F 3749 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

ADVANCED POWER SYSTEMS (Elective–II) (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is AGC?
2. What are the objectives of AGC?
3. What are the constraints to be considered in unit commitment?
4. What are thermal unit constraints?
5. Discuss briefly hydroelectric plant model.
6. What is meant by short range hydro scheduling?
7. What is the procedure for studying interchange of power over extended period of time.
8. How interchange evaluation with unit commitment is done?
9. What are the different functions of system security?
10. Discuss about network sensitivity factors.

(10 × 4 = 40 marks)

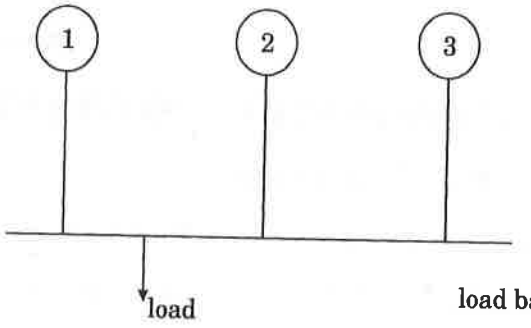
Part B

Each question carries 12 *marks.*

11. Given a single area with three generating units.

Unit	*Rating*	*Speed droop* R (per unit on unit box)
1	100 MVA	0.01
2	500 MVA	0.015
3	500 MVA	0.015

Turn over



load base = 1000 MVA

The units are initially loaded as

$P_1 = 80$ MW, $P_2 = 300$ MW, $P_3 = 400$ MW Assume D = 0. What is the new generation of each unit for a 50 MW load increase. Repeat with D = 1.0pu (1.0 pu on load box)). Convert all quantities to a common base. (12 marks)

Or

12. With Block diagram explain generator load model. (12 marks)

13. Explain priority lit method for a unit commitment problem. (12 marks)

Or

14. Draw the flow chart of Unit commitment via forward dynamic programming. (12 marks)

15. Explain pumped storage bydro scheduling by gradient method. (12 marks)

Or

16. Explain the dynamic programming solution to the hydro thermal scheduling problem. (12 marks)

17. Explain with flow chart pool economic dispatch. (12 marks)

Or

18. Explain economic interchange evaluation. (12 marks)

19. Explain network sensitivity methods. (12 marks)

Or

20. Explain contingency analysis using sensitivity factors. (12 marks)

(5 × 12 = 60 marks)

F 3781 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

DIGITAL PROTECTION OF POWER SYSTEMS (Elective III) (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is meant by sample and hold circuit ?
2. What is the function of current transformer in protective relying ?
3. How simulation of power system disturbance is done ?
4. Discuss simulation of Voltage transformers in protective circuit.
5. Discuss on line application of computers in protection.
6. What is meant by relay co-ordination programme ?
7. What is multistage frequency relay ?
8. What are the special features of microprocessor based distance relay ?
9. Draw the block diagram of microprocessor based distance relay.
10. What is quadrilateral relay ?

(10 × 4 = 40 marks)

Part B

Answer any **five** *questions.*
Each question carries 12 *marks.*

11. Explain in detail the function and construction of instrument transformers used in protective circuit.

Or

12. Explain in detail how protective relays are classified based on technology and function.
13. Discuss in detail the application of digital computer in power system protection.

Or

Turn over

14. How simulation of distance relay is done during transient condition.

15. Explain in detail relay co-ordination programme.

Or

16. What is the necessity of supervisory control and data acquisition system in inter connected power networks ? Explain the function and configuration of it.

