

EN 212 Electrical Machines

Assignment - 2

Instructions

- **Write all the steps clearly.**
 - **Scan and attach one pdf document or word document on MS Teams page.**
 - **If your roll number is 201700123 and first name is "John" then the file name should be 201700123_John.pdf**
 - **After uploading the document in MS Teams Assignment page you must click on Turn-in (submit button). Then the submission process is complete.**
1. A dc generator has 24 armature conductors. Average emf induced in one conductor is 2 V and each conductor is designed to handle a current of 5 A. Calculate the rating of this generator if the number of parallel paths in this machine are 2, 4 and 6.
 2. Draw equivalent circuit models for dc shunt, series and compound machines.
 3. A 230 V, dc shunt motor, takes an armature current of 3.33 A at rated voltage and at a no-load speed of 1000 rpm. The resistances of the armature circuit and field circuit are respectively 0.3 ohm and 160 ohm. The line current at full load and rated voltage is 40 A. Calculate, at full load, the speed and the developed torque in case the armature reaction weakens the no-load flux by 4%.
 4. A 10 kW, 250 V, dc shunt generator has total no load rotational loss of 400 W. The armature circuit (including brushes) and shunt field resistances are 0.5 ohm and 250 ohm respectively. Calculate the shaft power input and the efficiency at rated load. Also calculate the maximum efficiency and the corresponding power output.
 5. The following data pertain to the magnetization curve of a dc shunt generator at 1500 rpm.

I_f (A)	0	0.4	0.8	1.20	1.60	2.00	2.40	2.80	3.00
E_a (V)	6	60	120	172.5	202.5	221	231	237	240

For this generator, obtain

- (a) The voltage an open circuit to which the machine will build up (i.e., no load emf) for a total shunt field resistance of 100 ohm
- (b) The critical value of shunt field resistance at 1500 rpm
- (c) The critical speed for the shunt field resistance of 100 ohm