Registration No :

Total Number of Pages : 02 **B.Tech**

PCEL4302

5th Semester Back Examination 2018-19

ELECTRICAL MACHINES - II

BRANCH : EEE, ELECTRICAL

Time : 3 Hours

Max Marks : 70

Q.CODE : E211

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) List the necessary conditions for parallel operation of three phase alternators.

b) Enlist the parameters required to get V- curves.

c) Write two applications of reluctance motors..

d) Find the slip of a 4-pole three phase induction motor with 50 Hz supply, running at 1460 rpm.

e) Draw the phasor diagram of a salient-pole synchronous motor operating at full-load with lagging power factor

f) Why salient pole construction is rejected for turbo alternator?

g) what is short circuit ratio(SCR)?

h) Delta-delta and Zig-zag transformers are usually used where in a power system.

i) What are Synchronous condensers? Mention its applications.

j) 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)** Describe the e.m.f. method and the m.m.f method of determination of voltage regulation of a synchronous generator(cylindrical type). **(5)**

b) A 3-phase, star connected 1000 kVA, 2000 V, 50 Hz synchronous generator gave the open circuit and short circuit test readings as given below. Determine the full load percentage voltage regulation at 0.8 p.f. lag using M.M.F. method. **(5)**

Field current I_f (A)	10	20	25	30	40	50	60
Open circuit line voltage (V)	800	1500	1760	2000	2350	2600	2750
Short circuit armature current (A)		200	250	300			

Q3 **a)** Explain Blondel's two reaction theory with necessary phasor diagrams. **(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.. **(5)**

i. Find the excitation emf neglecting saliency and assuming $X_s=X_d$.

ii. Find the excitation emf taking into account the saliency.

Q4 **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) A three phase transformer 33/6.6 kV, 3MVA has aprimary resistance 8 Ω and secondary resistance of 0.09 Ω per phase.the percentage impedance is 7%. Calculate the secondary load voltage with rated primary voltage and hence the regulation for full load 0.85 p.f lagging condition. **(5)**

Q5 **a)** What do you mean by V curves and inverted V curves? What are causes & effect of it? **(5)**

b) A three phase, salient pole 2300v, 150KW,1000rpm, syn. Motor has Xd = 32Ω ,Xq = 20Ω per phase. Calculate the torque developed if δ = 160, Eb = 2V and neglecting losses. **(5)**

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

i. Unity p.f
ii. 0.87p.f(lagging)
iii. 0.875p.f(leading)

Q6 **a)** Derive and Explain torque slip characteristic of a three phase IM at running condition. **(5)**

b) A 4 pole,3-phase ,50Hz,27.5 KW inductionmotor is running at full load at 1440 rpm. The star connected rotor has a resistance and a standstill reactance of 0f 0.3 Ω and 2 Ω respectively. The emf between slip ring at stand still is 240 V. Find the induced emf in each rotor phase at full load condition , rotor impedance per phase and rotor current anfp.fassuming the slip rings are short circuited **(5)**

Q7 A 3-ph,Y-connected syn. motor takes 20kW at 400V from the mains. The syn. reactance is 4Ω & the effective resistance is negligible. If the exciting current is so adjusted that the back emf is 550V,calculate the line current and P.f of the motor. **(10)**

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

a) Explain briefly Reluctance torque of a cylindrical pole synchronous motor.

b) Neatly draw the phasor diagram of a Syn. motor for lagging, unity & leading p f & hence derive the expression for rotor angle(δ).

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

d) Explain in details the advantages of Two bright and one dark lamp method over all dark/bright lamp method for syncronisation of an alternator with infinite bus.