Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2160908 **Date: 01/05/2017**

Subject Name: Electrical Power system – II

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1		**ATTEMT THE FOLLOWING QUESTIONS**	**14**
	1	Differentiate symmetrical faults and unsymmetrical faults.	
	2	How circuit breaker S.C current ratings are decided?	
	3	Define negative and positive sequence components.	
	4	What is the effect of negative and zero sequence currents in 3 phase system?	
	5	Define Visual disruptive voltage with its expression.	
	6	State disadvantages of corona.	
	7	Define reactive power. State methods of reactive power compensation	
	8	Define Restriking Voltage.	
	9	Justify that series capacitor and shunt reactor works as line compensators.	
	10	Write equation which shows relationship between Receiving end active power and load angle, Receiving reactive power and voltage	
	11	Define Surge impedance loading of transmission line.	
	12	Define Arcing ground	
	13	State causes of transient surges on power line.	
	14	Define the term voltage regulation related to transmission line. Also write its expression.	
Q.2	**(a)**	What u meant by symmetrical faults? Explain briefly its necessity in fault analysis.	**03**
	(b)	Prove that in case of transients in RL series circuits, short circuit current contains symmetrical short circuit components and D.C offset components.	**04**
	(c)	For the radial network shown in fig no -1, a three phase fault occurs at F. Determine the fault current and line voltage at 11 Kv bus under fault conditions.	**07**
		OR	
	(c)	A synchronous generator and a synchronous motor each rated 25 MVA, 11 Kv having 15% sub transient reactance are connected through transformers and a line as shown in following fig -2 , when symmetrical three phase fault occurs at the motor terminals. Find sub transient current in the generator, motor and fault.	**07**

Q.3 **(a)** Discuss possible faults on overhead lines. **03**

(b) Prove that positive and negative sequence impedances of fully transposed transmission lines are always equal. **04**

(c) Draw positive sequence network and negative sequence network for system shown in fig no -3 .Assume that negative sequence reactance of each machine is equal to its subtrasient reactance. Omit resistances. **07**

OR

Q.3 **(a)** Explain Types of Transmission Line. **03**

(b) Obtain the Equivalent circuit for nominal π representation for long transmission line. **04**

(c) A three phase 50 Hz transmission line is 100 Km long and delivers 20 MW at 220KV at 0.9p.f. Lagging and at 110V. The resistance and reactance of the line per conductor per km are 0.2 Ω and 0.4 Ω respectively. While capacitance admittance is 2.5×10-6 ʊ/km/phase. Calculate (i) the current and voltage at sending end (ii) Efficiency of transmission line. Use nominal T method. **07**

Q.4 **(a)** What is 3 phase unsymmetrical fault? Discuss the different types of unsymmetrical in brief. **03**

(b) Derive an expression for fault current for line-to-line fault by symmetrical components method. **04**

(c) The currents in a 3-phase unbalanced system are : IR = (12 + j 6) A ; I Y = (12 − j 12) A; IB = (−15 + j 10) A The phase sequence in RYB. Calculate the zero, positive and negative sequence components of the currents. **07**

OR

Q.4 **(a)** Why is 3-φ symmetrical fault more severe than a 3-φ unsymmetrical fault? **03**

(b) Derive an expression for fault current for double line-to-ground fault by symmetrical components method. **04**

(c) In a 3-phase, 4-wire system, the currents in R, Y and B lines under abnormal conditions of loading are as under : IR = 100 ∠30° A ; I Y = 50 ∠300° A ; IB = 30 ∠180° A Calculate the positive, negative and zero sequence currents in the R-line and return current in the neutral wire. **07**

Q.5 **(a)** Explain methods of reducing corona. **03**

(b) Explain travelling waves of transmission line when receiving end is short circuited briefly. **04**

