

Sub: EM-II
Time: 1½ Hrs.

Date: 03-03-2018
Max Marks: 30M

Question 1 is compulsory. Answer one from 2 or 3 and one from 4 or 5.

	Question	Marks	Unit	CO	Cognitive level															
1.a	Discuss the effect of variations of voltage and frequency on iron losses in a transformer.	2M	1	C214.5	Understand															
1.b	A 200 KVA, 1-phase transformer with a voltage ratio of 6350/660V has the following winding resistances and reactances : $R_1 = 1.56 \Omega$, $R_2 = 0.016 \Omega$, $X_1 = 4.67 \Omega$, $X_2 = 0.048 \Omega$. Calculate the equivalent resistance and reactance referred to the high voltage side.	2M	1	C214.1	Understand															
1.c	Identify various advantages of an Auto transformer over the two winding transformer	2M	2	C214.1	Understand															
1.d	In a transformer, the core loss is 100 W at 40Hz and 72 W at 30Hz. Find the hysteresis and eddy Current losses at 50HZ.	2M	2	C214.5	Evaluate															
1.e	Why should you conduct the oc and sc test on a single phase transformer?	2M	2	C214.1 C214.5	Remember															
2	Explain with phasor diagrams the operation of transformer on load and proof the flux remains constants whatever may be the load on the transformer.	10M	1	C214.1	Understand															
3	Find the all-day efficiency of a 500 KVA distribution transformer whose maximum efficiency of 96% occurs at the load of 0.7 pf. In a day it is loaded as follows? <table style="margin-left: auto; margin-right: auto;"> <tr> <th>Hrs</th> <th>output power(KW)</th> <th>P.f of load</th> </tr> <tr> <td>6</td> <td>400</td> <td>0.8</td> </tr> <tr> <td>10</td> <td>300</td> <td>0.75</td> </tr> <tr> <td>4</td> <td>100</td> <td>0.8</td> </tr> <tr> <td>4</td> <td>0</td> <td>-</td> </tr> </table>	Hrs	output power(KW)	P.f of load	6	400	0.8	10	300	0.75	4	100	0.8	4	0	-	10M	1	C214.1 C214.5	Analyze
Hrs	output power(KW)	P.f of load																		
6	400	0.8																		
10	300	0.75																		
4	100	0.8																		
4	0	-																		
4	A single phase 200/400 V, 6KVA, 50HZ transformer gave the following results OC test (lv side) : 200V, 0.8A, 80W SC test (hv side) : 25V, 10A, 90W Determine (i) The circuit constant refered to L.V side.(ii) The efficiency at full load with 0.8 P.F lagging (iii) The regulation at 0.8 P.f lagging.	10M	2	C214.1 C214.5	Apply															
5	Explain in detail with phasor diagrams the following connections of a 3-phase transformer (i) Star-star connection (ii) delta-delta connection	10M	2	C214.2	Understand															

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Question 1 is compulsory. Answer one from 2 or 3 and one from 4 or 5.

	Question	Marks	Unit	CO	Cognitive level
1.a	Define the voltage regulation and What is the condition for maximum regulation of a transformer.	2M	1	C214.1	Remember
1.b	Proof the maximum efficiency of a transformer is occurs at UPF of the load.	2M	1	C214.5	Understand
1.c	An auto transformer supplies a load of 3kw at 115V at a UPF. If the applied primary voltage is 230V, calculate the power transferred to the load by conductively and inductively.	2M	2	C214.1	
1.d	List out advantages of use of three single phase transformers over the single three phase transformer?	2M	2	C214.2	Understand
1.e	Define the term ideal transformer?	2M	1	C214.1	Remember
2.a	A single - phase transformer has 500turns on the primary and 40 turns on the secondary winding. The mean length of the magnetic path in the iron core is 150cm and the joints are equivalent to an air gap of 0.1mm. When a P.d of 3000V is applied to the primary, maximum flux density is 1.2wb/m ² . Calculate (i). The cross-sectional area of the core (ii). No-load secondary voltage (iii) The no load current drawn by the primary (iv). Power factor on no-load. Given that AT/cm for a flux density of 1.2wb/m ² in iron to be 5, the Corresponding iron loss to be 2watts/kg at 50Hz and the density of iron as 7.8 gm/cm ³ .	7M	1	C214.1	Apply
2.b	Discuss the effect of variation of frequency and voltage on the iron losses of a transformer.	3M	1	C214.5	Understand
3.	Describe in detail the constructional details of a single phase transformer, including the measures taken to minimize the iron and copper losses?	10M	1	C214.1	Understand
4.a	Evaluate the expression for saving of cu in an auto transformer compare with the 2-winding transformer.	5M	2	C214.1	Evaluate
4.b	Two single-phase transformers with equal turns have impedances of $(0.5+j3)$ Ω and $(0.6+j10)$ Ω with respect to the secondary. If they operate in parallel, determine how they will share a total load of 100KW at 0.8pf lagging.	5M	2	C214.1	Understand
5	Develop the equivalent circuit of single phase transformer by conducting OC and SC Tests?	10M	2	C214.5	Apply,Create

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Question 1 is compulsory. Answer one from 2 or 3 and one from 4 or 5.

