FACULTY OF ENGINEERING &TECHNOLOGY
S.E.(EEP/EE/EEE) Year Examination-June-2015
A .C. Machines
(Revised)

Time: Three Hours   **Maximum Marks: 80**

"Please check whether you have got the right question paper."
i) Q. 1 and Q.6are compulsory.
ii) Attempt from each section,<u>any two</u> questions from remaining questions.
iii) Assume suitable data if required.

<center>SECTION-A</center>

Q.1   Solve (<u>any five</u>)   10
1) An eighth pole wound rotor induction motor operating on 50HZ supply is driven at 1800 r. p. m. by a prime mover in opposite direction of revolving magnetic field. What is the frequency of rotor current?
2) A 6 pole, 50Hz, 3 PH induction motor has a full load speed of 940rpm. At half load what is its speed?
3) State the different methods of speed control of 3 phase induction motors.
4) Define the term Crawing.
5) State the procedure to reverse the direction of rotation of capacitor start induction motors.
6) Draw the equivalent circuit of single phase induction motor considering core losses.

Q.2   a) Explain in detail different stages of power development in induction motor.   07
       b) A 6 pole, 500V,50Hz, 3 Phase induction motor running at 950 r.p.m. takes input power of 40 kw. The stator losses are 1kw & the friction &windage losses total 2 kw. Calculate   1) slip (2) rotor cu loss (3) shaft power (4) efficiency.   08

Q.3   a) Derive expression for induction motor torque equation.   07
       b) With neat circuit diagram explain working of star delta starter for three phase induction motor.   08

Q.4   a) Explain the principle of operation of single phase capacitor start induction run motor .   07
       b) Draw phasor diagram of single phase induction motor with load & explain.   08

Q.5   Write short notes on   15
1) Rotor resistance starter.
2) Repulsion motor.
3) Hysteresis motor.

<center>SECTION-B</center>

Q.6   Solve <u>any five</u>   10
1) Draw phase diagram over exited operation of synchronous motor.
2) Define hunting in synchronous motor.
3) State to necessary condition for synchronizing synchronous generators.
4) The effective resistance of a 2000v, 50Hz, 500KVA, single phase alternator is 0.5 ohm. On short circuit, a field current of 40A gives the full load current of 200A. theemf on open circuit with same field excitation is 1100V. calculate the synchronic impedance and reactance.
5) Draw vector diagram of loaded alternator for leading PF.
6) State under which condition a synchronous motor will fail to pull into step.

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Q.7 a) Explain with neat diagram the construction feature & function of each part of synchronous generator. 07

b) Calculate the RMS value of induced emfper phone of a 8 pole, 3 phase 50 Hz alternator with 2 slots per pole per phase & 4 conductors per slot in two layers. The coil span is 150°. To flux per pole has fundamental component of 0.1wb & a 20% third component 08

Q.8 a) Explain in details the effect of load PF on to armature reaction of alternator. 07

b) A 3 phase 50KVA, 440V, 50Hz, star connected alternator, having effective armature resistance of 0.25Ω/phasethe synchronous reactance is 3.2 Ω/ph. and leakage reactance is 0.5 Ω/ phase. Determine at rated loud & unity PF: 08
  1) Internal emf
  2) No load emf
  3) Percentage regulation on full load
  4) Value of synchronous reactance which replaces armature reaction.

Q.9 a) With the help of vector diagram explain the effect of different excitation on to performance of synchronous motor. 07

b) A 3 phase star connected, 2KV, 50Hz, synchronous motor has effective resistance and synchronous reactance of 0.2 Ω & 2.2 Ω respectively. The input is 1MW at normal voltage & the inducedemf is 2500V. Calculate the line current & power factor. 08

Q.10 Write short notes on 15
  1) Power angle equation.
  2) Alternator voltage regulation by synchronous impedance method.
  3) V curves & its experimental set up.