Enrollment No._____

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-V

Subject Code:-EE-501 **Subject Name:-**Electrical Power - II

Date:-09/11/2016 **Time:-**10:30 am to 01:30pm **Total Marks:-**70

Instructions:

1. Answer each section in separate Answersheet.
2. Use of Scientific Calculator is permitted.
3. All questions are Compulsory.
4. Indicate Clearly, the options you attempt along with its respective question number.
5. Use the last page of main supplementary for rough work.
6. Assume suitable data if any.

Section-I

Q-1 **[A]** The three phase ratings of a three winding transformer are: **[05]**
Primary: Y-connected,66 kv,15 MVA
Secondary: Y-connected, 13.2 kv,10 MVA
Tertiary: Δ - connected, 2.3 kv, 5 MVA
Neglecting resistance, the leakage impedances are Z_{ps}=7% on 15 MVA-66 kv base, Z_{pt}= 9% on 15 MVA-66 kv base, Z_{pt}= 8% 10 MVA-13.2 kv base. Find the per unit impedances of star connected equivalent circuit for base of 15 MVA-66 kv in the primary circuit.

[B] Show how regulation and transmission efficiency are determined for medium line using end condenser method with vector diagram. **[05]**

[C] Explain reactive compensation of transmission line. **[05]**

OR

[C] Explain one line diagram representation for power system network. Also explain reactance diagram and per unit diagram of power system network. **[05]**

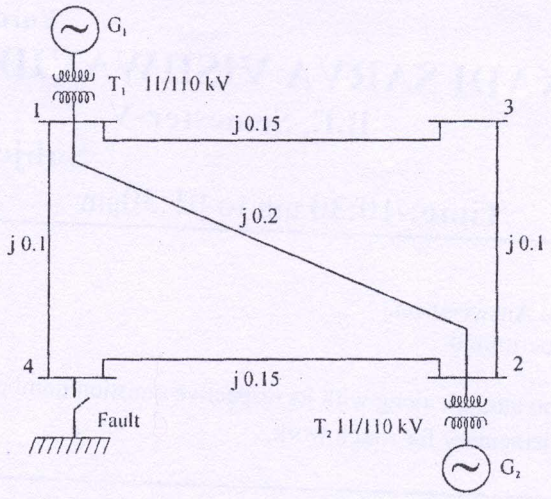
Q-2 **[A]** Explain three phase fault at terminals of unloaded synchronous generator. **[05]**

[B] Find the following for a single circuit transmission line delivering a load of 50MVA at 110 kV and p.f. 0.8 lagging. (1) Sending end voltage (2) Sending end current (3) Sending end power (4) efficiency of transmission. Given A=D=0.98∠3°; B= 110∠75°Ω; C=0.0005 ∠ 80°siemen. **[05]**

OR

Q-2 **[A]** Evaluate the generalized circuit constant for Medium line- nominal T method. **[05]**

[B] Consider the 4-bus system of fig. buses 1 & 2 are generator bases and 3 & 4 are load buses. The generators are rated 11 KV, 100 MVA, with transient reactance of 10% each. Both the transformers are 11/110 KV, 100 MVA with a leakage reactance of 5%. The reactances of the lines to a base of 100 MVA, 110 KV are indicated on the fig. Find the short circuit MVA for a three-phase solid fault on bus 4 (load bus). **[05]**



Q-3 **[A]** Explain : selection of circuit breaker. **[05]**

[B] A balanced star connected load takes 90 A from a balanced 3-phase, 4-wire supply. If the fuses in the Y and B phases are removed, find the symmetrical components of the line currents (i) before the fuses are removed (ii) after the fuses are removed. **[05]**

OR

Q-3 **[A]** Starting from first principles, show that surges behaves as travelling waves. **[05]**

