

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, May 2019
B. Tech. in Electrical Engineering, Semester IV

Roll No.....

Course Code :EE 484
Course Name: Electrical Machine-I

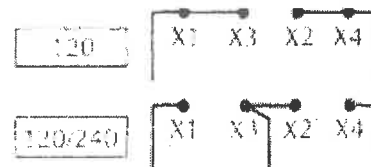
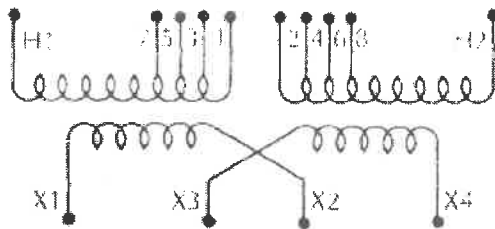
Time: 03 hours Max. Marks: 60

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. Attach graph sheet with answer sheet properly

Q.1 A 25-KVA, single-phase transformer is used to supply 120/240 V, 3 wires, 100-A panel board. The primary voltage is only 450 V instead of the normal 480 V. Determine voltage at primary side for series and parallel HV Winding connection in below table

HV Winding 240/480



LV Winding 120/240

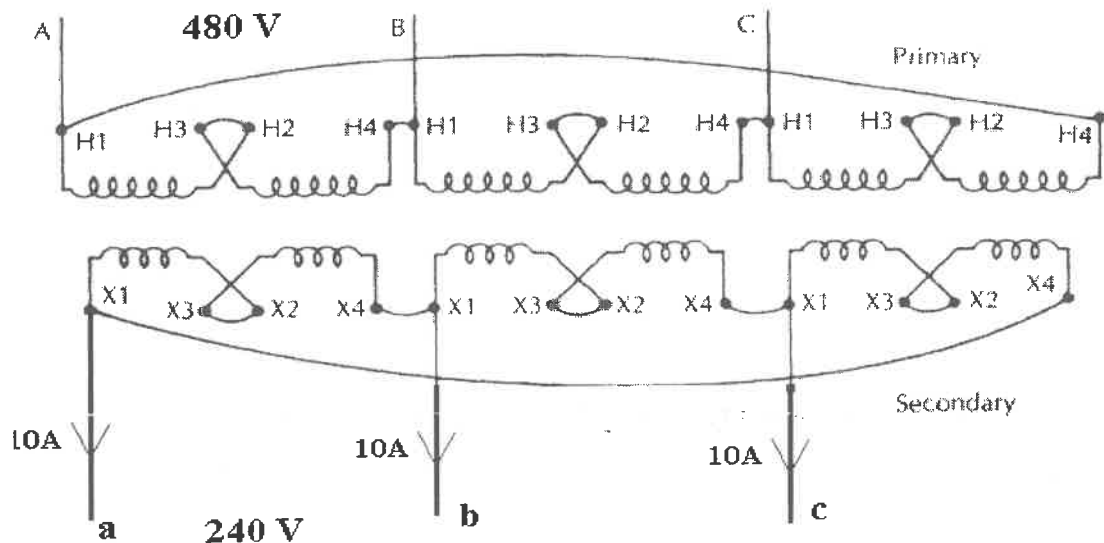
Series HV Winding Connection	
Connects	Volts
1-2	504 V
2-3	
3-4	
4-5	
5-6	
6-7	
7-8	

Parallel HV Winding Connection		
Connects		Volts
H1-2	H2-1	252 V
H1-4	H2-3	
H1-6	H2-5	
H1-8	H2-7	

OR

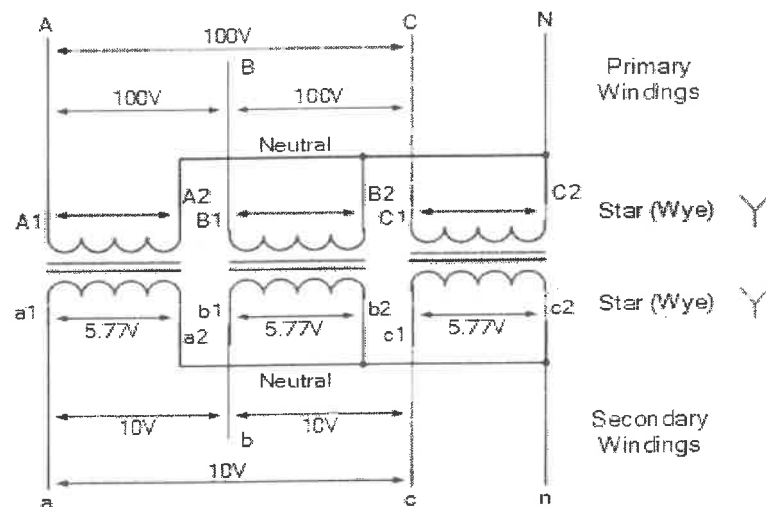
- (a) For below circuit determine the following as below
- (a) Minimum kVA rating of unit,
 - (b) Line current on primary and secondary side winding
 - (c) Phase current on primary and secondary side winding

08



- (b) A building is supplied with a 480-V, 3-phase electrical system. Determine kVA rating of a single-phase transformer required to supply a 60-A, 3-wire, 120/240-V panel board 02

- Q.2 (a) Determine the turn ratio for below mentioned three phase ideal transformers configuration 03



- (b) Three single phase ideal transformers, each of rating 5kVA, 200V/400V, 50 Hz are available. 07

The LV sides are connected in star and HV sides are connected in delta. What line to line 3-phase voltage should be applied and what will be the corresponding HV side line to line voltage will be? Also calculate and show the line and phase current magnitudes in both LV & HV sides corresponding to rated condition.

OR

- (a) Give the constructional features and draw the cross sectional view of DC generator 07

and label all parts.

- (b) Sketch the important characteristics (no load and load characteristics) of DC shunt, series and compound generators. Also, identify various factors responsible for internal voltage drop. 03
- Q.3 (a) Enumerate the methods used for armature reaction effects and explain its effect on performance of a DC motor. 05
- (b) A 440 V D.C shunt motor takes 4 A at no load. Its armature and field resistances are 0.4 ohms and 220 ohms respectively. Estimate the kW output and efficiency when the motor takes 60A on full load. 05
- Q.4 (a) Describe the working of 3 point starter for DC shunt motor with neat diagram. 05
- (b) A 4 pole, DC shunt generator has a simple wave-wound armature with 35 slots and 12 conductors per slot and delivers 35 A on full-loads. If the brush lead is 10 space degrees, calculate the demagnetizing and cross-magnetizing ampere-turns per pole at full-load. 05

OR

- (a) With the help of neat circuit diagram, explain Swinburne's test and derive the relations for efficiency (both for generator and motor) also state the merits and demerits of this method 05
- (b) A shunt generator delivers 50 kW at 250 V and 400 rpm. The armature and field resistances are 0.02Ω and 50Ω respectively. Calculate the speed of the machine running as a shunt motor and taking 50 kW input at 250 V. Allow 1 volt per brush for contact drop. 05
- Q.5 (a) Enumerate the methods used for improving commutation and explain any one of them in details. 05
- (b) A 460 V series motor runs at 500 rpm taking a current of 40 A. Calculate the speed and percentage change in torque if the load is reduced so that the motor is taking 30 A. Total resistance of the armature and field circuits is 0.8Ω . Assume flux is proportional to the field current. 05
- Q.6 (a) Explain the experiment on Ward Leonard method of a speed control on a DC shunt motor with a suitable circuit diagram. 05
- (b) Enumerate the parameters on which the cooling of the transformer depends. Also discuss transformer accessories in detail with suitable neat diagrams. 05