17. Explain how protection of alternator is done against loss of excitation.

Or

18. Draw the block diagram representing interface of self checking microprocessor based relay with disturbance detector.

19. Explain in detail microprocessor based directional relay.

Or

20. Explain in detail microprocessor based impedance relay.

(5 × 12 = 60 marks)

F 3709 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch – Electrical and Electronics Engineering

SWITCHGEAR AND PROTECTION (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

1. What are the advantages of Airblast circuit breaker over oil circuit, circuit breaker?
2. Define and explain the terms: breaking capacity and recovery voltage.
3. Explain the need for protective relaying.
4. With a block diagram explain the operation of a static differential relay.
5. Briefly explain the protection of alternator against failure of excitation.
6. Write a note on overcurrent protection of transformer.
7. Explain carrier current protection of transmission lines.
8. Draw a connection diagram of the Translay system for the protection of a 3 phase feeder.
9. Define surge impedance with reference to transmission line and give an expression for its value.
10. What is meant by insulation co-ordination? Explain briefly.

(10 × 4 = 40 marks)

Part B

11. Explain the construction, principle of operation and applications of minimum oil circuit breaker. (12 marks)

Or

12. (a) Explain how are is initiated and maintained in circuit breaker. (5 marks)

    (b) Describe the construction and principle of operation of SF6 circuit breaker. (7 marks)

13. (a) What are the basic requirements of good protective relay? (4 marks)

    (b) Describe the construction and working principle of distance relay. (8 marks)

Turn over

Or

14. What are the main features of good protective relay? Give a classification of relays. Explain. (12 marks)

15. What are the common types of faults that may occur in generators? Draw and explain the differential protection scheme for generator. (12 marks)

Or

16. (a) Describe with neat diagram the earth fault protection of λ/λ transformer. (7 marks)

(b) Give the principle of operation of Buchholz' relay. (5 marks)

17. What is the Merz-price voltage balance protection system? How does it protect feeder? Explain it with a neat diagram. (12 marks)

Or

18. (a) Explain a scheme of protection for a ring main. (6 marks)

(b) Explain the earth fault protection of transmission line. (6 marks)

19. (a) What is horn gap arrestor? Explain how it works? What is the purpose of inserting a resistance between horn gap arrestor and the line. (8 marks)

(b) Explain the use of ground wires. (4 marks)

Or

20. (a) Discuss the various internal and external causes of over voltages in a power system. (5 marks)

(b) Describe various types of lighting arrestors for protection against surge voltages. (7 marks)

[5 × 12 = 60 marks]

F 3720 (Pages : 2) Reg. No.....

Name .....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

INSTRUMENTATION (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What are the classifications of transducers ? Explain with examples.
2. Differentiate between accuracy and precision with examples.
3. Explain the sensitivity type of resistance potentiometer. What are its advantages ?
4. Describe the temperature effect and its compensation in strain gauges.
5. Explain the principle of operation of a radiation pyrometer.
6. Explain the characteristics of thermistors.
7. Explain the principle of operation of Doppler flow meter. What are its advantages ?
8. Describe the principle of operation of null balance type accelerometers.
9. Discuss the advantages and disadvantages of McLeod gauge.
10. Describe the working of a scintillation counter with its applications.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. What are the different methods of correction for interferring and modifying inputs ? Discuss any three types in detail with examples.

(12 marks)

Or

12. (a) Define the transfer function of a system. What are the different standard test signals ? Explain. (4 marks)

(b) Derive the step response of a second order instrument. (8 marks)

13. Explain the working principle of a LVDT. Draw the equivalent circuit of a LVDT and explain. Discuss the applications.

(12 marks)

Or

Turn over

14. (a) Explain load cells with their advantages. (5 marks)

(b) Describe the principle of working of piezoelectric transducers. Draw the equivalent circuit and explain. (7 marks)

15. Explain thermoelectric laws with different thermocouple systems. Draw the characteristics of thermocouples and explain. (12 marks)

Or

16. (a) Draw the bridge circuits used with RTDs and explain. (8 marks)

(b) What are Thermistors ? Explain with the materials used for their construction. (4 marks)

17. (a) Describe with diagram the piezoelectric accelerometer. (6 marks)

(b) Explain the principle of operation of an optical transducer. What are its applications ? (6 marks)

Or

18. Explain with diagram the electromagnetic flow meter. Compare it with the ultrasonic flow meters. (12 marks)

19. (a) Draw the block diagram of a spectrum analyser and explain. (6 marks)