[B] The 33 KV busbars of station are separated in two sections i.e. section A and section B by a reactor. Section A is fed from four 10 MVA generators each having 0.2 pu reactance and section B is fed from grid through 50 MVA transformer of 0.1 pu. An outgoing feeder is connected through CB of 500 MVA short circuit capacity, nearer to reactor on section A side. Find reactance of reactor to prevent CB to be overloaded, if symmetrical fault occurs on the outgoing feeder. **[05]**

Section-II

Q-4 **[A]** Derive equations for line to line fault for three phase alternator. **[05]**

[B] Explain factors affecting corona loss. **[05]**

[C] Write a brief note on phase shift of symmetrical components in Y-Δ transformer banks **[05]**

OR

[C] Write a short note on 'Critical visual voltage'. **[05]**

Q-5 **[A]** Explain : Overvoltage due to Arcing ground **[05]**

[B] A three phase generator is connected to star(solidly grounded)/delta transformer, via transmission line. The +ve ,-ve & zero sequence impedances of alternator are j0.1, j0.1 & j0.05 pu respectively and those of line are j0.4,j0.4 & j0.8 pu respectively. Determine the fault current & voltages at fault point when single line to ground fault occurs at midpoint of line with a) alternator neutral is grounded b) alternator neutral is isolated. **[05]**

OR

Q-5 **[A]** Describe the phenomena of corona in brief. **[05]**

[B] A generator rated 100 MVA, 20 KV has $X_1=X_2=0.2$ & $X_0=0.05$ pu. Its neutral is grounded through reactor of 0.32 Ω. Generator is operated at rated voltage with load and is disconnected from system when LL fault occurs at its terminals. Find fault current and line to line voltages. **[05]**

Q-6 [A] Explain behavior of travelling waves for open line. **[05]**

[B] Explain: Radio interference and its remedies **[05]**

OR

Q-6 [A] Advantages and disadvantages of per unit system. **[05]**

[B] Explain double line to ground line fault through fault impedance on power system network. **[05]**

---------- ALL THE BEST----------

Enrollment No._____

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-V

Subject Code:-EE-501 **Subject Name:-Electrical Power - II**

Date:-09/11/2016 **Time:-10:30 am to 01:30pm** **Total Marks:-70**

Instructions:

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2. Use of Scientific Calculator is permitted.
3. All questions are Compulsory.
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Section-I

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[B] Show how regulation and transmission efficiency are determined for medium line using end condenser method with vector diagram. **[05]**

[C] Explain reactive compensation of transmission line. **[05]**

OR

[C] Explain one line diagram representation for power system network. Also explain reactance diagram and per unit diagram of power system network. **[05]**

Q-2 [A] Explain three phase fault at terminals of unloaded synchronous generator. **[05]**

[B] Find the following for a single circuit transmission line delivering a load of 50MVA at 110 kV and p.f. 0.8 lagging. (1) Sending end voltage (2) Sending end current (3) Sending end power (4) efficiency of transmission. Given A=D=0.98∠3°; B= 110∠75°Ω; C=0.0005 ∠ 80°siemen. **[05]**

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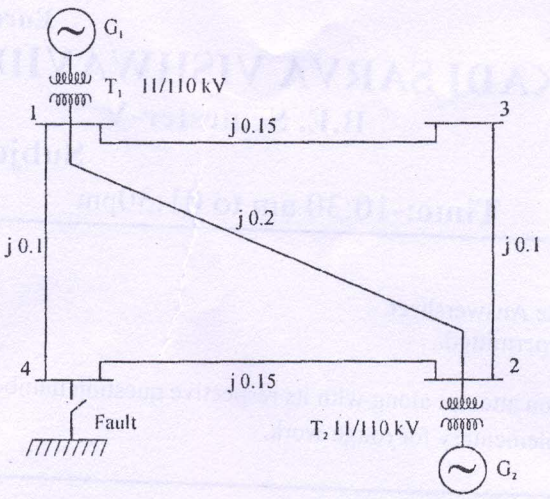
Q-2 [A] Evaluate the generalized circuit constant for Medium line- nominal T method. **[05]**

