Meters
    Power to be transmitted at 400KV level = 391 MVA [Based on thermal rating]
    Factor of Safety considered =2
    a) Identify the quantities to be computed. [1 Mark]
    b) Mention the assumption made. [1 Mark]
    c) Compute the unknowns [6 Marks]

BASIC DATA FOR ALUMINIUM CONDUCTORS STEEL REINFORCED (ACSR) AS PER IS 398 (PART - II) : 1996

Code word	Aluminium area (Sq.mm) Nominal	Aluminium area (Sq.mm) Actual	Total Sectional area (Sq. mm)	Stranding & Wire Diameter (mm) Aluminium No.	Aluminium Dia (mm)	Steel Core No.	Steel Core Dia (mm)	Overall Dia (mm) (Approx)	Weight (kg/km) Total	Weight (kg/km) Al	Weight (kg/km) Steel	Approx. Ultimate Strength (kN) (Min)	Approx. Modulus of Elasticity (kg/sq.mm)	Coefficient of linear expansion per deg. C x 10^-6 Aluminium	Coefficient of linear expansion per deg. C x 10^-6 Steel	Coefficient of linear expansion per deg. C x 10^-6 Total
Mole	10	10.60	12.37	6	1.50	1	1.50	4.50	43	29	14	2.780	3.97	58	70	NA
Squirrel	20	20.98	24.48	6	2.11	1	2.11	6.33	85	58	27	1.394	7.61	89	107	NA
Weasel	30	31.61	36.88	6	2.59	1	2.59	7.77	128	87	41	0.9289	11.12	114	138	NA
Rabbit	50	52.88	61.7	6	3.35	1	3.35	10.05	214	145	69	0.5524	18.25	157	190	NA
Racoon	80	78.83	91.97	6	4.09	1	4.09	12.27	318	215	103	0.3712	26.91	200	244	NA
Dog	100	105.0	118.5	6	4.72	7	1.57	14.15	394	288.3	105.7	0.2792	32.41	239	291	NA

Wolf	150	158.1	194.9	30	2.59	7	2.59	18.13	727	438	289	0.1871	67.34	329	405	NA
Panther	200	212.1	261.5	30	3.00	7	3.00	21.00	976	588.5	387.5	0.1390	89.67	395	487	NA
Kundah	400	404.1	425.2	42	3.50	7	1.96	26.88	1282	1119	163	0.07311	88.79	566	705	NA
Zebra	420	428.9	484.5	54	3.18	7	3.18	28.62	1621	1182	439	0.06868	130.32	590	737	NA
Moose	520	528.5	597.0	54	3.53	7	3.53	31.77	1998	1463	535	0.05595	159.60	667	836	NA
Morculla	560	562.7	591.7	42	4.13	7	2.30	31.68	1781	1553	228	0.05231	120.16	688	862	NA

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PRESIDENCY UNIVERSITY
BENGALURU

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Even Semester: 2018-19 | **Date**: 22 May 2019

Course Code: EEE-212 | **Time**: 3 Hours

Course Name: Transmission & Distribution | **Max Marks**: 80

Program & Sem: B.Tech & VI Sem | **Weightage**: 40%

Instructions:

(i) ***Answer all the questions***

(ii) ***Missing data may be suitably assumed with justification.***

Part A

Answer **all** the Questions. **Each** question carries **one** mark. (20Qx1M=20M)

1. Select the most appropriate option/options from the choices provided.

i. Transmission Voltages are higher than the distribution voltages because:
   a) Power cannot be distributed at High voltages.
   b) The current flowing in the line for a given power is less with high voltages.
   c) Transmission line design is very complex for low voltages.
   d) It is an arbitrary decision without any technical reason.

ii. In modeling of transmission line for performance studies following line parameters are considered:
   a) Conductance, Insulation Resistance & capacitance
   b) Impedance, Leakage Resistance &Inductance
   c) Resistance, Inductance &Capacitance
   d) Frequency, Resistance &Inductance

iii. The flux linkage between two line conductors is used to derive an expression for:
   a) Line Inductance b) Line Capacitance c) Corona Loss d) Line Efficiency

iv. Application of Gauss's law help to compute:
   a) Line Inductance b) Line Capacitance c) Corona Loss d) Line Efficiency

v. Select the assumption which is correct in modelling of a short transmission line:
   a) The line parameters are assumed to be distributed.
   b) The sending end voltage and the receiving end voltages are equal.
   c) The frequency effect is neglected.
   d) The parameters are assumed to be lumped.

