Hall Ticket Number :										

R-15

Code: 5G261

III B.Tech. II Semester Supplementary Examinations February 2021

Power System Analysis

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level

UNIT–I

1. a) Discuss with an example the procedure to form Zloop using singular transformation — 7M

   b) Obtain the Y-Bus of the power system shown in below figure 1. Take reactance of each line as j0.3 p.u.

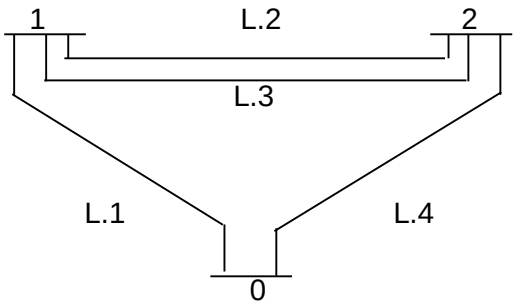


Figure 1. Power System Network — 7M

OR

2. a) Write algorithm for the modification of Zbus matrix for addition of an element. (type1 Modification) — 7M

   b) What is a partial network? Explain with an example. — 7M

UNIT–II

3. The load flow data for the sample power system are given below. The voltage magnitude at bus 2 is to be maintained at 1.04 p.u. The maximum and minimum reactive power limits of the generator at bus 2 are 0.35 and 0.0 p.u respectively. Determine the set of load flow equations at the end of first iteration by using Newton-Raphson method.

   Impedance for system

Bus Code	Impedence	Line charging
1-2	0.08+j0.24	0.0
1-3	0.02+j0.06	0.0
2-3	0.06+j0.18	0.0

   Schedule of generation and loads:

Bus code	Voltage	Generation		Load	
		MW	MVAR	MW	MVAR
1	1.06+j0.0	0	0	0	0
2	1.0	20	0	50	20
3	1.0	0	0	60	25

14M

OR

4. a) Write algorithm for Newton -Raphson method of load flow with polar coordinates — 8M

   b) Compare different load flow studies. — 6M

UNIT–III

5. a) Write notes on: (i) Per Unit System (ii) Short circuit capacity of Bus. 6M

   b) Two generators rated at 10 MVA, 11 KV and 15 MVA, 11 KV respectively are connected in parallel to a bus. The bus bars feed two motors rated 7.5 MVA and 10 MVA respectively. The rated voltage of the motors is 9 KV. The reactance of each generator is 12 % and that of each motor is 15 % on their own ratings. Assume 30 MVA, 10 KV base and draw reactance diagram 8M

OR

6. a) Explain the principle of symmetrical components. Derive the equations to convert phase quantities into symmetrical components and symmetrical components into phase quantities. 7M

   b) A 3-phase 37.5 MVA, 33kV alternator having X_1=0.18pu, X_2 = 0.12pu and X_0=0.10pu based on its rating, is connected to a 33 kV overhead line having X_1=6.3 ohms, X_2 = 6.3 ohms and X_0 = 12.6ohms per phase. A single line to ground fault occurs at the remote end of the line. The alternator neutral is solidly grounded. Calculate fault current. 7M

UNIT–IV

7. a) What is meant by power system stability? How they are classified? 6M

   b) A generator rated 75MVA is delivering 0.8 p.u power to a motor through a transmission line of reactance j0.2 p.u. The terminal voltage of the generator is 1.0p.u and that of the motor is also 1.0 p.u. Determine the generator emf behind transient reactance. Also find the maximum power that can be transferred. 8M

OR

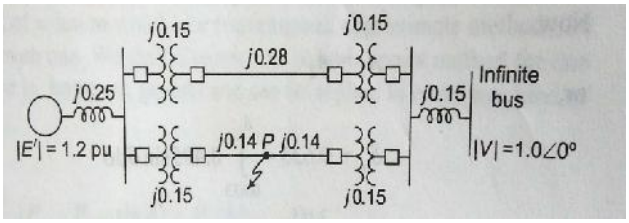
8. a) Derive power flow equations in terms of A, B, C, D constants. 6M

   b) A 200KM, 3-phase, 50Hz transmission line has the data A=D=$0.928\angle 1.2^0$, B=$131.2\angle 72.3^0$ per phase. The sending end voltage is 230 kV. Determine the maximum power that can be transmitted at the receiving end voltage of 220kVand the corresponding power required at the receiving end. 8M

UNIT–V

9. a) Draw a diagram to illustrate the application of equal area criterion to study transient stability when there is a sudden increase in the input of generator. 6M

   b) Find the critical clearing angle for the system shown in fig. for a three-phase fault at the point P. The generator is delivering 1.0 pu power under prefault conditions.