[B] Consider the 4-bus system of fig. buses 1 & 2 are generator bases and 3 & 4 are load buses. The generators are rated 11 KV, 100 MVA, with transient reactance of 10% each. Both the transformers are 11/110 KV, 100 MVA with a leakage reactance of 5%. The reactances of the lines to a base of 100 MVA, 110 KV are indicated on the fig. Find the short circuit MVA for a three-phase solid fault on bus 4 (load bus). **[05]**



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[B] A balanced star connected load takes 90 A from a balanced 3-phase, 4-wire supply. If the fuses in the Y and B phases are removed, find the symmetrical components of the line currents (i) before the fuses are removed (ii) after the fuses are removed. **[05]**

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Section-II

Q-4 **[A]** Derive equations for line to line fault for three phase alternator. **[05]**

[B] Explain factors affecting corona loss. **[05]**

[C] Write a brief note on phase shift of symmetrical components in Y-Δ transformer banks **[05]**

OR

[C] Write a short note on 'Critical visual voltage'. **[05]**

Q-5 **[A]** Explain : Overvoltage due to Arcing ground **[05]**

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Q-6 [A] Explain behavior of travelling waves for open line. **[05]**

[B] Explain: Radio interference and its remedies **[05]**

OR

Q-6 [A] Advantages and disadvantages of per unit system. **[05]**

[B] Explain double line to ground line fault through fault impedance on power system network. **[05]**

---------- ALL THE BEST----------

KADI SARVA VISHVAVIDYALAYA

B.E. SEMESTER V EXAMINATION (NOV/2014)

SUBJECT CODE: EE-501 **SUBJECT NAME:** ELECTRICAL POWER -II

DATE: 12/11/2014 **TIME:** 10: 30 a.m. to 1:30 p.m. **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheets.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.

Section – I

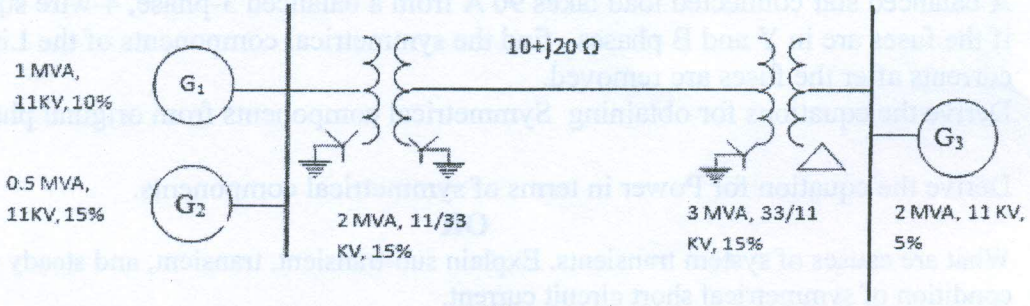
Q-1

A Derive the expression for representation of Medium transmission line by Nominal T method with phasor diagram. **5**

B An overhead 3-phase line delivers 5MW at 22 kV at 0.8 lagging p.f. The resistance and reactance of each conductor is 4Ω and 6Ω respectively. Determine the following: **5**

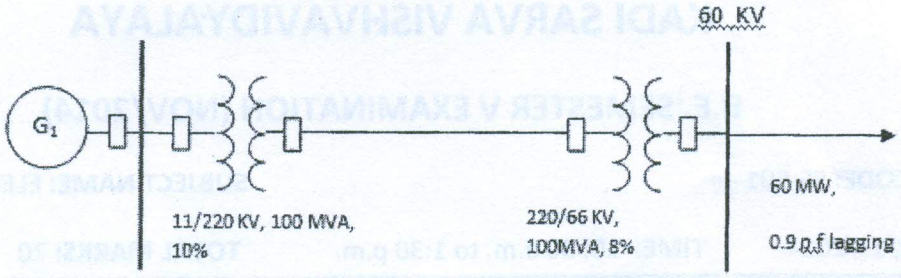
(a) Sending End Voltage
(b) Percentage Regulation
(c) Total line losses
(d) Transmission Efficiency

