

School: SOE	Level: BE	Invigilator's Sign:
Program: BEEE	Year/Part: IV/I	Superintendent's Sign:
Subject: Transmission & Distribution Engineering (EG718EE)		Code No.

- i. Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.
ii. The main answer sheet can be used for rough work.

Code No.

GROUP A (Multiple-Choice Questions)	[10x1=10]	Time: 20 Minutes
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- The Horizontal configuration is general practice for and above transmission line.
a) 132 Kv b) 220 Kv c) 400 kV d) 1000 kV
- When the ambient temperature increases, the current carrying capacity of a conductor
a) Remains unchanged b. increases c. decreases d. becomes zero
- The following improvement can reduce the corona effect in a transmission line.
a. Increasing conductor length b. increasing bundle size
c. increasing height of tower d. increasing cross arm length
- Which of the following system is most reliable in distribution?
a. Radial b. Interconnected c. Loop d. Double circuit Radial
- Which of the following equipment can be used to improve the power factor at the load center?
a. Capacitor Bank b. Synchronous Condenser c. Reactor d. All of above
- The Voltage regulation of Transmission line should be
a. >10% b. <10% c. >5% d. <5%
- The Loss of Load Factor is calculated as:
a. Average Load / Peak Loss b. Average Loss/Peak Load
c. Average Loss/Peak Loss d. Rms Load Loss / Peak Load Loss
- Which of the following is not considered for load forecasting of a country?
a. Population b. GDP of the country
c. Per Capita Electricity Consumption d. Literacy Rate
- Which of the following problem is most applicable in rural distribution feeder?
a. Lower power factor b. High inductive load
c. high voltage drop d. high current demand
- The Sag of transmission line is maximum at:
a. Minimum Tension condition b. Normal Tension Condition
c. Maximum Tension Condition d. Double Earth Wire Condition

Multiple Choice Questions' Answer Sheet

Marks Secured: _____

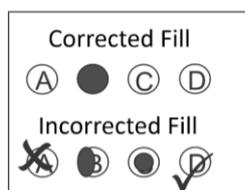
In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____



1. (A) (B) (C) (D)	6. (A) (B) (C) (D)
2. (A) (B) (C) (D)	7. (A) (B) (C) (D)
3. (A) (B) (C) (D)	8. (A) (B) (C) (D)
4. (A) (B) (C) (D)	9. (A) (B) (C) (D)
5. (A) (B) (C) (D)	10. (A) (B) (C) (D)

Manmohan Technical University
Office of the Controller of Examinations
Exam Year: 2082, Mangsir(Model Question)

School: SOE	Level: BE	Time: 3 Hours
Program: BEEE	Year/Part: IV/I	Full Marks: 50
Subject: Transmission & Distribution Engineering (EG718EE)		

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

GROUP A (Multiple-Choice Questions in separate paper)

[10×1=10]

GROUP B (Short Answer Questions - *Attempt Any Eight*)

[8×2=16]

1. Write down the advantages of High Voltage in Transmission System.
2. How do you select the no. of earth wires in a Transmission System. Name any three earth conductors.
3. What are the problems that are associated with the construction of High Voltage Transmission Lines in Nepal?
4. What do you mean by BIL? What is its use in insulator selection of a transmission design?
5. Do you prefer underground distribution system or overhead distribution system in Biratnagar City? Justify your answer.
6. Describe the load and supply pattern of Nepal during winter and summer season. How would you suggest for the demand side management?
7. Sketch a distribution system of any academic institution showing its components starting from a 11kV feeder.
8. With the help of suitable load curve, show that the Loss of Load Factor may be expressed as:
 $LLF = k_1 \times LF + k_2 \times LF^2$
9. What do you mean by Corona? Also describe the Ferranti effect in transmission system.

GROUP C (Long Answer Questions - *Attempt Any Six*)

[6×4=24]

1. Find the most economical voltage and no. of circuits for transmission of 500 MW power to 400 km distance.
2. Compute the various clearances required to design a transmission tower for 220 kV Double circuit line.
3. Select the most economical span for a single circuit transmission line with horizontal distance between conductors 8.7 m and vertical distance between conductors 2 m each.

Span (m)	Maximum Sag (m)
250	3.24
275	3.28
300	4.57
325	5.32
350	6.15

Given that: Conductor diameter = 28 mm, Cross sectional area = 463 mm², UTS =15910 kg, Wind pressure = 100 kg/m², Factor of Safety = 2, Minimum Ground Clearance = 6m. Assume all the towers as straight line tower.

