



SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Building service Engineering

2nd Year, second Semester Examination – 2016

BSE 2205- Electrical Distribution in Buildings

Instructions for Candidates:

Answer any **four (4)** questions.

All questions carry equal marks.

No. of questions : 5

No. of pages : 3

Time allowed : Two (2) hours

1.

- I. State three advantages of using capacitor banks over synchronous condensers for power factor improvement. (06 marks)
- II. A single phase 50Hz a.c. generator supplies the power to a lighting load at 25kW at unity power factor, an induction motor load of 50kw at 0.8 power factor lagging. (19 marks)
 - a. Draw a phasor diagram for the above conditions.
 - b. Calculate the total KVA delivered by the generator.
 - c. At what power factor does the generator operate?
 - d. If we were to improve the power factor to 0.9 using a capacitor bank, Find the value capacitors required.

[Total 25 marks]

2.

- I. What is known as grounding? (02 marks)
- II. State two methods of neutral grounding. (04 marks)
- III. Draw a figure to illustrate resistance grounding. (05 marks)
- IV. A 33kV, 3 phase transmission line in Sri Lanka has a capacitance to earth each conductor as $4\mu\text{F}$ and employs a Peterson coil for earthing. (14 marks)
 - a. Calculate the reactance of the Peterson coil.
 - b. What is the inductance of the Peterson coil used?

[Total 25 marks]

Q3.

- I. What is known as a symmetrical fault in a power system? (02 marks)
- II. Write an equation for percentage reactance in terms of base KVA. (03 marks)
- III. A 3 phase transmission line operating at 11kV and having a reactance of 3Ω is connected to the generating station buss bar through 4MVA step up transformer having a reactance of 5%. Current is supplied to the bus bars by a 10MVA alternator having a 8% reactance. Calculate the short circuit current if a fault occurs, (20 marks)
 - a. At the high voltage terminal of the transformer
 - b. At the load end of the transmission line.

Total 25 marks]

Q4.

- I. Name 4 types of internal wiring techniques. (04 marks)
- II. Name 4 types of wire splicing. (04 marks)
- III. A building is to be wired for single phase alternating current supply taken from a main that has a voltage of 230 volts. 2100m long, two core wire enclosed inside a conduit is used for the installation. If it is required to carry 17 amperes of current, calculate the diameter of wire that should be used for the operation. (17 marks)

[Total 25 marks]

Conductor	Reference method A of Table 4E2A (enclosed in conduit in thermally insulating wall etc.)				Reference method B of Table 4E2A (Enclosed)			
	1 two-core cable, with or without protective conductor single phase a.c. or d.c.		1 three-core or 1 four-core cable, with or without protective conductor three phase a.c.		1 two-core cable, with or without protective conductor single phase a.c. or d.c.		1 three-core or 1 four-core cable, with or without protective conductor three phase a.c.	
C.S.A.	Current carrying capacity	Voltage drop	Current carrying capacity	Voltage drop	Current carrying capacity	Voltage drop	Current carrying capacity	Voltage drop
mm ²	A	mV/A/m	A	mV/A/m	A	mV/A/m	A	mV/A/m
1.0	14.5	46	13	40	17	46	15	40
1.5	18.5	31	16.5	27	22	31	19.5	27
2.5	25	19	22	16	30	19	26	16
4	33	12	30	10	40	12	35	10
6	42	7.9	38	6.8	51	7.9	44	6.8
10	57	4.7	51	4.0	69	4.7	60	4.0
16	76	2.9	68	2.5	91	2.9	80	2.5
25	99	1.90a 1.85d	89	1.65	119	1.90a 1.85d	105	1.65
35	121	1.35a 1.35d	109	1.15	146	1.35a 1.35d	128	1.15
50	145	1.00a 0.98d	130	0.87	175	1.00a 0.98d	154	0.87
70	183	0.69a 0.67d	164	0.60	221	0.69a 0.67d	194	0.60

5.

- I. At what voltage levels does primary and secondary distribution occur? (02 marks)
- II. What is known as demand side management? (03 marks)
- III. State 4 features of a a good protective device. (04 marks)
- IV. Name four disirable chrateristics of a fuse element? (04 marks)
- V. Name four different types of circuit breakers. (08 marks)
- VI. What is the main type of loss in power transmission, from Generation station to substation? (02 marks)
- VII. What is meant by a harmonic? (02 marks)

[Total 25 marks]