(b) Explain with figure the hygrometer. What are its applications ? (6 marks)

Or

20. (a) Explain with figure the Pirani gauge. What are its limitations ? (4 marks)

(b) Explain the principle of operation of ionization and thermal conductivity gauges. What are their applications ? (8 marks)

[5 × 12 = 60 marks]

F 3729 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL SYSTEM DESIGN (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Discuss in detail the factors that influence the choice of corelength in d.c. machine.
2. Explain output coefficient and specific electric and magnetic loadings of a d.c. machine.
3. How are low voltage and high voltage windings arranged in a transformer with respect to core and why ?
4. Write the properties of the oil to be used for cooling in a transformer.
5. A 500 kVA, 3.3 kV, 50 Hz., 600 r.p.m., 3-phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 Wb./m.^{2} the ratio of pole arc to pole pitch 0.65, short circuit ratio 1.2, the gap contraction factor 1.15, winding factor 0.955.
6. Three light points each with one way switch are to be wired up. Switches are to be provided in three different places. Draw the following :—
   (a) Schematic diagram.
   (b) Wiring diagram in looping in system.
   (c) Single line diagram for (b).
   (d) Wiring diagram for joint box system.
7. Enlist and describe in brief the equipments required for an indoor substation.
8. Give a description of earthing system in a substation. Mention the factors that affect earth resistance.
9. State the reasons for providing fuses on the neutral wire.
10. Derive the general output equation of an a.c. machine.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Give the step by step procedure for designing the shunt field winding of a d.c. machine highlighting the pole, coil design and temperature rise.

Or

12. Calculate the diameter and length of armature for a 7.5 kW, 4 pole, 1000 r.p.m., 220 V shunt motor. Given the full-load efficiency = 0.83, maximum gap flux density 0.9 Wb./m.^{2}, specific electric loading = 30,000 ampere conductors per metre, field form factor = 0.7. Assume that the maximum efficiency occurs at full-load and the field current is 2.5 % the rated current. The pole face is square.

Turn over

13. Derive the expression for the output equation of a single-phase transformer.

Or

14. Calculate the approximate over all dimensions for a 300 kVA, 6600/400 V, 50 Hz., 3-phase core type transformer. Assume : e.m.f. per turn = 12 V ; maximum flux density = 1.5 Wb/m.^{2}, current density = 3A/mm.^{2}, window space factor = 0.4, over height = overall width, stacking factor = 0.9. Use a 3 stepped core. Width of the largest stamping = 0.9 d, net iron area = 0.6 d^2 where d is the diameter of the circumscribing circle.

15. In a (30 m. × 15 m.) size work shop, one 15 hp, 400 volts, 3-phase, 50 Hz. motor is to be installed. Prepare the estimate the quantity of material required and its cost with a layout of the wiring.

Or

16. (a) Compare the overhead and underground distribution schemes.

    (b) With the help of an arbitrary schematic diagram and layout, explain the steps estimating the total cost for a house wiring.

17. Estimate the material requirement for the installation of a 400 kVA, 11 kV/415 V foundation mounted outdoor substation.

Or

18. A substation has to be installed in a residential complex having a load of 80 kVA, taking supply from a near by 11 kV line. Select the type of substation, estimate the material and cost of installation.

19. Explain the effect of airgap length on the performance of a synchronous machine. Also discuss the factors to be considered while deciding the no. of stator slots in a synchronous machine.

Or

20. Estimate the stator core dimensions, no. of stator slots and number of stator conductors per slot for a 100 kW, 3300 V, 50 Hz., 12 pole, star connected slipring inductor motor. B = 0.4 Wb/m.^{2}, a.c. 25000 amp. cond./m., $\eta = 0.9$, p.f. = 0.9. Choose main dimensions to give the best power factor. The slot loading should not exceed 500 amp. conductors.