4. A particular load center has a peak demand of 50 kW at power factor of 0.8 lagging. Compute the % peak power loss and voltage drop in 3 phase LT feeder with rated transformer of 11/0.4 kV with 4 feeders each of 3 km.
Impedance per phase = $1.1 + j0.25$ ohm/km. Assume uniformly distributed load along the feeders.
5. Find the inductance and capacitance of the transmission line with double circuit configuration with horizontal spacing of 5 m and vertical spacing of 4 m if the conductor used is sheep.
6. Draw the Load duration curve and calculate load factor, loss load factor, diversity factor and capacity factor if the generator of 3 MW is supplying the load.

Region A		Region B	
Midnight – 6 am	200 kW	Midnight – 3 am	300 kW
6 am – 11 am	800 kW	3 am – 10 am	500 kW
11 am - 3 pm	1100 kW	10 am to 2 pm	1400 kW
3pm – 5 pm	1500 kW	2 pm to 5 pm	1200 kW
5pm – 9 pm	1200 kW	5pm to 7pm	800 kW
9 pm - midnight	700 kW	7 pm to 10 pm	600 kW
10 pm - midnight	300 kW		

7. What do you mean by Load Forecasting? Explain the process of Load Forecasting in a region.

All The Best

Appendix-A

I. Most economical voltage empirical formula: $5.5 \sqrt{\frac{\text{length in km}}{1.6} + \frac{\text{power in MW} \cdot 1000}{\cos \phi \cdot N_c \cdot 150}}$

II. Standard voltage: 66kv, 132kv, 220kv, 400kv.

III. Table-A-1: transmission line capability curve with assumption of single circuit transmission line surge impedance of 400Ω

Length(km)	Multiplying factor(m.f.)
80	2.75
160	2.25
240	1.75
320	1.35
480	1.00
640	0.75

IV. Table-A-2: withstand voltage capability for different system voltages.

Maximum system voltage	1 min dry withstand (KV)	1 min wet withstand (KV)	Impulse withstand (KV)
123	215	185	450
145	265	230	550
255	435	395	900
420	760	680	1550

V. Table-A-3: flashover voltages for 254X154 mm disc insulators.

No. of Discs	1 min dry FOV(KV)	1 min wet FOV(KV)	Impulse FOV(KV)
1	80	50	150
2	155	90	255
3	215	130	355
4	270	170	440
5	325	210	525
6	380	250	610
7	435	290	695
8	485	330	780
9	535	370	860
10	585	410	945
11	635	450	1025
12	685	485	1105
13	730	520	1185
14	775	555	1265
15	820	590	1345
16	865	620	1425
17	910	650	1505
18	955	680	1585
19	1000	710	1665
20	1045	740	1745

Appendix B

Table A2 Aluminium Conductor Steel Reinforced [Based on IS : 398 (1961)]