3.1. Write a brief Note on the string insulators used in overhead lines. (5M)
3.2. Define the dielectric power factor (2M)
3.3. What is Ferranti effect? (3M)

4.1. Explain with the help of the mathematical expression that the line efficiency and the volume of the conductor to be used are the functions of Power, power loss, voltage, power factor & length. (5M)
4.2. For a give power the current in the D.C. 2 wire system is found to be 150 Amps. If the same power is transmitted through the A.C. Single Phase 2 wire system the current is found to be changed depending on the P.F. Show with the numerical values that the current in the A.C. Single Phase 2 wire system changes with the value of the P.F. Consider a P.F. of 0.8 and 0.9 for the same current, voltage and power. (5M)

Part C

Answer **both** the Questions. **Each** question carries **fifteen** marks. (2Qx15M=30M)

5.1. A 220KV transmission line between Bangalore and Nelamangala has a circuit distance of 41 KM. The R/ph./KM is 0.15 ohms and the XL/ph./KM is 0.6 ohms. The line is supplying a load of 120MVA at half peak load with a lagging power factor of 0.8.
   a. List all the Un known quantities that could be computed from the data provided.
   b. List all the assumptions to be made while computing unknowns
   c. Compute all the unknowns. (3+2+5=10M)
5.2. The resistance of the conductor used in an underground cable is directly proportional to the length of the conductor but the insulation resistance of the underground cable is inversely proportional to the length of the cable. Justify this statement with the help of a mathematical expression. (5M)

6.1. It is required to compute the maximum deflection [Sag) and the total length of the conductor required for a specific span of a 400 KV line. List all the data required for the same and explain the steps to be followed to compute them. (5+5=10M)
6.2. With the help of a single line diagram show the following components of a typical distribution system:
   a) 66KV/11KV sub station
   b) 11 KV feeders
   c) Distribution transformers
   d) L.T. [440 Volts) Lines emanating from distribution transformer
   e) Single phase and three phase loads on the L.T. line. (5M)

vi. To assess the performance of a transmission line ---------- &---------- are computed:
   a) Sending end current & receiving end current.
   b) Line charging Current &Voltage.
   c) Line distance &sag
   d) efficiency & voltage regulation

vii. The effect of Wind and ice Increases the ---------- in the transmission line
   a) Loading on the conductor, b) Load current, c) transmitted power, d) Regulation.

viii. Improper voltage distribution across each of the disc insulator of a string of insulators used in an EHV Transmission line causes:
   a) Reduction in the line capacitance.
   b) Increases the string efficiency
   c) Decreases the string efficiency
   d) reduction in the line efficiency.

ix. The faults in an underground cable:
   a) Occurs very frequently.
   b) Very rare occurrences but needs special methods to locate.
   c) Cannot be located.
   d) Can be avoided.

x. For a given length and the current carrying capacity of an overhead line and the underground cable, the capacitance of the Underground cable is:
   a) Less than the overhead line.
   b) More than the Overhead line.
   c) Equal to that of the overhead line.
   d) Zero.

xi. Insulation Resistance of U.G. Cable is ----------
   a) Inversely Proportional to the length of the cable.
   b) Equal to the Resistance of the Conductor used in cable
   c) Directly Proportional to the length of the cable
   d) always to be Zero.

