Total No. of Printed Pages:3

SUBJECT CODE NO:- H-524
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Power System Analysis
(Revised)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Question No.1 and Question No.6 are compulsory.
ii) Attempt from each section any two questions from remaining questions.
iii) Assume suitable data wherever necessary.

Section A

Q.1 Solve any five questions from the following 10

a) What is impedance and reactance diagram?
b) A single-phase transformer is rated at 110/440V, 2.5 KVA, and its leakage reactance measured from L.T. side is 0.06 Ω. Determine the leakage reactance in p.u.
c) What are different types of load buses?
d) What is need of slack bus?
e) Define terms i) tree, ii) cotree.
f) Write expression for complex power injected to a bus.
g) Why is load flow study necessary?
h) What are advantage of p.u. system.

Q.2 a) Determine per unit impedance of 1-ϕ- transformer 07

b) Draw the reactance diagram for the power system shown in fig.1. Neglect resistance and use a base of 100 MVA, 220 KV in 50Ω line. The rating of the generator, motor and transformers are given below. 08

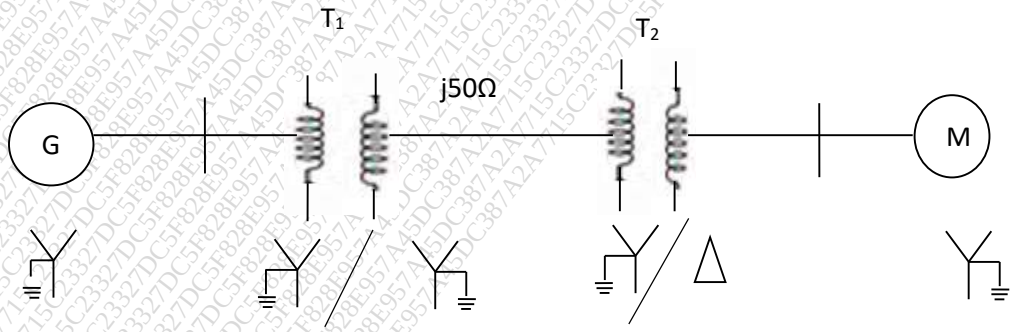

Fig.1

Generator : 40 MVA, 25 KV, X''= 20%
Motor : 50 MVA, 11 KV, X''= 30%
Transformer (T_1): 40 MVA, 33/220 KV, X = 15%
Transformer (T_2): 30 MVA, 11/220 KV, X = 15%

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Q.3 a) Prove that $Y_{Bus} = A^T y A$ 07

b) For a power system shown in figure.2 08
Obtain A, $\overline{A}$ and C, $\overline{C}$

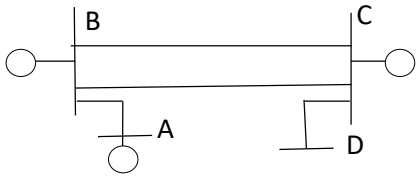

Fig.2

Q.4 a) Write the algorithm for load flow solution using GS method. 07

b) Fig.3 shows 3 Bus power system 08
Bus1: Slack bus V=1.05 Lo^o p.u.
Bus2: PV bus V=1.0 p.u. p_9=3.0 p.u.
Bus 3: PQbus, P_1=4 p.u, Q_1=2 p.u.
Carry out one iteration of solution by G-S method. Neglect limits on reactive power generation

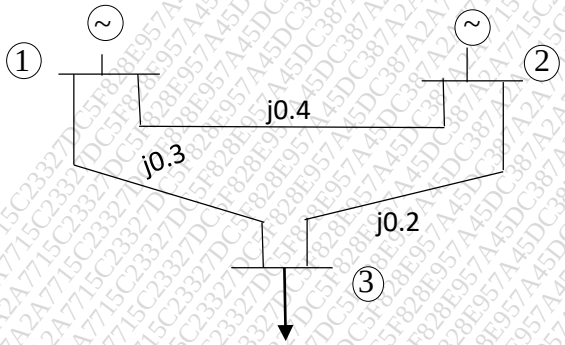

Fig.3

Q.5 a) Write a short note on selection of circuit breaker 07

b) Explain transient (i.e. short circuit) on a loaded synchronous machine. 08

Section – B

Q.6 Solve any five questions from following 10

a) Define i) Transient period
ii) Sub Transient period.
b) How the faults are classified?
c) What is meant doubling effect?
d) What is sequence operator?
e) What is need for short circuit studies or fault analysis.
f) What is difference between L-G and L-L faults?
g) What is sequence impedance and sequence network.
h) What is synchronous reactance

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Q.7 a) Explain sequence impedance of Transmission line 07

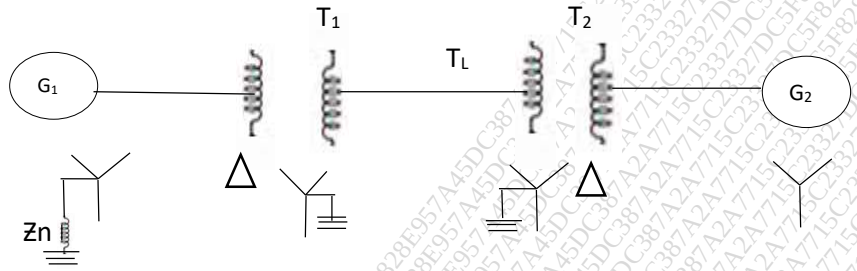
b) In a 3- ϕ and 4 wire system, the current in R_1Y_1 and B lines under abnormal conditions of loading are under 08

$I_R = 100\angle 30°A$; $I_y = 50\angle 300°A$, $I_B = 30\angle 180°A$

Calculate positive, negative and Ƶero sequence current in "R" Line and return current in neutral wire.

Q.8 a) Explain $Ƶ_{bus}$ building for Type 2 and Type3 modifications 07

b) For the power system whose line diagram and data shown in figure below. Draw the positive, negative, and zero sequence network. 08



G_1: $X_1 = X_2 = j0.2$ p.u, $X_0 = j0.06$p.u, $Ƶ_n = 0.5$ p.u.
G_2: $X_1 = X_2 = j0.69$ p.u, $X_0 = j0.164$ p.u,
T_1: $X_1 = X_2 = X_0 = j0.08$ p.u,
T_2: $X_1 = X_2 = X_0 = j0.08$ p.u,
T_L: $X_1 = X_2 = j0.164$ p.u, $X_0 = j0.494$ p.u.

Q.9 a) Derive an expression to determine fault current for L-G fault. Draw the sequence network. 07

b) Determine the fault current for L-L-G short circuit at the terminals of a star connected synchronous generator operating initially on an open circuit voltage of 1.0 p.u. The positive, negative and zero sequence reactance of the generator are respectively j0.35, j0.25, and j0.20 p.u. and its star point is isolated from ground. 08

Q.10 a) Explain open conductor faults 07

b) Explain the static security analysis at control centers. 08

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