Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Nov-December 2021

Programme Name: B.tech Electrical **Semester : V**

Course Name : Power system I **Time : 03 hrs**

Course Code : EPEG 3010 **Max. Marks : 100**

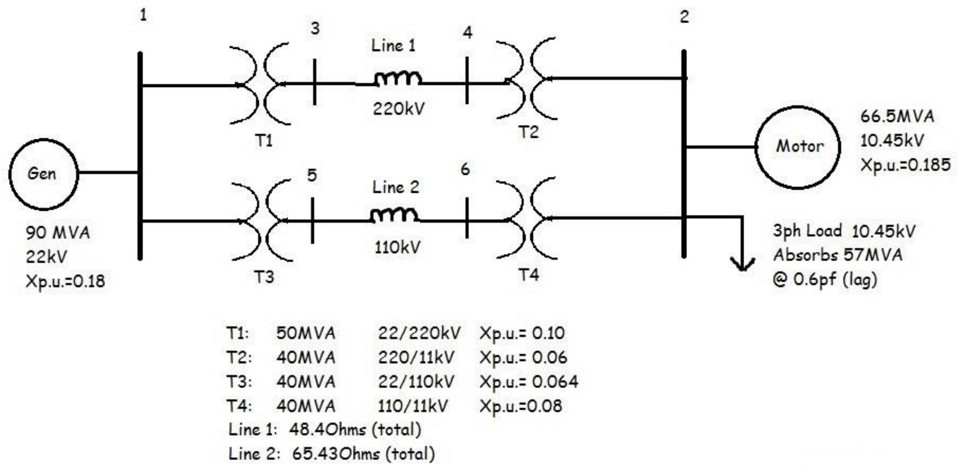
Nos. of page(s) : 2

SECTION A

S. No.		Marks	CO
Q 1	Discuss the uses of bundle conductor for transmission line.	**4**	**CO2**
Q.2	The reactance of a generator designated X'' is given as 0.25 pu based on the generator's name plate rating of 18 kV, 500 MVA. If the base for calculations is changed to 20 kV, 100 MVA, what will be generator reactance X'' on new base?	**4**	**CO1**
Q.3	The surge impedance of 50 miles long underground cable is 50 ohms. For a 25 miles length it will be:	**4**	**CO2**
Q.4	A 3-phase overhead transmission line has its conductor horizontally spaced with spacing between adjacent conductors equal to 'd'. If, now the conductors of the lines are rearranged to form an equilateral triangle of sides equal to 'd', then what will be impact on line average inductance and capacitance?	**4**	**CO1**
Q.5	The self GMD method is used to evaluate; a) Inductance b) Capacitance C) Inductance and capacitance d) none	**4**	**CO2**

SECTION B

Q.6	Determine the efficiency and regulation of a 3-phase, 100 km, 50 Hz transmission line delivering 20 MW at .8 lagging p.f. and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm per km, 1.5 cm outside dia, spaced equilaterally 2 meters between centers. Neglect leakage and use nominal pi method.	**10**	**CO3**
Q.7	Show that the inductance per unit length of an overhead line due to internal flux linkage is constant and is independent of size of conductor. **OR** Explain the concept of GMD and mutual GMD for evaluating inductance of transmission lines.	**10**	**CO2**
Q.8	Deduce that for a 1-phase transmission system, instantaneous power has two components i.e. active and reactive. Also sketch that reactive power pulsate double of the frequency than active power with proper mathematical proof.	**10**	**CO1**
Q.9	Derive an expression for the flux linkage of one conductor in a group of n conductor carrying currents whose sum is zero. Hence derive an expression for inductance of composite conductors of a 1-phase line consisting of m strands in one conductor and n strands in the other conductor. **OR**	**10**	**CO3**

	Derive an expression for critical visual disruptive voltage for corona, taking into account irregularity factor.		
	SECTION-C		
Q.10	A single circuit 50 Hz, 3-phase transmission line has the following parameters per km: R = 0.2 ohm, L = 1.3 mH and C = 0.01 micro F The voltage at the receiving end is 132 kV. If the line is open at the receiving end, find the rms value and phase angle of the following: (i) The incident voltage to neutral at the receiving end (ii) The reflected voltage to neutral at the receiving end. (iii) Efficiency of the line if the line is 120 km long and delivers 40 MW at 132 kV and 0.8 p.f. lagging OR A single phase transmission line has conductors of diameter 1.25 cm and spaced 2.5 meters apart. Derive an expression for the potential gradient at any point on a line joining the centers of the conductors if the operating voltage of line is 60 kV. Calculate the voltage at which corona will start.	**20**	**CO4**
Q.11	Find out the equivalent impedance diagram for the given figure using per unit analysis.  	**20**	**CO3**