GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

B.TECH Electrical Engineering
Semester End Examination - Aug 2024

Duration : 180 Minutes
Max Marks : 100

Sem V - G2UB502T - Power System Analysis

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Compare transient stability and steady-state stability.	K1(2)
2)	Explain term sequence impedance.	K2(4)
3)	Illustrate the positive, negative and zero sequences components in 3 phase systems.	K2(6)
4)	Develop the impact of line loading on signal quality and power transfer in a transmission line.	K3(9)
5)	Construct the algorithm to calculate base current, and base impedance of a three phase system.	K3(9)
6)	A generator-transformer unit is connected to a line through a circuit breaker. The unit ratings are: Gen.: 10 MVA, 6.6 KV, Xd" = 0.1 pu, Xd' = 0.2 pu and Xd = 0.8 pu; and Transformer: 10 MVA, 6.9/33 KV, Xl = 0.08 pu; The system is operating on no-load at a line voltage of 30 KV, when a three-phase fault occurs on the line just beyond the circuit breaker. Construct the following: (i) Initial symmetrical RMS current in the breaker, (ii) Maximum possible DC off-set current in the breaker, (iii) Momentary current rating of the breaker, (iv) Current to be interrupted by the breaker and the interrupting KVA and (v) Sustained short circuit current in the breaker.	K5(10)
7)	Analyse load flow equations developed using Newton Raphson method in power system analysis.	K4(12)
8)	A 80 MVA, 10 KV, 3-phase generator has a sub transient reactance of 10%. The generator supplies a motor through a step - up transformer - transmission line – step-down transformer arrangement. The motor has rated input of 95 MVA, 6.3 KV with 15% sub transient reactance. The step-up 3-phase transformer is rated at 90 MVA, 11 KV-Y /110 KV-Y with 10% leakage reactance. The 3-phase step-down transformer consists of three single phase Y -Δ connected transformers, each rated at 33.33 MVA, 68/6.6 KV with 10% leakage reactance. The line has a reactance of 20 ohms. By selecting the 11 KV, 100 MVA as base values in the generator circuit, determine the base values in all the other parts of the system. Hence evaluate the corresponding pu values and draw the equivalent per unit reactance diagram.	K5(15)

9)	Determine the reactances of the three generators rated as follows on a common base of 200 MVA, 35 KV: Generator 1: 100 MVA, 33 KV, sub transient reactance of 10%; Generator 2: 150 MVA, 32 KV, sub transient reactance of 8% and Generator 3: 110 MVA, 30 KV, sub transient reactance of 12%.	K5(15)
10)	Assume that the fuel input Btu/hr for units 1 and 2 are given by F1 = (8P1 +0.024P12 +80)106 F2 = (6P2 +0.04P22 +120)106 The maximum and minimum loads on the units are 100MW and 10MW respectively. Determine the minimum cost of generation when the following load is supplied. The cost of fuel is Rs`2/million Btu.	K6(18)