8M

OR

10. a) Describe the methods of improving transient stability. 6M

    b) State and explain equal area criterion. How do you apply equal area criterion to find the maximum additional load 8M

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III B.Tech. II Semester Supplementary Examinations February 2021

Switch Gear and Protection

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Explain the following : i) Symmetrical breaking capacity. ii) Asymmetrical breaking capacity.	7M	1	II
	b)	A circuit breaker interrupts the magnetizing current of a 90 MVA transformer at 220kV. The magnetizing current of the transformer is 8% of the full load current. Determine the maximum voltage which may appear across the gap of the breaker when the magnetizing current is interrupted at 60% of its peak value. The stray capacitance is 3250 μF. The inductance is 40 H.	7M	4	V
		OR			
2.	a)	What are the different types of circuit breakers when the arc quenching medium is the criterion? Mention the voltage for which a particular range of circuit breaker is recommended.	7M	1	I&V
	b)	Explain the operation and applications of Vaccum Circuit Breakers.	7M	1	II&III
		UNIT–II			
3.	a)	Explain the operation of a directional over current relay with a neat circuit diagram.	7M	2	II
	b)	Explain in detail about the IDMT relays characteristics.	7M	2	V
		OR			
4.	a)	Derive the Universal Torque equation of relay.	7M	2	VI
	b)	Compare Directional relay and Differential relay.	7M	2	V
		UNIT–III			
5.	a)	Explain briefly about stator fault protection in generator	7M	3	II
	b)	A 3 – phase, 2 pole, 33 KV, 8300 KVA alternator has neutral earthed through a resistance of 3.66 ohms. The machine has current balance protection which operates up on out of balance current exceed 20 % of full load. Determine % of winding protected against earth fault.	7M	4	V
		OR			
6.	a)	Explain the Buchholtz relay operation with a neat sketch.	7M	3	V
	b)	Explain the percentage differential protection scheme used for transformers.	7M	3	II&III
		UNIT–IV			
7.	a)	Explain the principle of operation of a Translay Relay protection for feeders	7M	3	II&III
	b)	Differentiate between the roles of a wave trap and coupling capacitors in carrier current protection.	7M	3	IV
		OR			
8.	a)	Explain the operation of a carrier current protection of transmission line with a neat schematic diagram.	7M	3	V
	b)	What do you understand by a zone of protection? Discuss various types of Zones of protection.	7M	3	I&VI
		UNIT–V			
9.	a)	Differentiate between a surge diverter and a surge absorber with sketch.	7M	3	IV
	b)	What are various methods commonly used for neutral grounding?	7M	3	I
		OR			
10.	a)	What is lightning? List its properties. Discuss the methods of protection against lightning.	7M	3	I&VI
	b)	What is reactance grounding? Mention its advantages and disadvantages.	7M	3	I

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III B.Tech. II Semester Supplementary Examinations February 2021

Microprocessors and Microcontrollers

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Describe about the signals involved in minimum mode operation of 8086 microprocessor based system with the timing diagram.	7M	1	1
	b)	Explain about the following assembler directives: ENDP, EQU, EVEN, EXTRN with examples.	7M	1	2
		OR			
2.	a)	Explain the following instruction set of 8086 microprocessor with examples: (i) Bit Manipulation Instructions (ii) Program Execution Transfer Instructions (iii) Interrupt Instructions (iv) Arithmetic Instructions.	8M	1	2
	b)	Write an assembly language program in 8086 to sort the given 'N' numbers in ascending order.	6M	1	3
		UNIT–II			
3.	a)	What is DMA? Explain DMA based data transfer using 8257 DMA controller.	7M	2	1
	b)	Explain the following data transfers (i) Programmed I/O (ii) Interrupted I/O.	7M	2	5
		OR			
4.	a)	With neat functional block diagram, explain the 8255 programmable peripheral interface and its operating modes.	8M	2	5
	b)	What is interrupt vector table of 8086? Explain its structure.	6M	2	1
		UNIT–III			
5.	a)	What is a USART? With a block diagram, explain the architecture of USART.	8M	4	5
	b)	Draw the conversion circuit of TTL to RS232C and explain the necessity of this interface.	6M	4	6
		OR			
6.	a)	Explain the pin structure of RS232C and discuss about voltage and current specifications of RS232C.	7M	4	5
	b)	Write an assembly language program to initialize 8251 and transmit and receive 100 bytes of data.	7M	4	3
		UNIT–IV			
7.	a)	Explain briefly serial communication features and modes of 8051.	7M	5	5
	b)	Explain bit level instructions of 8051 microcontroller with appropriate examples.	7M	5	2
		OR			
8.	a)	Draw the internal RAM memory organization of 8051 microcontroller and explain in detail.	7M	5	6
	b)	Write an 8051 assembly program to evaluate the factorial of an integer number N using recursive procedure.	7M	5	3
		UNIT–V			
9.	a)	Explain the features and applications of ARM7 microcontroller.	7M	5	2
	b)	Explain the PWM controller features in available ARDUINO microcontroller.	7M	5	5
		OR			
10.	a)	Explain the features and applications of ARM9 microcontroller.	7M	5	2
	b)	Draw the block diagram of ARDUINO microcontroller and explain its main features.	7M	5	6