(5 × 12 = 60 marks)

F 3750 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

ADVANCED MICROPROCESSORS—Elective II (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is pipelining in 8086 microprocessor operation ? Explain.
2. Explain the memory segmentation in 8086 microprocessor.
3. List 5 addressing modes of 8086 with examples.
4. Explain the memory banking in 8086.
5. Discuss the features of 80186 processor.
6. Explain the datatypes supported by 80286 processor.
7. What are descriptors and selectors ?
8. Explain the memory management unit of 80386 microprocessor.
9. What are the special Pentium registers ?
10. Compare CISC and RISC architectures.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Discuss the minimum and maximum mode of operation of 8086 processor.

    (b) Discuss the functions of the following pairs of 8086 :—

    (i) $M/\overline{IO}$; (ii) NMI ; (iii) $B\overline{HE}$; (iv) ALE.

Or

12. (a) Explain the Flag bits in 8086 processor.

    (b) Discuss on bus buffering and latching.

13. (a) Write the various CALL instructions in 8086.

    (b) An array of ten 8 bit numbers (signed) are stored in memory starting from address AOOOH. Write an Assembly language programme to generate two arrays from the above array such that one array starting from BOOOH construct all positive numbers and another array starting from location COOOH consists of all negatives numbers.

Or

Turn over

14. (a) Interface 4KB of RAM to 8086 processor in minimum mode. Basic chips available are 2142 (1K × 4) RAM. Provide facility for byte and/or wood access at even/odd addresses.

(b) Explain the various string instructions in 8086.

15. With neat block diagram, explain the internal architecture of Intel 80286 processor.

Or

16. Discuss the internal architecture of 8087 Numeric data processor. Draw the interfacing with 8086 processor.

17. (a) Explain the salient features of 80386 processor and the protected mode of operation.

(b) Explain briefly TSS in 80386.

Or

18. (a) Explain with neat block diagram the internal architecture of 80486 processor.

(b) Explain Cache memory.

19. (a) Discuss the architecture of Pentium Processors.

(b) What is Hyperpipelined technology ?

Or

20. Explain the function of the following :—

(i) Branch prediction logic.

(ii) Pentium control register.

(iii) Interrupt vector table.

(iv) Memory paging.

(5 × 12 = 60 marks)

F 3752 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

ADVANCED POWER ELECTRONIC SYSTEMS—Elective II (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain the principle of operation of a Buck converter.
2. Find the duty ratio of a cuk converter operating at 25 kHz to obtain an output voltage 200 V. The input d.c. voltage consists of two series connected 12 V batteries. Also find the voltage across the switch.
3. Discuss the push-pull topology of SMPS.
4. Why are multiple switches, balanced, isolated d.c.-d.c. converters used in SMPS ?
5. What are the various types of Resonant converters ?
6. Give the principle of zero voltage switching.
7. What is the advantage of eliminating low frequency harmonics and the need for PWM techniques ?
8. What are the disadvantages of SPWM ?
9. Explain the terms displacement factor and distortion factor.
10. What are the various types of UPS ? Explain.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. With neat circuit diagram, explain the operation of a buck-boost converter. Explain continuous conduction mode and discontinuous conduction mode.

Or

12. Draw the circuit configuration of full bridge d.c.-d.c. converter. Obtain the output voltage equation, with unipolar and bipolar switching.

13. Describe with a block diagram the operation of an SMPS. What are its advantages and applications ?

Or

14. What are the basic control methods for SMPS ? Describe with block diagrams.

Turn over

15. Describe with circuit diagrams and relevant waveform series and parallel resonant converters.

Or

16. With neat circuit diagram and waveform explain zero current switching. Compare it with zero voltage switching.

17. What are the various PWM techniques used in inverter ? Explain each technique briefly.

Or

18. Describe the tolerance band control and fixed frequency control of PWM with block diagram.

19. (a) Explain with neat block diagram an online UPS.

(b) Give a method of powerfactor correction.

Or

20. (a) Discuss the principle of input line current shaping using boost reactifier.

(b) Describe the block schematic of an electronic ballast.

