Scheme of Valuation/Answer Key

(Scheme of evaluation (marks in brackets) and answers of problems/key)

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: EE306

Course Name: POWER SYSTEM ANALYSIS

Max. Marks: 100		Duration: 3 Hours

PART A

		Answer all questions, each carries5 marks.	Marks
1		Definition (2).....Merits(1.5).....Demerits (1.5)	(5)
2		Significance of current limiting reactors in power system (2) Location (1.5).....Examples (1.5)	(5)
3		Difference of Slack bus from other buses (3) Significance of slack bus (2)	(5)
4		AVR(3).....Functions (2)	(5)
5		Problem statement$Minimize\ \ F_T = \sum_{n=1}^{k} F_n$ subjected to $P_R - \sum_{n=1}^{k} P_n = 0$ (2) Derivation of $\frac{dF_n}{dP_n} = \lambda\ for\ n = 1,2, \dots k$(3)	(5)
6		Loss coefficients(2).....Penalty factor(3)	(5)
7		Steady state stability(2).....Dynamic stability (1)....Transient stability (2)	(5)
8		five methods. 1 mark for each(5)	(5)

PART B

Answer any twofull questions, each carries10 marks.

9	a)	Calculations of base values of all sections (2) Reactance of G_1= j0.2(1).....Reactance of T_1=j0.0857(1) Reactance of transmission line =j0.1815(1) Reactance of T_2 =j0.0915(1).....Reactance of M_1 =j0.2745(1) Reactance of M_2 =j0.594(1) Reactance diagram with all reactance's marked (2)	(10)
10	a)	Zero sequence network of star-delta transformer (3) (star grounded-(2)+star ungrounded(1)) Zero sequence network of delta-delta transformer (2)	(5)
	b)	Diagram with proper markings (3).....Explanation(2)	(5)
11	a)	Single Line to Ground fault	(10)

(a) Fault current (2)

(b) Interconnection of sequence networks (3)

Line to Line fault

(a) Fault current (2)

(b) Interconnection of sequence networks (3)

PART C

Answer any twofull questions, each carries10 marks.

12 a) ***Admittance Value admittance table(2)*** (10)

Line	G (p.u)	B(p.u)
1-2	2	-6
1-3	1	-3
2-3	0.66	-2
2-4	1	-3
3-4	2	-6

Case a: With dotted line unconnected write Y_{BUS} (4)

Y_{11}=(1-j3), Y_{22}=(0.666-j2)+(1-j3)=(1.666-j5) ,Y_{33}=(1-j3)+(0.666-j2)+(2-j6)=(3.66-j11)

Y_{44}=(2-j6)+(1-j3)=(3-j9)

$Y_{12}=Y_{21}$=0 , $Y_{13}=Y_{31}$= -(1-j3)= -1+j3 , $Y_{14}=Y_{41}$=0

$Y_{23}=Y_{32}$= -(0.666-j2)= -0.666+j2. $Y_{24}=Y_{42}$= -(1-j3)= -1+j3

$Y_{34}=Y_{43}$= -(2-j6) = -2+j6

Case b: With dotted line connected write Y_{BUS} (4)

only the following changes due to the inclusion of the line

Y_{11}=(1-j3)+(2-j6)=(3-j9)

Y_{22}=(2-j6)+(0.666-j2)+(1-j3)=(3.666-j11)

$Y_{12}=Y_{21}$= -(2-j6) = -2+j6 all other values remains the same as case a

13 a) Any five difference between GS and NR (5x 1=5 marks) (5)

b) Figure (2), Explanation (3) (5)

14 Derivation Generator load model (5) (10)

Complete block diagram with all parameters specified (5)

PART D

Answer any twofull questions, each carries 10 marks.

15 a) $\frac{dF_1}{dP_1} = 0.096\,P_1 + 16\ Rs/MWhr$ (10)

		$\frac{dF_2}{dP_2} = 0.16\,P_2 + 12\,Rs/MWhr(2)$ Load 50 MW: P_1=15.625 MW P_2 =34.375 MW (3) Load 150 MW: P_1=78.126 MW P_2 =71.874 MW (3) Total cost= Rs. 52628 (2)	
16	a)	Definition/Explanation of spinning reserve(2) Significance with example (3)	(5)
	b)	Derivation for the condition of equal area criterion with necessary diagram (5)	(5)
17	a)	Derivation of swing equation (5)	(5)
	b)	$K.E. = \frac{1}{2}J\omega_{sm}^2 = 434.26\,MJ(1)$ $H = \frac{KE}{MVA\,rating} = 6.15\,MJ/MVA$ (2) $M = \frac{GH}{180\,f} = 0.0484\,MJ - \frac{s}{electr}.deg(2)$	(5)
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