C The one line diagram for a two generator system is shown below. Draw the per unit reactance diagram by taking 7000 KVA as base. **5**



OR

C The figure given below shows the schematic diagram of system network. Calculate the terminal voltage of the synchronous machine **5**



Q-2

A	Describe the phenomena of Corona in brief. Explain Critical Disruptive Voltage.	**5**
B	Explain Travelling waves on transmission line in detail.	**5**
	OR	
A	Discuss measures taken to control Corona in EHV A.C transmission lines.	**5**
B	Explain the phenomena of arcing grounds. How does neutral grounding eliminate the arcing ground?	**5**

Q-3

A	Derive the expression for solution of Long Transmission Line by Rigorous method.	**5**
B	Two generators G_1 and G_2 are connected in parallel to a bus bar. Generator G_1: 10MVA, 13.2kV, reactance = 15% Generator G_2: 15MVA, 13.2kV, reactance = 15% The generators G_1 and G_2 feed supply to two motors M_1 and M_2 respectively. Motor M_1 : 8 MVA, 12.5 kV, reactance = 20% Motor M_2 : 12 MVA, 12.5 kV, reactance = 20% Assuming base qualities as 50 MVA and 13.8 kV, draw the reactance diagram.	**5**
	OR	
A	Explain Ferranti Effect in detail.	**5**
B	What is a Power Circle diagram. Draw Power circle diagram for Receiving end of transmission line.	**5**

Section – II

Q-4

A	A balanced star connected load takes 90 A from a balanced 3-phase, 4-wire supply. If the fuses are in Y and B phases , find the symmetrical components of the Line currents after the fuses are removed.	**5**
B	Derive the equations for obtaining Symmetrical components from original phasors.	**5**
C	Derive the equation for Power in terms of symmetrical components.	**5**
	OR	
C	What are causes of system transients. Explain sub-transient, transient, and steady state condition of symmetrical short circuit current.	**5**

Q-5

A	Explain and derive equation for fault current when L-G fault occurs through a fault impedance Z_f.	**5**
B	A synchronous generator is rated at 25 MVA,11 KV. It is star connected with neutral is solidly grounded. Its reactance is $X_1=X_2=0.2$ & $X_0=0.08$ pu. Calculate fault current for i) single phase to ground fault ii) double line fault.	**5**

OR

A	The currents in a 3-phsae unbalanced system are: $I_R = (12 + j\,6)A$; $I_Y = (12 - j\,12)A$; $I_B = (-15 + j\,10)A$ The phase sequence is RYB. Calculate the zero, positive and negative sequence components of the currents.	**5**
B	Write a short note on capacitance switching.	**5**

Q-6

A	Derive equations of equivalent- π circuit of a medium transmission line.	**5**
B	Derive the expressions for Line-to-Line fault in power system.	**5**

OR

A	A delta connected balance resistive load is connected across an unbalanced 3-phase supply. The currents in lines A & B are $10\angle 30^\circ$ and $15\angle -60^\circ$ respectively. Find the current in line C. Find symmetrical components of phase current.	**5**
B	Write a short note on various types of Unsymmetrical faults in power system.	**5**

************ALL THE BEST************

Enrollment No._____

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-V

Subject Code:-EE-501 **Subject Name:-**Electrical Power - II

Date:-19/11/2015 **Time:-**10:30 am to 01:30 pm **Total Marks:-**70

Instructions:

