Q. Code: 272411

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Six Semester

EE16601 – POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

(Regulation 2016)

Time: Three Hours **Maximum : 100 Marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	List the objectives of power system control.	1	R
2.	Distinguish between plant level and system level control.	1	U
3.	What is the function of load frequency control?	2	U
4.	List the methods available for LFC of interconnected systems.	2	R
5.	What are the various functions of excitation system?	2	R
6.	List the advantages of static excitation system.	2	R
7.	Differentiate between unit commitment and economic dispatch.	3	U
8.	Differentiate minimum up and minimum down time in unit commitment problem.	3	U
9.	What is the need for computer control of power system?	4	U
10.	What do you understand by security constraints?	4	U

PART B - (5 X16 = 80 Marks)

11. (a) A power station has to meet the following demand: **(16)** **1** **AP**

Group A: 200 KW between 8 A.M. and 6 P.M.

Group B: 100 KW between 6 A.M. and 10 A.M.

Group C: 50 KW between 6 A.M. and 10 A.M.

Group D: 100 KW between 10 A.M. and 6 P.M. and then between 6 P.M. and 6 A.M.

Plot the (i) daily load curve and (ii) load duration curve. Determine the (iii) diversity factor (iv) units generated per day and (v) load factor. Comment on your results.

(OR)

(b) A set of electrical load data, when plotted resembles an exponential curve **(16) 1 AP**

$$y = a_0 e^{a_1 x}$$

Evaluate the parameters a_0 and a_1 of this regression curve using the principle of least squares for load forecasting?

12. (a) With the block diagram of speed governing system, explain the Automatic Load Frequency Control. Also derive the necessary equations. **(16) 2 AP**

(OR)

(b) A two-area power system has identical parameters and operating conditions as given below: **(16) 2 AP**

Rated capacity of the area	=	1500 MW
Normal operating load	=	750 MW
Nominal frequency	=	50 Hz
Inertia constant of the area	=	5.0 s
Speed regulation	=	3 percent
Damping coefficient	=	1 percent
Governor time constant	=	0.06 s
Turbine time constant	=	0.25 s

Area-1 is subjected to a load increase of 30 MW. Determine Δf_{stat} and $\Delta P_{tie,12,stat}$.

13. (a) Derive the expression for steady state voltage error for step change in reference signal of closed loop AVR system. **(16) 2 AN**

(OR)

	(b)	Explain voltage control in power systems using composite characteristics of SVC.	**(16)**	**2**	**AN**
14.	(a)	The fuel inputs per hour of plants 1 and 2 are given as $F_1 = 0.2\ P_1^2 + 40\ P_1 + 120$ Rs/hr $F_2 = 0.25\ P_2^2 + 30\ P_2 + 150$ Rs/hr Determine the economic operating schedule and the corresponding cost of generation. The maximum and minimum loading on each unit is 100 MW and 25 MW respectively. Assume the transmission losses are ignored and the total demand is 180 MW. Also determine the saving obtained if the load is equally shared by both the units.	**(16)**	**3**	**AP**

(OR)

	(b)	Explain with a neat flow chart the procedure for finding the solution for unit commitment problem using forward DP method.	**(16)**	**3**	**AP**
15.	(a)	(i) Briefly discuss the various functions of ECC.	**(8)**	**4**	**AN**
		(ii) With a neat block diagram explain the SCADA hardware configuration.	**(8)**	**4**	**AN**

(OR)

	(b)	(i) Brief the various operating states and the control strategies of a power system.	**(8)**	**4**	**AN**
		(ii) Explain the security monitoring using state estimation with necessary diagrams.	**(8)**	**4**	**AN**