

Reg. No. \_\_\_\_\_ Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2017****Course Code: EE 205****Course Name: DC MACHINES AND TRANSFORMERS (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions, each question carries 5 marks)*

1. Explain the working of a DC motor. What is the significance of back e.m.f in DC motors?
2. What is armature reaction in dc machines? How it affects the main flux distribution and how can armature reaction be reduced?
3. Draw the phasor diagram of a practical transformer on load at (a) lagging p.f (b) leading p.f (c) u.p.f.  
Also draw the phasor diagram of an ideal transformer at no load.
4. Define the terms critical resistance and critical speed and bring out their roles in the process of self excitation in dc machines. What are the conditions for voltage build up in a DC shunt generator?
5. A 4 kVA, 400/200 V single phase transformer has resistance of 0.02 p.u and reactance of 0.06 p.u. What is the value of its resistance and reactance referred to h.v side?
6. What are the necessary and desirable conditions for parallel operation of transformers?
7. Explain the principle of operation of a transformer. Derive the emf equation of a single phase transformer.
8. What are the different connections of three phase transformers?

**PART B***(Answer any 2 questions, each question carries 10 marks)*

9. Give the constructional features and working principle of a DC generator. Draw the cross-sectional view of a 4 pole DC generator and label all the parts. Explain the function of each part.
10. Explain the different methods of excitation of DC generators with suitable diagrams.

11. A short shunt compound generator has armature, series field & shunt field resistances of  $0.06\Omega$ ,  $0.03\Omega$  and  $110\Omega$  respectively. It supplies 100 lamps rated at 250V, 40W. Find the generated e.m.f. Assume that contact drop per brush = 1V.

**PART C**

*(Answer any 2 questions, each question carries 10 marks)*

12. Why is a starter necessary for a motor? Give the diagram and explain the working of a three- point starter for a shunt motor including the features of 'no volt release' and 'overload release'.
13. A 200V series motor has a total resistance of  $0.5\Omega$ . It runs at 800 rpm taking an input current of 10A. Find the series resistance required to reduce the speed to 600 rpm, the input current being kept constant.
14. A transformer on no load has a core loss of 50W, draws a current of 2A (rms) and has an induced emf of 230V (rms). Determine the no load power factor, core loss current and magnetizing current. Also calculate the no load circuit parameters of the transformer. Neglect winding resistances & leakage flux.

**PART D**

*(Answer any 2 questions, each question carries 10 marks)*

15. Explain sumpner's method of testing transformers. What are its advantages over OC and SC tests?
16. Explain the operation of an autotransformer. How saving of copper is achieved in an autotransformer as compared to an ordinary two winding transformer. What are the advantages of autotransformer over conventional two winding transformer?
17. The efficiency of 100kVA, 110V/220V, 50Hz single phase transformer is 98.5% at half full load and 0.8 pf lead and 98.8% at full load upf, find (a) Iron loss (b) Full load copper loss (c) maximum efficiency at upf.