1. Answer each section in separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are Compulsory.
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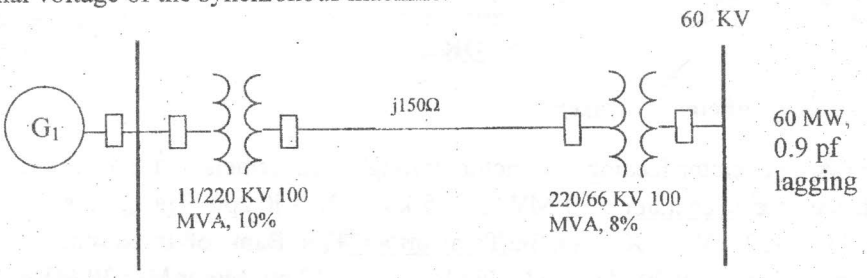
Section-I

Q-1 **[A]** Show how regulation and transmission efficiency are determined for medium line using nominal π method. Illustrate your answer with suitable vector diagrams. **[05]**

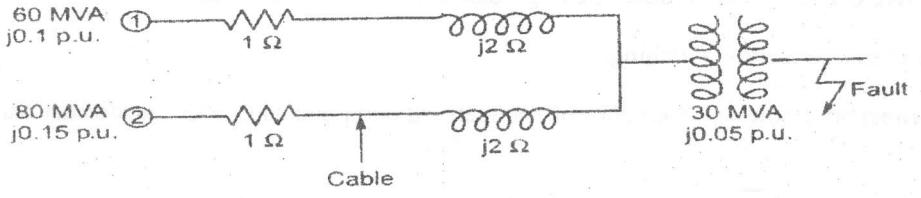
[B] The figure given below shows the schematic diagram of system network. Calculate the terminal voltage of the synchronous machine. **[05]**



[C] A 3-phase, 50 Hz, overhead transmission line delivers 10 MW at 0.8 p.f.lagging and at 66 kV. The resistance and inductive reactance of the line per phase are 10 ohm and 20 ohm respectively while capacitance admittance is $4*10^{-4}$ Siemen. Calculate: (1) the sending end current (2) sending end voltage (line to line) (3) sending end power factor (4) transmission efficiency. Use nominal T method. **[05]**

OR

[C] A transformer rated at 30 MVA and having short circuit reactance of 0.05 pu is connected to busbar of a generating station which is supplied through two 33 KV cables each having an impedance of 1+j2 Ω. One of the feeder connected to generating station using generating capacity of 60 MVA connected to its busbar having short circuit reactance of 0.1 pu and other feeder to generator with 80 MVA,0.15 pu. Calculate MVA supplied to the fault in the event of short circuit occurring at secondary terminal of transformer. **[05]**



Q-2 [A] Evaluate the generalized circuit constant for Medium line- nominal T method. [05]

[B] Discuss different methods of reducing corona loss. [05]

OR

Q-2 [A] Explain one line diagram representation for power system network. Also explain reactance diagram and per unit diagram of power system network. [05]

[B] Explain following: [05]

1) What is doubling effect in context with transmission line?
2) Transient reactance is always less than sub-transient reactance of synchronous machine. True of false? Support your answer with proper reason.

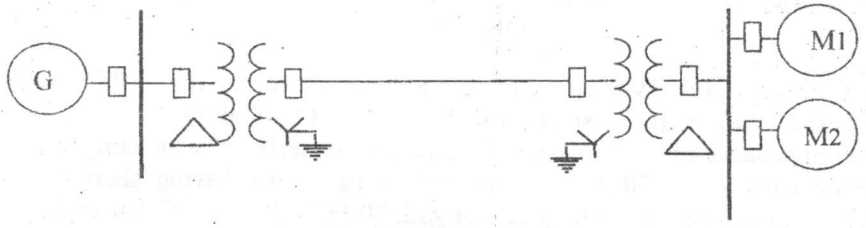
Q-3 [A] In a 3-phase 4-wire-system [05]
$I_{R1} = 200\angle 0°$ A ; $I_{R2} = 100\angle 60°$ Find I_{R0} if the total current flowing back into the supply in the neutral conductor is $300 \angle 300°$.

