4th Semester Regular / Back Examination 2018-19
ELECTRICAL MACHINES & POWER DEVICES
BRANCH : ECE, ETC
Time : 3 Hours
Max Marks : 100
Q.CODE : F488
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1	**Short Answer Type Questions (Answer All-10)**	**(2 x 10)**

a) What is the function of commutator in dc motor?

b) At what condition a DC generator operates most efficiently?

c) What are the conditions to be full filled for self-excitation of a dc shunt generator?

d) Why a Dc series motor is never started at no load?

e) Why the core of a transformer is laminated?

f) Draw the Phasor diagram of an ideal transformer?

g) Explain the objective of using an auxiliary winding in a single phase induction motor ?

h) Why an induction motor rotates in the direction of rotating magnetic field?

i) How a salient pole type alternator different from cylindrical rotor type?

j) What do you mean by Rotating Magnetic field?

Part- II

Q2	**Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**	**(6 x 8)**

a) Explain the process of voltage build up in a dc shunt generator.

b) A lap wound DC shunt generator having 90 slots with 8 conductors per slot generate a no load emf of 400V, when running at 1200 RPM. Find out the flux per pole. If the armature resistance is 0.4 Ω, determine the terminal voltage for a load current of 20A. Assume 1V drop per brush.

c) Explain the working of a 3-point starter.

d) A 220V, D.C. shunt motor takes 60A when running at 800 rpm. It has an armature resistance of 0.1 Ω. Determine the speed and armature current if the magnetic flux is weakening by 5%. Assuming a brush drop of 2V and torque remain constant.

e) Derive the emf equation of a transformer?

f) Describe the construction of three phase transformer.

g) A three-phase 440 V, 4 poles, 50 Hz, squirrel cage induction motor is runningat a slip of 4%. Calculate the speed of stator magnetic field with respect to rotor magnetic fieldand speed of rotor with respect of stator magnetic field.

h) Explain double field revolving theory.

i) Explain the working Brushless motor?

j) Explain various starting methods of 3-phase induction motor.

k) Explain Power-Angle curve of an Alternator.

l) How a 3-phase synchronous motor can be started?

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

Q3 Give a comparison of speed ~ Armature current and speed ~ Torque characteristics **(16)** for DC shunt and compound motor.

Q4 A single-phase 2.2 kVA, 220/110V transformer has a maximum efficiency of 96% at a **(16)** load of 60% at upf. What are the values of constant and copper losses at this load condition? What is the efficiency of this transformer at full-load condition at 0.8 PF lagging condition? What will be the readings of the voltmeter, wattmeter and ammeter if the SC test is conducted on the HV side and the OC test conducted by applying rated voltage on the LV side gives a current reading of 0.44A, what are the values of R_c and X_m in the transformer equivalent circuit?

Q5 For a three phase Induction motor derive the expression for torque, condition for **(16)** maximum torque and explain torque~ slip characteristics. Also show the effect of variable rotor resistance.

Q6 Calculate the rms value of the induced emf per phase of a 10-pole, 3-phase, 50 Hz **(16)** alternator with 2 slots/pole/phase and 4 conductors/slot in two layers. The coil span of 150^0 electrical. The flux per pole has fundamental component of 0.012 wb. Also derive the mathematical expression for K_p and K_d.