(5 × 12 = 60 marks)

F 3782 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

INSULATION TECHNOLOGY—(Elective—III) (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *the questions.*
Each question carries 4 *marks.*

1. What are electronegative gases ? Why is the breakdown strength higher in these gases ?
2. List out the properties of various insulating materials for use in HV cables.
3. Explain the representation of a lossy dielectric.
4. Define electric field stress and dielectric strength. List the factors on which dielectric strength depend.
5. How is interfacial polarisation different from other mechanisms of polarisation ?
6. What are the measures incorporated to withstand HV surges in transformer ?
7. Explain diffusion coefficient and mean free path.
8. How is breakdown in non-uniform fields different from that in uniform fields ?
9. What are the properties of composite dielectrics ?
10. How does electrical conduction in liquids different from that in gases ?

(10 × 4 = 40 marks)

Part B

Answer any **five** *questions.*
Each question carries 12 *marks.*

11. Explain the properties and applications of the following insulating materials :—
    (i) Teflon.
    (ii) SF_6.
    (iii) Paper.

Or

12. Write short notes on the following :—
    (i) Polychlorobiphenyls.
    (ii) Transformer oil impurities and purification.

Turn over

13. Explain any *two* methods of measuring dielectric constant and loss factor.

Or

14. Explain partial discharge detection using straight detectors. What drawbacks of this method are over come in balanced detection method ?

15. Explain orientational polarisation and derive the expression for the same.

Or

16. Explain the measures adopted in the design of insulating system of capacitors.

17. Explain the Townsend's criterion for breakdown in gases.

Or

18. Explain the following :—

    (i) Paschen's law.

    (ii) Penning effect.

19. Explain break-down phenomena in pure and commercial liquids.

Or

20. Explain the breakdown phenomena in social dielectrics.

(5 × 12 = 60 marks)

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F 3702 (Pages : 3) Reg. No EEE

Name .....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Eighth Semester

Branch : Electrical and Electronics Engineering

POWER SYSTEM ANALYSIS (E)

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

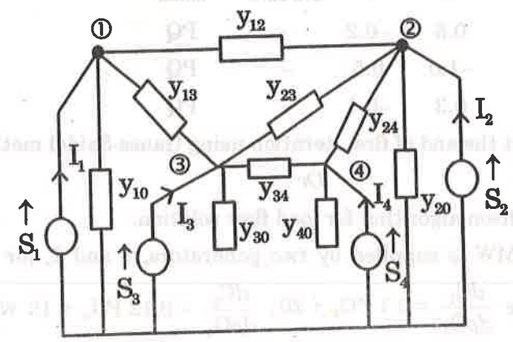
1. Explain per unit system.
2. What are Sequence impedances ?
3. Write the Jacobian matrix for a system having three buses. Bus 1 is the swing bus.
4. What modifications are to be made in the Gauss-Seidel algorithm when PV buses are also present.
5. Derive the criterion for economic distribution of load between units within a plant.
6. What are B coefficients ?
7. Why do we use reactors in the power system ? Discuss their advantages.
8. Derive an expression for fault current for single line to ground fault on an unload generator.
9. What is power system stability ?
10. What is critical clearing time and angle ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11.

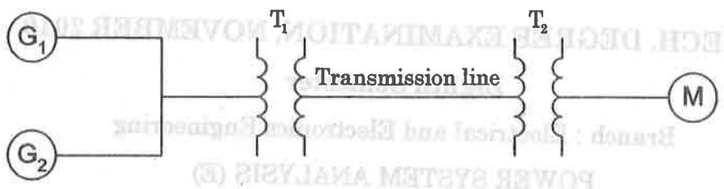


Formulate Y_{bus} for the network shown by using singular transformation.

Or

Turn over

12.



$G_1 \rightarrow$ 10 kVA, 2500 V, $z = j\,0.2$ p.u

$G_2 \rightarrow$ 20 kVA, 2500 V, $z = j\,0.3$ p.u

$T_1 \rightarrow$ 40 kVA, 2500/8000 V, $z = 0.1$ p.u

$T_2 \rightarrow$ 80 kVA, 10000/5000 V, $z = 0.09$ p.u

$M \rightarrow$ 25 kVA, 4000 V.

