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Total Number of Pages : 02

B.Tech
PCEL4302

5th Semester Back Examination 2017-18

Electrical Machines-II

BRANCH: ELECTRICAL/EEE

Time: 3 Hours

Max Marks: 70

Q.CODE: B246

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)

- Why is short pitch winding preferred over full-pitch winding?
- Inverted v curves are the result of relationship between which two parameters?
- Write two applications of universal motors.
- Draw the phasor diagram of a salient-pole synchronous motor operating at full-load with lagging power factor.
- List the necessary conditions for parallel operation of three phase alternators.
- Why salient pole construction is rejected for turbo alternator ?
- what is short circuit ratio(SCR)?
- Star –star and star- delta transformers are usually used where in a power system.
- When Synchronous motors can supply leading VAR?
- A 400/200V transformer has total resistance of 0.02 p.u on its LV side . what would be its value when it is referred to HV side?

Q2 a) Derive the e.m.f. equation of a synchronous generator. (5)

- b) A 3-phase, 50Hz, 40-pole, star alternator has 184 slots with 2 conductors per slot. The pitch of the coil is 3 slots less than the pole pitch. If the m/c gives 3300V between lines on open circuit with sinusoidal flux distribution, find the useful flux per pole. (5)

Q3 a) Describe the working principle of reluctance motors. (5)

- b) Why single phase motors are nor self starting? How are they made self starting. Explain split phase and shaded pole type method of starting (5)

Q4 a) Explain armature reaction in synchronous generators. What is the effect of load power factor on armature reaction? (5)

- b) A 400V,50Hz,delta-connected alternator has a direct axis reactance of 0.1Ω and a q-axis reactance of 0.07Ω . The armature resistance is negligible. The alternator is supplying 1000A at 0.8 lag p.f..
i. Find the excitation emf neglecting saliency and assuming $X_s=X_d$. (5)
ii. Find the excitation emf taking into account the saliency.

Q5 a) Describe the Scott connection and the open delta or V- connection of the three phase transformers. Compare the output of each with a three phase delta connected transformer. (5)

- b) Two identical transformers each rating 10 kVA, 200/100 V, 50 hz are connected in open delta. Calculate the kVA rating of the open delta bank WHEN HV side is used as primary. (5)

Q6 a) What do you mean by hunting? What are causes & effect of hunting & how would you reduce it. **(5)**

b) A 100kVA, 11000V, 3-ph, Y-connected syn. motor has an armature resistance & reactance per phase of 3.5Ω & 40Ω respectively. Determine the induced emf & angular retardation of the rotor when fully loaded at

a) Unity p.f

b) 0.8 p.f (lagging)

c) 0.8 p.f (leading)

Q7 a) Explain principle of operation of synchronous motor & what the main features of synchronous motor are **(5)**

b) The efficiency of a 3-ph, 400V, Y-connected syn. motor is 95% and it takes 24A at full load & unity p.f. what will be the induced emf and mechanical power developed at full load and 0.9 p.f leading? The syn. impedance per phase is $(0.2 + j2)\Omega$. **(5)**

Q8 Write short answer on any TWO : (5 x 2)

a) Explain briefly Torque-angle characteristics of a salient pole synchronous machine.

b) Blondel's two reaction theory.

c) Why parallel operation of alternators are required? Give the necessary conditions for parallel operation of alternators

d) Two bright and one dark lamp Synchronisation method of an alternator with infinite bus.