Conductor Code name	Electrical Properties					Mechanical Properties										
	Nominal Cu area mm ²	Equiv. area of Al mm ²	Calculated resist. at 20°C Ω/km	Approx. current carrying capacity 40°C ambient temp.	Stranding and wire diameter mm				Conductor dia mm	Conductor area mm ²	Approx. weight Total Al St	Approx. ult. strength kg	Calculated linear coeff. per °C × 10 ⁻⁴	Calculated modulus of elasticity kg/cm ² × 10 ⁴		
					Aluminium		Steel									
					No.	Diam.	No.	Diam.								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MOLE	6.3	10.47	2.71800	—	6	1.50	1	1.50	4.50	12.37	43	29	14	407	18.99	0.809
SQUIRREL	13	20.71	1.37400	115	6	2.11	1	2.11	6.33	24.43	85	58	27	771	18.99	0.809
GOPHER	16	25.91	1.09800	133	6	2.36	1	2.36	7.08	30.62	106	72	34	952	18.99	0.809
WEASEL	20	31.21	0.91160	150	6	2.59	1	2.59	7.77	36.88	128	87	41	1136	18.99	0.809
FERRET	25	41.87	0.67950	181	6	3.00	1	3.00	9.00	49.48	171	116	55	1503	18.99	0.809
RABBIT	30	52.21	0.54490	208	6	3.35	1	3.35	10.05	61.70	214	145	69	1860	18.99	0.809
MINK	40	62.32	0.45650	234	6	3.66	1	3.66	10.98	73.65	255	173	82	2207	18.99	0.809
HORSE	42	71.58	0.39770	—	12	2.79	7	2.79	13.95	116.20	542	204	338	6108	35.30	1.070
HEAVER	45	74.07	0.38410	261	6	3.99	1	3.99	11.97	87.53	303	205	98	2613	18.99	0.809
KACCOON	48	77.83	0.36560	270	6	4.09	1	4.09	12.27	91.97	318	215	103	2746	18.99	0.809
OTTER	50	82.85	0.34340	281	6	4.22	1	4.22	12.66	97.91	339	230	109	2923	18.99	0.809
CAT	55	94.21	0.30200	305	6	4.50	1	4.50	13.50	111.30	385	261	124	3314	18.99	0.809
DOG	65	103.60	0.27450	324	6	4.72	7	1.57	14.16	118.50	394	288	106	3299	19.53	0.735
LEOPARD	80	129.70	0.21930	375	6	5.28	7	1.76	15.84	148.40	493	360	133	4137	19.53	0.735
COYOTE	80	123.50	0.22140	375	26	2.54	7	1.90	15.86	151.60	521	365	156	4638	18.99	0.773
TIGER	80	123.10	0.22210	382	30	2.36	7	2.36	16.52	161.80	604	363	241	5758	17.73	0.787
WOLF	95	154.30	0.18440	430	30	2.59	7	2.59	18.13	195.00	727	436	291	6880	17.73	0.787
LYNX	110	179.00	0.15890	475	30	2.79	7	2.79	19.51	226.20	844	506	338	7950	17.73	0.787
PANTHER	133	207.00	0.13750	520	30	3.00	7	3.00	21.00	261.60	976	586	390	9127	17.73	0.787
LION	140	232.50	0.12230	555	30	3.18	7	3.18	22.26	293.90	1097	659	438	10210	17.73	0.787
BEAR	160	253.10	0.11020	595	30	3.35	7	3.35	23.45	326.10	1219	734	485	11310	17.73	0.787
GOAT	185	312.50	0.08989	680	30	3.71	7	3.71	25.97	400.00	1492	896	596	13780	17.73	0.787
SHEEP	225	366.10	0.07771	745	30	3.99	7	3.99	27.93	462.60	1726	1036	690	15910	17.73	0.789
KUNDAH	250	394.40	0.07434	—	42	3.50	7	1.94	26.82	424.80	1282	1120	162	9002	21.42	0.646
DEER	260	419.30	0.06786	806	30	4.27	7	4.27	—	520.30	1977	1188	789	18230	17.73	0.787
ZEBRA	260	418.60	0.06800	795	54	3.18	7	3.18	—	484.50	1623	1185	438	13316	19.35	0.686
ELK	300	465.70	0.06110	860	30	4.50	7	4.50	31.50	588.40	2196	1320	876	20240	17.73	0.787
CAMEL	300	464.50	0.06125	—	54	3.35	7	3.35	30.15	537.70	1804	1318	486	14750	19.35	0.686
MOOSE	325	515.70	0.05517	900	54	3.53	7	3.53	31.77	597.00	2002	1463	539	16250	19.53	0.686
MORKULLA	330	549.20	0.05182	—	42	4.13	7	2.30	31.68	591.70	1790	1564	226	12236	21.42	0.6
SPARROW	20	33.16	0.35780	—	6	2.67	1	2.67	8.01	39.22	135	92	43	1208	18.99	0.809
FOX	22	36.21	0.78570	165	6	2.79	1	2.79	8.37	42.92	149	101	48	1313	18.99	0.809
GUINEA	49	78.56	0.36200	—	12	2.92	7	2.92	14.60	127.20	590	224	366	6664	15.30	1.070
LARK	125	196.10	0.14510	—	30	2.92	7	2.92	20.44	247.80	922	556	366	8639	17.73	0.787

Note: (i) The resistance (R_T) of the conductor at any other temperature (T) will be:

$$R_T = R_{20} [1 + 0.004 (T - 20)] \text{ where } R = \text{resistance at temperature } T$$

$$R_{20} = \text{ " " " " } 20^\circ\text{C given in the tables}$$

(ii) Ampere rating is given for conductor working temperature 75°C