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Kafr Elshiekh University Faculty of Engineering Department: Mechanical Engineering Year : 2 nd year(2007) 2016-2017 Subject: Electrical Engineering		Date: 3-1-2017 Time Allowed: 3:00 hr. Full Mark: 70 Marks. Final Exam: -- Academic Code: EPM 2133 Exam: Two pages
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Answer the Following Questions:

Q1

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An instrument is calibrated in an environment at a temperature of 25°C and has the following deflection/load characteristic:

Load (kg)	0	2	4	6
Deflection(mm)	0	30	60	90

It is then used in an environment at a temperature of 35°C and the following deflection/load characteristic is measured.

Load (kg)	0	2	4	6
Deflection(mm)	6	39	72	105

Determine the zero drift and sensitivity drift per °C change in ambient temperature.

Q2

10

A d.c. 2-wire system is to be converted into a.c. 3-phase, 3-wire system by the addition of a third conductor of the same cross-section as the two existing conductors. Calculate the percentage additional load which can now be supplied if the voltage between wires and the percentage loss in the line remain unchanged. Assume a balanced load of unity power factor.

Q3

15

A 50 km long transmission line supplies a load of 40 MVA at 0.9 p.f. lagging at 33 kV. The efficiency of transmission is 92%. 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 $2.85 \times 10^{-8} \Omega \text{ m}$.

Q4

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77

- 1- What are the principal elements of a high-voltage transmission line?
- 2- A 3-phase overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 1. m side. Calculate the capacitance of each line conductor per km. Given that diameter of each conductor is 1.22 cm.(Given that $\epsilon_0 = 8.854 \times 10^{-12}$ F/m).

Q5

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- 1- Mention the construction of DC machine and explain how the induced voltage generated across its terminals.
- 2- A 6 pole DC machine has 200 conductors rotate with 600 rpm and the flux per pole is 30 mwb, if it connected as shunt connection with shunt field resistance of 100 Ω , and armature resistance is 0.5 Ω , the load takes 20A ,find:
 - i) the load voltage
 - ii) the developed power and the developed torque
 - iii) the absorbed power by the load.

Q6

15

- 1- Mention the transformer losses and the explain its theory of operation.
- 2- A 2 kVA, 2000/200-V, 50-Hz, step-down transformer has the following parameters: $R_1 = 1.3 \Omega$, $X_1 = 2.2 \Omega$, $R_2 = 0.02 \Omega$, $X_2 = 0.025 \Omega$. It is operating at 80% of its rated load at unity power factor. Using the exact equivalent circuit to, determine the efficiency of the transformer and its regulation.

End of Exam Questions, Good Luck