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Total Number of Pages: 02

B.TECH
PCEL4302

5th Semester Regular / Back Examination 2015-16

ELECTRICAL MACHINES - II

BRANCH: EEE,ELECTRICAL

Time: 3 Hours

Max marks: 70

Q.CODE: T373

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

- Q1** Answer the following questions: **(2 x 10)**
- a) Explain how the alternator supplying power to an infinite bus be disconnected from the bus?
 - b) What is the significance of short circuit ratio? Write the expression of the SCR in terms of X_d .
 - c) How load power factor affects armature reaction in an alternator? Explain in brief.
 - d) What will happen if instead of distributed winding, the alternator will have concentric winding in the stator?
 - e) What do you mean by pull-out torque? What happens when the mechanical load on synchronous motor exceeds its pull-out torque.
 - f) Explain in brief about the notation Yy0d1, Dz11d1.
 - g) A 3 phase, 50Hz star connected alternator has 540 conductors and flux per pole is 0.0543wb. Find the emf generated per phase, if windings are full pitched and distribution factor 0.96.
 - h) What do you understand by voltage regulation of an alternator, why it is negative for leading p.f?
 - i) What will happen if a dc series motor will be supplied with single phase ac supply? Justify your answer.
 - j) Draw the phasor diagram of loaded alternator with lagging power factor. Clearly mention different terms in that.
- Q2** a) What is meant by three phase transformer phasor groups? What is the significance of these groups? **(5)**
- b) A 3 Phase, 50 Hz, star connected salient pole alternator has 216 slots with 5 conductors per slot. All the conductors of each phase are connected in series; the winding is distributed and full pitched. The flux per pole is 30 mwb and the alternator runs at 250 rpm. Determine the phase and line voltages of emf induced. **(5)**

- Q3 a)** Discuss why single-phase induction motors do not have a starting torque. (4)
- b)** A 3-phase star connected alternator is rated at 100 kVA. On short-circuit a field current of 50amp gives the full load current. The e.m.f. generated on open circuit with the same field current is 1575 V/phase. Calculate the voltage regulation at (a) 0.8 power factor lagging, and (b) 0.8 power factor leading by synchronous impedance method. Assume armature resistance is 1.5Ω . (6)

- Q4 a)** A salient pole alternator has the following per unit parameters. $X_d = 1.2$, $X_q = 0.8$, $R_a = 0.025$. Compute the excitation voltage on per unit basis when the generator is delivering the rated kVA at rated voltage and a power factor of 0.8 lagging and 0.8 leading. (5)
- b)** Explain how a three phase transformer Yd11 a group number 4, can be successfully operated in parallel with another transformer Dy1 of group number 3. (5)

- Q5 a)** Explain two important functions served by damper windings in a synchronous motor. State various applications of synchronous motors (4)
- b)** The following data relate to a 14860 kVA, 3-phase, 50Hz, 40 pole, star connected hydroelectric generator: (6)

O.C. Test

Field Current in Amp	10	15	20.5	25	30	35	40	45
voltage in kV	6.45	9	11	12.2	13.25	14	14.5	15

S.C. test. $I_f : 18A$, $I_{sc} : 780A$

Zpf test. $I_f : 52.5A$, $I_a : 780A$, $V_t : 11kV$

Find the voltage regulation at rated current of 780 A at 0.8 pf lag by zpf method. Take armature resistance of 0.2Ω per phase.

- Q6 a)** A 5.5 MVA, 50Hz, 3 phase, star connected alternator having synchronous reactance of 0.3 p.u. is running at 1500 rpm and is excited to give 11kV. If the rotor deviates slightly from its equilibrium position what is the synchronizing torque in N-m per degree mechanical displacement. (5)
- b)** Describe the dark lamp method of synchronizing one 3-phase alternator with another. (5)

- Q7 a)** Explain with neat sketch, how to measure X_d and X_q by slip test. (5)
- b)** A universal series motor has resistance of 35ohms and an inductance of 0.5H. When connected to 250V dc supply and loaded to take 0.8A it runs at 2000rpm. Determine the speed, torque and power factor, when connected to a 250V, 50Hz ac supply and loaded to take the same current as of dc supply. (5)

- Q8** Write short notes on any two: (5 x 2)
- a)** Synchronous Condenser
- b)** Hunting
- c)** V-curves
- d)** 3 Phase transformer connections.