xii. The use of Underground cable is more suitable for----------
   a) Transmission lines
   b) both transmission and distribution lines
   c) Distribution lines
   d) Lines only up to 11KV

xiii. Identify the most appropriate statement with respect to the relationship between powers transmitted, Area of the conductor and the system voltage:
   a) For a given value of power the area of the conductor is inversely proportional to the system voltage.
   b) For a given value of power the area of the conductor does not depend on the system voltage.

   c) For a given value of power the area of the conductor is directly proportional to the system voltage.
   d) The area of the conductor is independent of power and voltage.

xiv. Identify the most appropriate statement with respect to the relationship between powers transmitted, Transmission efficiency and the system voltage:
   a) The line efficiency will be higher for high system voltage.
   b) The efficiency does not get affected by the value of the system voltage.
   c) The efficiency will be low for higher system voltages.
   d) All the above statements are appropriate.

xv. Comparison of various types of distribution systems are always carried out with reference to AC 2- wire system.
TRUE/FALSE

xvi. The comparison of DC 2-wire system and the DC 2-wire midpoint earthed system yields that the resistance of the DC 2-wire system is four times the value of the midpoint earthed system.
TRUE/FALSE

xvii. Kelvin's law helps in identifying the Cross section of the conductor based on an economic balance between capital cost and the operating cost.
TRUE/FALSE

xviii. The corona is affected by the temperature and pressure.
TRUE/FALSE

xix. Electro static effect will not contribute to the Radio Interference of transmission line on A.M. Signal.
TRUE/FALSE

xx. Visual critical disruptive voltage is always more than the critical disruptive voltage.
TRUE/FALSE

Part B

Answer **three** the Questions. **Each** question carries **ten** marks. (3Qx10M=30M)

2.1. Indian power system generally has the following levels:
Primary transmission, Secondary transmission, Primary Distribution, Secondary Distribution
Draw a single line diagram to depict all the levels with the appropriate levels of voltages. (5M)

2.2. Mention any 4 steps to be followed in deriving an expression of a line Capacitance of a transmission line. (2M)

2.3. It is required to model a newly proposed 220KV transmission line from Raichur Thermal plant to Munirabad having a circuit distance of 132KM. draw the equivalent circuits or state the assumptions made in developing the model. (3M)

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM / MAKE UP END TERM EXAMINATION

Semester: Summer Term 2019 | **Date**: 22 July 2019

Course Code: EEE 212 | **Time**: 2 Hours

Course Name: Transmission and Distribution | **Max Marks**: 40

Program & Sem: B.Tech, VI Sem (2015 Batch) | **Weightage**: 20%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3Qx4M=12)

1. Fill in the blanks by inserting appropriate words:
   i) In short transmission line, the effect of ..... are neglected.
   ii) If shunt capacitance is reduced, then string efficiency is.....
   iii) If the string efficiency is 100%, it means that-----
   iv) In any transmission line AD - BC=.....1.....
2. Discuss the terms voltage regulation and transmission efficiency as applied to transmission line.
3. Explain the following terms with reference to corona:
   i. Critical disruptive voltage.
   ii. Visual critical voltage

Part B

Answer the Question. The Question carries **twelve** marks. (1Q=12M)

4 a) What is corona? What are the factors which affect corona? (4)

b) 3-phase, 50-Hz overhead transmission line 100 km long has the following constants: Resistance/km/phase=0.1Ω,Inductive reactance/km/phase = 0·2Ω Capacitive susceptance/km/phase = 0·04 × 10− 4 siemen. Determine the sending end current when supplying a balanced load of 10,000 kW at 66 kV, p.f. 0·8 lagging. Use nominal T method. (8)

Part C

Answer the Question. The Question carries **sixteen** marks. (1Q=16M)

5 a) Compare the merits and demerits of underground system versus overhead system. (4)

b) A single-core cable has a conductor diameter of 1cm and insulation thickness of 0.4cm. If the specific resistance of insulation is $5*10^{14}$ Ω-cm, calculate the insulation resistance for a 2km length of the cable. (8)

c) Explain capacitance grading with respect to underground cables. (4)