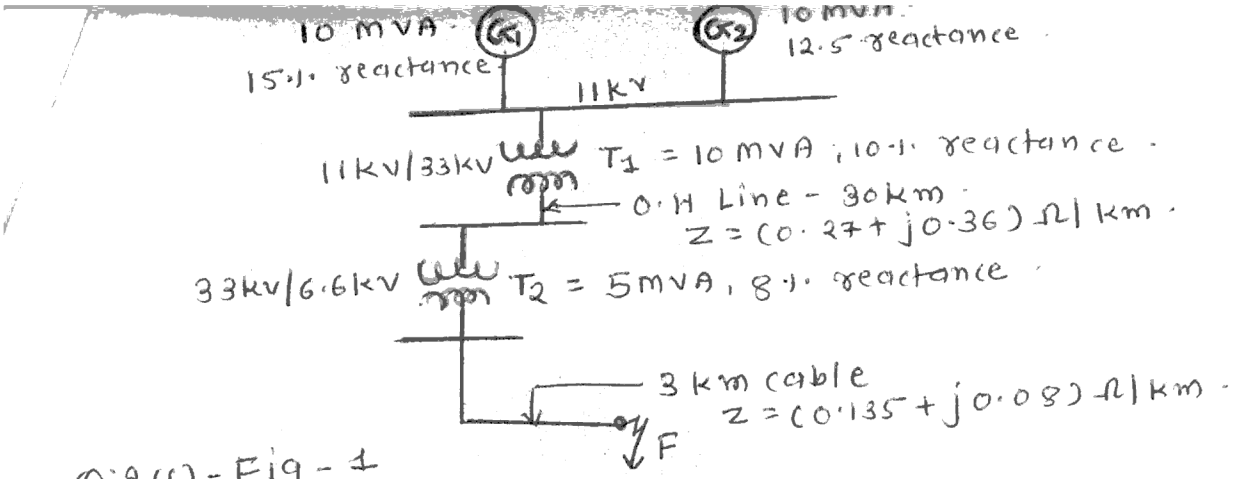
(c) Prove that the synchronous machine offers time varying reactance on no load condition. **07**

OR

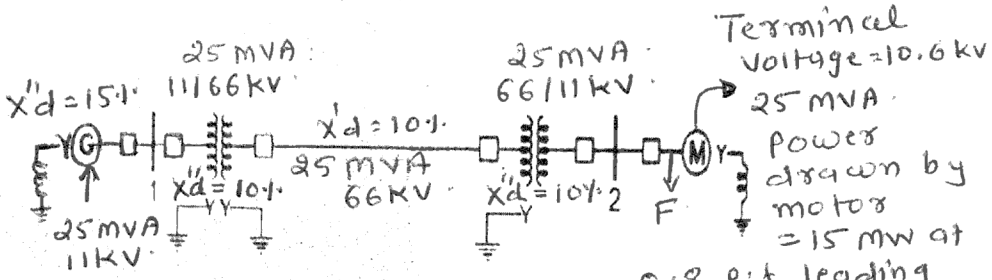
Q.5 **(a)** Explain any two causes which are producing Transient on line. **03**

(b) Explain switching of capacitor phenomenon on transmission line. **04**

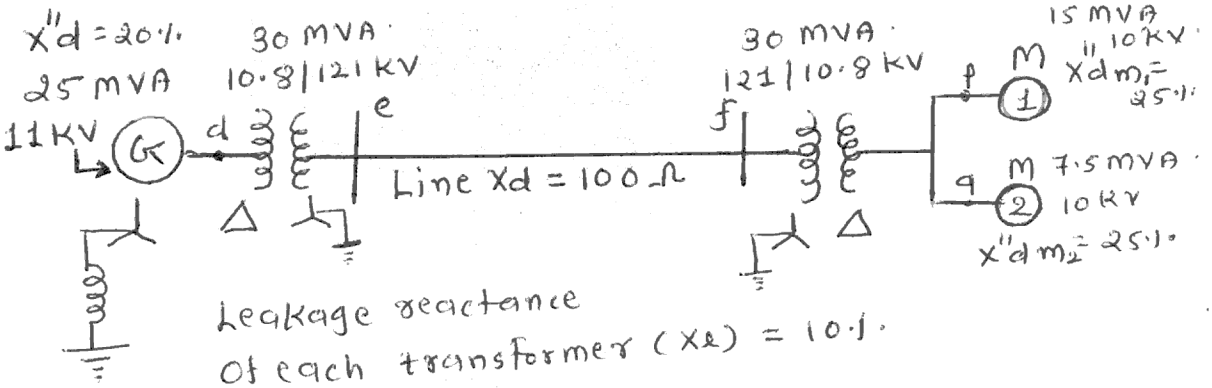
(c) A 3 phase 220 Kv, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temperature is 40° C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take $m_o = 0.85$. **07**



Q·2(c) - Fig - 1



Q·2(c) OR Fig - 2.



Q·3(c) - Fig·3