[B] A single phase overhead transmission line delivers 4000 kW at 11 kV at 0.8 p.f. lagging. If resistance and reactance per conductor are 0.15 ohm and 0.02 respectively, calculate: (1) percentage regulation (2) sending end power factor (3) line losses. [05]

OR

Q-3 [A] Explain : selection of circuit breaker. [05]

[B] Figure shows a generator feeding two motors through transformers and line. The ratings and reactances are :Generator : 50 MVA, 15 kV, X = j0.2pu ,Transformer T_1 : 50 MVA, 11 / 132 kV, X = j0.1pu,Transformer T_2 : Bank of three single phase transformers each rated at 20 MVA, 33 / 76 kV, X = j0.12 pu ,Motor M_1 : 30 MVA, 30 kV, X = j0.25puMotor M_2 : 20 MVA, 30 kV, X = j0.15 pu, Transmission line : X = 25+ j75 Ω Select generator rating as base values and find generator terminal voltage when two motors have input of 24 KW and 16 KW respectively with unity power factor at 30 KV. [05]



Section-II

Q-4 [A] Derive equations for Double line to ground fault for three phase alternator. [05]

[B] Discuss : Capacitor switching. [05]

[C] Write a brief note on phase shift of symmetrical components in Y-Δ transformer banks [05]

OR

[C] Write a short note on 'Radio Interference'. [05]

Q-5 [A] What is P. U. system? Explain the advantages of P. U. System [05]

[B] A 25 MVA, 13.2 KV alternator with solidly grounded neutral has subtransient reactance of 0.25 pu. The negative & zero sequence reactances are 0.35 & 0.1 pu respectively. A single line to ground fault occurs at the terminal of unloaded alternator. Determine the fault current & line to line voltage , neglect resistance. [05]

OR

Q-5 [A] Explain attenuation of travelling waves. [05]

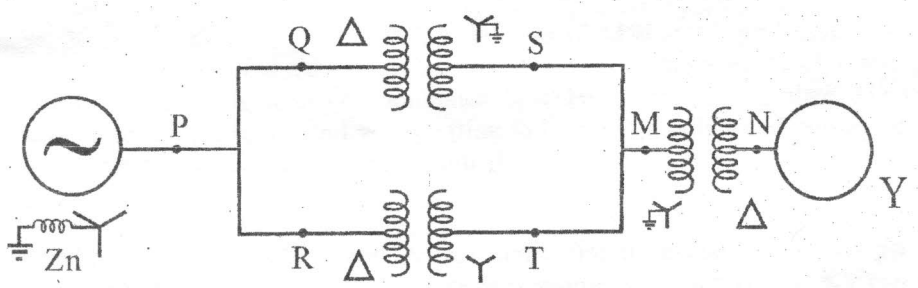
[B] Two 25 MVA, 11 KV generators are connected to a common busbar which supplies the feeder. The star point of one generator is grounded through resistance of 1 Ω, while that of the other generator is isolated. A LG fault occurs at far end of feeder. Determine fault current & the voltage to ground of healthy phases at the fault point. For generator X_1=j0.2 pu, X_2=j0.15 pu, X_0= j0.08pu , for feeder X_1= j0.4 Ω/ph = X_2, X_0= j0.8 Ω/ph. [05]

Q-6 [A] Explain in certain situations single phase fault is more severe than three phase fault. [05]

[B] Find the critical disruptive voltage and corona loss for a 3 phase line which is operating at 220 KV,50 Hz frequency. The line has conductor of 1.5 cm diameter arranged in a 3 m delta connection. Assume air density factor of 1.05 and dielectric strength of air to be 21.1 KV/cm. [05]

OR

Q-6 [A] Draw the zero sequence network for the following system. [05]



[B] Explain : Arcing ground [05]