



- 1- All the questions according to ILOs: a1, a3, a4, a8; b2, b9, b14, c3, c10.
- 2- Number of pages :2 No. of questions : 5
- 3- The weight of each problem is indicated.
- 4- This a closed book exam.
- 5- Clear, systematic answers and solutions are required in general, marks will not be assigned for answers and solutions that require unreasonable (in the opinion of the instructor) effort to decipher.
- 6- Ask for clarification if any question statement is not clear to you.
- 7- Attempts in all questions.
- 8- The exam will be marked out of 70.

Q1

10 Marks

A d.c. 3-wire system is to be converted into a 3-phase, 4-wire system by adding a fourth wire equal in X-section to each outer of the d.c. system. If the percentage power loss and voltage at the consumer's terminals are to be the same in the two cases, find the extra power at unity power factor that can be supplied by the a.c. system. Assume loads to be balanced.

Q2

20 Marks

1- A 50 km long transmission line supplies a load of 10 MVA at 0.9 p.f. lagging at 33 kV. The efficiency of transmission is 90%. Calculate the volume of aluminum conductor required for the line when (i) single phase, 2-wire system is used (ii) 3-phase, 3-wire system is used. The specific resistance of aluminum is $2.85 \times 10^{-8} \Omega \text{ m}$.

10 Marks

2- A single phase line has two parallel conductors 2 meters apart. The diameter of each conductor 1.4 cm. calculate the loop inductance per km of the line.

10 Marks

Q3

10 Marks

Find the most economical size of a single-core cable working on a 66 kV, 3-phase system, if a dielectric stress of 32 kV/cm can be allowed.

Good Luck

Dr. Fathalla , Mohammed and committee

Q4

10 Marks

A 3- phases , 380 v, 50 Hz, balanced supply, balanced loads consists of :

- 1- Three equal single phase loads of $(30+j40) \Omega$ connected in star, and
- 2- Three phases heating load of 1.2 kW

Determine:

- a- The supply current, supply active power, reactive power, and power factor
- b- The value of the capacitance that must be connected to improve the overall power factor to 0.99.

Obtain the results using :

- i- One phase of the three phase system,
- ii- The equivalent single phase circuit.

Q5

20 Marks

a- What are the sources of electric field and magnetic field?

5 Marks

b- What is the difference between a DC shunt and a series winding?

5 Marks

c- A 220-V, d.c. shunt motor takes 4 A at no-load when running at 750 r.p.m. The field resistance is 100Ω . The resistance of armature at standstill gives a drop of 6 volts across armature terminals when 10 A were passed through it. Calculate (a) torque in N-m (b) speed on load and (c) efficiency. The normal input of the motor is 8 kW.

10 Marks

End of Exam Questions