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III B.Tech. II Semester Supplementary Examinations February 2021

Power System Operation and Control

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Explain the step by step procedure for computing economic allocation of generation in a thermal station.	6M	CO1	II
	b)	In a thermal power station, incremental cost are given by the following equations: dC_1/dP_1 = Rs.$(0.15P_1+12)$; dC_3/dP_3 = Rs.$(0.21P_3+13)$; dC_2/dP_2 = Rs.$(0.05P_2+14)$; Where P_1, P_2 and P_3 are the loads in MW. Evaluate the economical load allocation between the three units, when the total load on the station is 300MW.	8M	CO1	V
		OR			
2.	a)	Give various advantages of general loss formula and state the assumptions made for calculating B_{mn} coefficients.	7M	CO1	I
	b)	The incremental fuel cost for two plants are dC_1/dP_1 =$0.075P_1$+18 Rs./MWh dC_2/dP_2 =$0.08P_2$+16 Rs./MWh The loss coefficients are given as B_{11}=0.0015/MW, B_{12}= -0.0004/MW and B_{22}=0.0032/MW for λ=25 Rs./MWh. Solve for the real power generations, total load demand and the transmission power loss.	7M	CO1	III
		UNIT–II			
3.	a)	Explain clearly the mathematical formulation of optimal scheduling of hydrothermal system with a typical example.	7M	CO2	II
	b)	In a two plant operation system, the hydro plant is operated for 10 hrs, during each day and the steam plant is to operate all over the day. The characteristics of the steam and hydro plants are: $CT=0.04PGT^2+30PGT+10$ Rs.hr $WH=0.12\ PGH^2+30PGH\ m^3/sec$ When both plants are running, the power owned from steam plant to load is 150 MW and the total quantity of water is used for the hydro plant operation during 10 hrs is $150x10^6\ m^3$. Determine the generation of hydro plant and cost of water used. Neglect the transmission losses.	7M	CO2	VI
		OR			
4.	a)	Write short notes on unit commitment problem, load scheduling, and economic dispatch with a real time example.	7M	CO2	II
	b)	Using dynamic programming method, how do you find the most economical combination of the units to meet a particular load demand?	7M	CO2	III

UNIT–III

5.	a)	Explain the mathematical modeling of speed governing system.	7M	CO3	II
	b)	Two turbo alternators rated for 110 MW and 220 MW have governor droop characteristics of 5% from no load to full load. They are connected in parallel to share a load of 250 MW. Determine the load shared by each machine assuming free governor action.	7M	CO3	IV

OR

6.	a)	Explain about the transfer function and block diagram representation of IEEE Type-1 model of excitation system.	7M	CO3	II
	b)	Explain the block diagram representation of an isolated power system with diagram.	7M	CO3	III

UNIT–IV

7.	a)	Explain the necessity of keeping frequency constant in a power system network.	7M	CO4	II
	b)	With a neat sketch of block diagram of two area load frequency control system, explain the operation under steady state condition, without any controllers.	7M	CO4	III

OR

8.	a)	With a neat block diagram explain the load frequency control for a single area system.	6M	CO4	II
	b)	Two generators rated for 250 MW and 500 MW are operating in parallel. The droop characteristics are 4% and 6% respectively. Assuming that the generators are operating at 50 Hz at no load, how a load of 750 MW would be shared. What is the system frequency? Assume free governor action.	8M	CO4	III

UNIT–V

9.	a)	Explain clearly what you mean by compensation of line and discuss briefly different methods of compensation.	7M	CO5	II
	b)	A 440V, 3-Ø distribution feeder has a load of 100 KW at lagging p.f. with the load current of 200A. If the p.f. is to be improved, determine the following: i) Uncorrected p.f. and reactive load ii) New corrected p.f. after installing a shunt capacitor of 75 KVAR.	7M	CO5	III

OR

10.	a)	What is load compensation? Discuss its objectives in power system.	6M	CO5	II
	b)	The load at receiving end of a three-phase overhead line is 25.5 MW, power factor is 0.8 lagging, at a line voltage of 33 kV. A synchronous compensator is situated at receiving end and the voltage at both the ends of the line is maintained at 33 kV. Calculate the MVAR of the compensator. The line has a resistance of 4.5 ohms per phase and inductive reactance (line to neutral) of 20 ohms per phase.	8M	CO5	IV

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