	Question	Marks	Unit	CO	Cognitive level
1.a	Calculate the regulation of a transformer in which ohmic loss is 1% of the output and reactance drop is 5% of the voltage when the power factor is (i) 0.8 lagging and (ii) 0.8 leading.	2M	1	C214.1	Remember
1.b	Justify the SC test is conducted on hv side but not on lv side?	2M	2	C214.5	Understand
1.c	List out the advantages of Single 3-phase transformer over the three 1-phase transformers.	2M	2	C214.2	Remember
1.d	Define the All day efficiency?	2M	1	C214.1	Understand
1.e	Calculate the load KVA Corresponding to the maximum efficiency of a 100KVA transformer having iron loss of 900KW and full load cu loss of 1600KW.	2M	1	C214.1 C214.5	Apply
2.	Two 100 KW transformers each has a maximum efficiency of 98% but in one the maximum efficiency occurs at full load while in the other, it occurs at half load. Each transformer is on full load for 4 hours, on half load for 6 hours and on one tenth load for 14 hours per day. Compare the all day efficiencies of the transformers.	10M	1	C214.1	Analyze
3.a	Discuss the principle of working of a transformer with the phasor diagrams.	5M	1	C214.1	Understand
3.b	The no load current of a transformer is 4A at 0.25 p.f when supplied at 250V, 50Hz . The no of turns on the primary winding is 200. Calculate (a)The rms value of flux in the core.(b) The core loss (c) The magnetizing current	5M	1	C214.1	Apply
4.a	(a) Explain the procedure to conduct the sumpner's test and obtain the different circuit parameters to estimate the performance of the transformer.	6M	2	C214.1 C214.5	Apply,Analyze
4.b	When a single phase transformer is supplied at 400V, 50Hz the hysteresis is found to be 310W and eddy current loss is found to be 260W. Determine the hysteresis loss and eddy current loss when the transformer is supplied at 800V, 100Hz.	4M	2	C214.5	understand
5.	What are the conditions required for for the parallel operation of two transformers and Evaluate the expressions for the load shared by the two transformers with equal voltage ratios.	10M	2	C214.1	Evaluate

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Question 1 is compulsory. Answer one from 2 or 3 and one from 4 or 5.

	Question	Marks	Unit	CO	Cognitive level
1.a	Can you justify why the rating of the transformer is in KVA?	2M	1	C214.1	Understand
1.b	List out various conditions, to connect two transformers in parallel to share a load.	2M	2	C214.1	Remember
1.c	The maximum flux density in the core of a 250/3000 V, 50Hz single phase transformer is 1.2 wb/m ² . If the emf per turn is 8V, determine the secondary turns and area of the core.	2M	1	C214.1	Apply
1.d	List out advantages of three phase transformer over the three single phase transformers.	2M	2	C214.2	Analyze
1.e	List out the applications of an Auto transformer	2M	2	C214.1	Remember
2.	The efficiency of a 1000 KVA, 110/220V, 50HZ Single phase transformer is 98.5% at half full load, 0.8 p.f and 98.8% at full load, unity p.f. Determine (i) iron loss (b) full load cu loss (c) Maximum efficiency at unity p.f.	10M	1	C214.1	Apply
3.a	Derive the EMF equation of a single-phase transformer	5M	1	C214.1	Create
3.b	The emf per turn of a 1-phase, 6.6kv/440v, 50Hz transformer is 12 V. Calculate (a) the number of turns in HV and LV windings.(b) The net cross sectional area of the core for a maximum flux density of 105 T.	5M	1	C214.1	Understand
4.	The following results were obtained on a 50 KVA , 2400/120V Transformer: OC TEST: 396W, 9.65 A, 120V on LV SIDE. SC TEST: 810w, 20.8A, 92V ON H.V SIDE. Determine (a) the circuit constants, (b) The efficiency at full load, and 0.8 power factor. (c) The approximate voltage regulation.	10M	2	C214.1 C214.5	Apply
5	Explain in detail how the iron losses of a transformer is separated into eddy current and hysteresis losses by conducting suitable test,	10M	2	C214.1 C214.5	Understand ,Apply

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