PAPER ID-420396

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BTECH
(SEM VI) THEORY EXAMINATION 2021-22
POWER SYSTEM-II

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

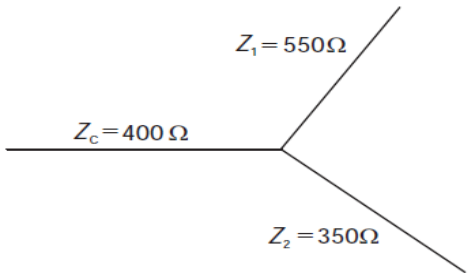
SECTION A

1. Attempt *all* questions in brief. 2*10 = 20

Qno.	Questions	CO
(a)	A 25 MVA ,33KV alternator has a p.u impedance value of 0.9 pu. Find the p.u impedance value at new base value of 50MVA at 11KV.	1
(b)	Mention the various assumptions taken in drawing a reactance diagram of a power system network.	1
(c)	Explain generator bus. When generator bus is treated as load bus?	2
(d)	Mention the reasons why Y-Bus is preferred over Z Bus during load flow analysis.	2
(e)	Compute the velocity of propagation of travelling waves in transmission lines.	3
(f)	Discuss why transmission lines are terminated by an underground cable.	3
(g)	What is the relation between angular momentum (M), inertia constant (H) and K.E of a synchronous machine?	4
(h)	Identify the difference between steady state stability and transient state stability of power system.	4
(i)	Define pick up value of the relay.	5
(j)	Explain the arc phenomenon in circuit breakers.	5

SECTION B

2. Attempt any *three* of the following: 10*3 = 30

Qno	Questions	CO
(a)	The phase voltages on the HV side of a step up transformer are 100 KV, 33 KV , 38 KV on phase a, b and c respectively . The voltages of phase a leads that of phase b by 100° and lags that of phase c by 176.5°. Determine the symmetrical components of the phase voltages.	1
(b)	Draw a flow chart for load flow solution through gauss seidel method whenboth PV and PQ buses are present in the network.	2
(c)	A 220 kV surge travels on a line of 400 Ω surge impedance and reaches a junction where two branch lines of surge impedances 550 Ω and 350 Ω, respectively are connected with the transmission line, Find the surge voltage and current transmitted and reflected into the lines. 	3
(d)	Derive the expression for critical clearing angle when a fault occurs at any one of the buses of standard system. Also mention the significance of critical clearing angle.	4

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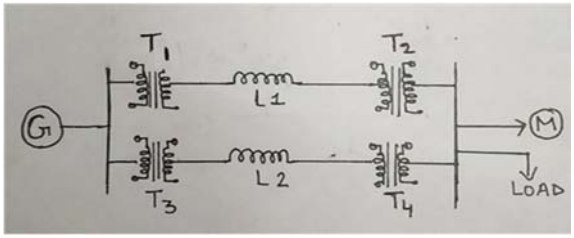
(e)	Explain high resistance and low resistance methodsof arc extinction at the time fault.	5

SECTION C

3. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Determine the fault currents and fault voltages when double line to ground fault occurs between phase b and cof an unloaded alternator.	1
(b)	The one-line diagram of three phase power system is shown in figure. Select a common base of 100 MVA and 22 KV on the generator side. Draw the reactance diagram. A 3-phase load of 60 MW, 0.6 P. F lagging at 10.5 KV is connected at bus. The line 1 and line 2 have reactance of 50 ohms and 65 ohms respectively.  Gen : 100 MVA, 22 KV , X= 0.18 p.u Tr1 50 MVA, 22/220 KV, X=0.1 p.u Tr2 40 MVA, 220/11KV, X=0.06p.u T3 40 MVA, 22/110KV , X=0.065p.u T4 50 MVA , 110/11KV, X=0.08p.u Motor 70 MVA , 11KV, X=0.2 p.u	1

4. Attempt any *one* part of the following: 10 *1 = 10

Qno	Questions	CO
(a)	Derive the static load flow equation for a power system network with n number of buses and also derive the expressions for Pi and Qi.	2
(b)	Form a Y-Bus for a given network using direct inspection method. Line | R in P.U | X in P.U 1-2 | 0.05 | 0.15 1-3 | 0.10 | 0.30 1-4 | 0.20 | 0.40 2-4 | 0.10 | 0.30 3-4 | 0.05 | 0.15	2

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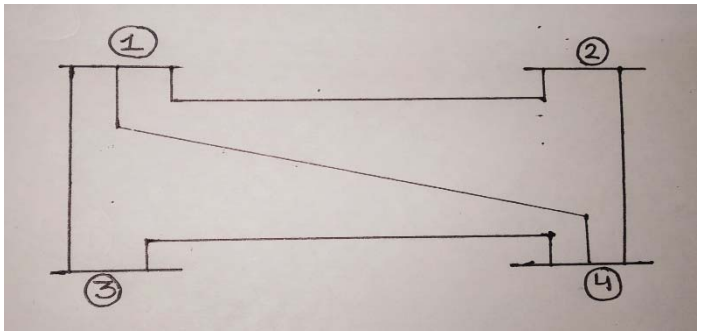

5. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Explain the expressions for reflection and refraction coefficients of voltage and current waves for the following cases: (i) Terminated through resistance (ii) Through a open circuit end	3
(b)	Explain the procedure for drawing Bewley's lattice diagram with the help of suitable example.	3

6. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Derive the swing equation for a synchronous machine connected to an infinite bus and explain the steady state stability limit on the basis of swing equation.	4
(b)	Explain the equal area criteria concept of power system stability when there is sudden increase in mechanical power.	4

7. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	What is the objective of power system protection scheme?Explain differential protection relay used for the protection of power system network.	5
(b)	Explain PSM of relay and find out the valueof plug setting multiplier for 50% and 100 % relay setting .The fault current is 2000 A, and CT ratio is 400 : 5.	5

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