Transmission line $\rightarrow (50 + j\,200)\ \Omega$.

Draw an impedance diagram, expressing all value in p.u.

13. The following is the system data for a load flow solution. The line admittances are :

Bus code		Admittance
1 – 2	...	$2 - j\,6$
1 – 3	...	$1 - j\,3$
2 – 3	...	$0.666 - j\,2$
2 – 4	...	$1 - j\,3$
3 – 4	...	$2 - j\,6$

13. The Schedule of active and reactive powers :

Bus code		P	Q	V	Remarks
1	...	–	–	$1.04\angle 0$	slack
2	...	0.5	–0.2	–	PQ
3	...	–1.0	0.5	–	PQ
4	...	0.3	–0.1	–	PQ

Determine the voltages at the end of first iteration using Gauss-Seidel method.

Or

14. Explain the Newton Raphson algorithm for load flow solution.

15. A constant load of 300 MW is supplied by two generators, 1 and 2, for which the respective incremental fuel costs are $\frac{dC_1}{dpG_1} = 0.1\,PG_1 + 20$, $\frac{dC_2}{dpG_2} = 0.12\,PG_2 + 15$ with powers PG in MW and costs C in Rs./hr. Determine (a) the most economical division of load between the generators and (b) the savings in Rs./day thereby obtained compared to equal load sharing between machines.

Or

16.

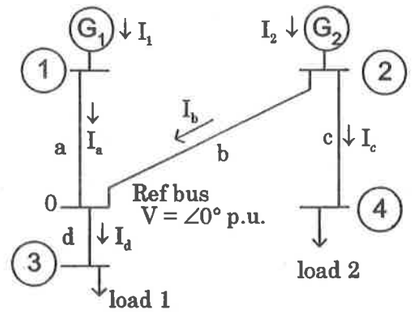


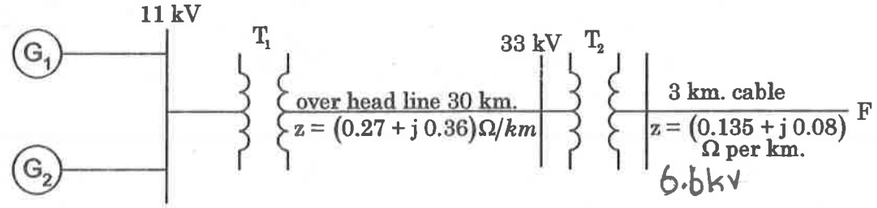
Figure shows a system having two plants 1 and 2 connected to buses 1 and 2, respectively. There are two loads and a network of four branches. The branch currents and impedances are :

$I_a = 2 - j\,5$ p.u ; $I_b = 1.6 - j\,0.4$ p.u. ; $I_c = 1 - j\,0.25$ p.u. ; $I_d = 3.6 - j\,0.9$ p.u. ;

$z_a = 0.015 + j\,0.06$ p.u. ; $z_b = 0.015 + j + 0.06$ p.u. ; $z_c = 0.01 + j\,0.04$ p.u. ; $z_d = 0.01 + j\,0.04$ p.u.

Calculate the loss formula coefficients of the system in p.u. and in reciprocal MW, if the base of 100 MVA.

17.



G_1 : 10 MVA, 15 % reactance.

G_2 : 10 MVA, 12.5 % reactance.

T_1 : 10 MVA, 10 % reactance.

T_2 : 2.5 MVA, 8 % reactance.

For the radial network shown, a three-phase fault occurs at F. Determine the fault current and the line voltage at 11 kV bus under fault conditions.

Or

18. Show that positive and negative sequence currents are equal in magnitude but out of phase by 180° in a line to line fault. Draw a diagram showing inter connection of sequence networks for this type of fault.

19. Explain the concept of equal area criterion. How can it be used to steady transient stability ?

Or

20. Discuss the procedure for solving the swing equation by using point by point method.

$(5 \times 12 = 60$ marks)