QP Code : **1903**

(3 Hours) [Total Marks : 100

N.B. : (1) Question no. **1** is **compulsory**
(2) Attempt **any four** questions out of remaining.

1. (a) Explain an expression for distribution factor & pitch factor. 10
   (b) Explain Slip test to determine Xd & Xq. 10

2. (a) A 2000V, 3 phase, star connected cylindrical rotor synchronous motor with 10
   synchronous reactance $x_{sm} = 2\,\Omega$ is connected to a turbogenerator with $x_{sg} = 3\,\Omega$,
   through a transmission line of reactance $x_{tr} = 1.5\,\Omega$. The synchronous motor is
   drawing 100A at rated terminal voltage & at unity power factor at its terminals. Hence
   compute excitation voltages of motor and alternator. Find power transfer between
   alternator and motor also.

   (b) Explain V curves of synchronous motor with the help of phasor diagram 10

3. (a) Explain hunting in synchronous machine 10
   (b) A salient pole synchronous generator has following parameters in pu. 10
   Xd = 1.2   Xq=0.8 r_a = 0.025.
   Computer excitation voltage E_f on pu basis, when the generator is delivering rated 10
   KVA at rated voltage and at pf of 0.8 lag.

4. (a) Explain Blondel's two reaction theory for salient pole machines. 10
   (b) Two identical 20 MW alternators are operating in parallel. The governor of first 10
   machine is such that the frequency drops uniformly from 50Hz on no-load to 48Hz
   on full load. The corresponding uniform speed drop of second machine is 50Hz to
   47.5 Hz. How will they share a load of 30 MW and what will be the frequency?

5. (a) Explain variable reluctance stepper motor 10
   (b) Derive condition for maximum power output of synchronous generator and hence 10
   obtain an expression for maximum power output.

6. (a) Explain EMF & MMF methods to predict regulation of an alternator. 10
   (b) Develop power circles of synchronous motor and efficiency at maximum power 10
   output is 50%

7. (a) A three phase synchronous machine has 54 slots and 6 poles. There are 8 conductors 10
   per slot. The winding is chorded by one slot. Find distribution factor and pitch factor.
   (b) Explain armature reaction in synchronous machines on various power factors. 10

QP-Con. 8450-15.