

**Roll No:** 

### BTECH

(SEM VI) THEORY EXAMINATION 2021-22

## **POWER SYSTEM-II**

# Time: 3 Hours

1.

# Total Marks: 100

10\*3 = 30

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

## SECTION A

Attem	pt <i>all</i> questions in brief. 2	*10 = 20
Qno.	Questions	CO
(a)	A 25 MVA ,33KV alternator has a p.u impedance value of 0.9 p	ou. 1
	Find the p.u impedance value at new base value of 50MVA at 11KV	•
(b)	Mention the various assumptions taken in drawing a reactan	ce 1
	diagram of a power system network.	
(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 los	ad 2
	flow analysis.	
(e)	Compute the velocity of propagation of travelling waves in	3
	transmission lines.	
(f)	Discuss why transmission lines are terminated by an underground cable.	3
(g)	What is the relation between angular momentum (M), inertia constant (H)	4
	and K.E of a synchronous machine?	0
(h)	Identify the difference between steady state stability and transient state	4 7-
	stability of power system.	<u> </u>
(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:

Qno Questions CO (a) The phase voltages on the HV side of a step up transformer are 100 1 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. Draw a flow chart for load flow solution through gauss seidel method (b) 2 whenboth PV and PQ buses are present in the network. A 220 kV surge travels on a line of 400  $\Omega$  surge impedance and reaches (c) 3 a junction where two branch lines of surge impedances 550  $\Omega$  and 350  $\Omega$ , respectively are connected with the transmission line, Find the surge voltage and current transmitted and reflected into the lines.  $Z_1 = 550 \Omega$  $Z_c = 400 \Omega$  $Z_{2} = 350\Omega$ (d) Derive the expression for critical clearing angle when a fault occurs at 4 any one of the buses of standard system. Also mention the significance of critical clearing angle.



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

### **SECTION C** Attempt any *one* part of the following:

10\*1 = 10

Atten	$10^{-1} - 10$	
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. 1 lagging at 10.5 KV is connected at bus. The line 1 and line 2 hav reactance of 50 ohms and 65 ohms respectively.	F
	$ \begin{array}{c}  T_{1} \\  T_{2} \\  T_{3} \\  T_{3} \\  T_{4} \\  T_{$	2
	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	
Atten	10 npt any <i>one</i> part of the following:	*1 = 10

#### Attempt any *one* part of the following: 4.

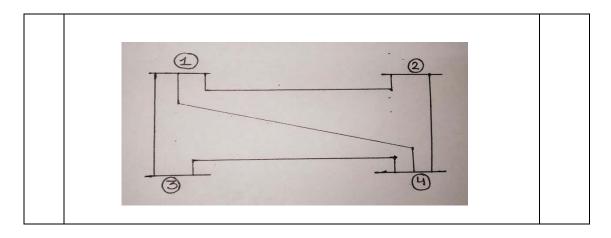
Atten	npt any <i>one</i> part of the <b>f</b>	following:	10 *	*1 = 10
Qno		Questions	17	CO
(a)	Derive the static load f number of buses and al		er system network with n ns for Pi and Qi.	2
(b)	Form a Y-Bus for a giv	en network using direc	t inspection method.	2
	Line	R in P.U	X in P.U	
	1-2	0.05	0.15	
	1-3	0.10	0.30	
	1-4	0.20	0.40	
	2-4	0.10	0.30	
	3-4	0.05	0.15	
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### Attempt any one part of the following: 5.

Attempt any <i>one</i> part of the following: 10*1		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	2
(b)	Explain the procedure for drawing Bewley's lattice diagram with the help of suitable example.	33.	

#### 6. rt of the fall

Atten	npt any <i>one</i> part of the following: 10*1	1 = 10
Qno	Questions	CO
(a)	Derive the swing equation for a synchronous machine connected to an infinite	4
	bus and explain the steady state stability limit on the basis of swing equation.	
(b)	Explain the equal area criteria concept of power system stability when	4
	there is sudden increase in mechanical power.	

### 7. Attempt any one part of the following:

	there is studien mercuse in mechanical power.		
Attempt any <i>one</i> part of the following: 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 value of plug setting multiplier for 50% and 100 % relay setting .The fault current is 2000 A, and CT ratio is 400 : 5.	5	