SUBJECT CODE NO:- P-310
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E. (EEP/EE/EEE) Examination May/June 2017
A.C. Machines
(Revised)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Q.no.1 and Q.No.6 are compulsory.
2. Solve <u>any two</u> questions from Q. no. 2 to 5.
3. Solve <u>any two</u> questions from Q. No. 7 to 10.
4. Assume suitable data, if required.

Section A

Q.1		Solve <u>any five</u> of the following	10
	a)	Define slip. What is standstill slip?	
	b)	State the necessity of starting in 3 -ph induction motor and enlist the different starters used.	
	c)	Draw the torque – slip characteristics of 3 – ph induction motor.	
	d)	A 3 – ph, 6 pole, squirrel cage induction motor runs at 960 r. p .m. what will be the frequency of rotor current?	
	e)	Define the term crawling.	
	f)	Enlist the various methods for speed control of an induction motor.	
	g)	Write any four point of comparison between single – phase and 3 – phase induction motor.	
	h)	Write applications of AC servomotor.	

Q.2	a)	In an induction motor show that the starting torque is proportional to the square of applied voltage i.e. $\tau_{st} \propto v^2$.	07
	b)	A 3 – ph, 6 – pole, 50 Hz induction motor has a slip of 1 % at no load and 3% at full load, determine.	08

1. Synchronous speed
2. No-load speed
3. Full load speed
4. Frequency of rotor current at standstill
5. Frequency of rotor current at full load

Q.3	a)	Explain in detail the torque – slip and torque – speed characteristics of 3 – ph induction motor.	07
	b)	With neat circuit diagram explain the working of direct – on – line starter in 3 – ph induction motor.	08

Q.4	a)	Explain in detail the double – revolving – field theory of single phase induction motor	07
	b)	Draw the phase diagram of single phase induction motor with load & explain.	08

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Q.5 Write short note on the following (<u>any -3</u>) 15
    a) Speed control of induction motor by pole changing method.
    b) AC servomotor
    c) Double – cage induction motor
    d) FHP synchronous motor.

<center>Section B</center>

Q.6 Solve <u>any five</u> of the following 10
    a) State any two advantages of short pitching or chording in an alternator.
    b) Describe armature leakage reactance.
    c) Define voltage regulation. Enlist the methods used to determine the voltage regulation in cylindrical rotor type alternator.
    d) A synchronous generator has 9 slots per pole, if each coil span is 8 slot pitches what is the value of pitch factor?
    e) State the necessity for parallel operation of alternator.
    f) Enlist the different torques considered in selection of synchronous motor.
    g) State various causes of hunting in synchronous motor.

Q.7 a) Derive an EMF equation of alternator. 07
    b) A 3 – phase, 6 pole, star connected alternator revolves at 1000 r. p. m. The stator has 90 slots and 08 8 conductors per slot. The flux per pole is 0.05 Wb (sinusoidally distributed). Calculate the voltage generated by machine if the winding factor is 0.96.

Q.8 a) Explain voltage regulation by synchronous impedance method in synchronous generator. 07
    b) A 3 – phase, star connected alternator is rated at 1600KVA, 13500V. The armature effective 08 resistance and synchronous reactance are 1.5Ω and 30Ω respectively, Per phase. Calculate the percentage regulation for a load at 1280 KW at power factors of
        i. 0.8 leading
        ii. Unity
        iii. 0.8 lagging

Q.9 a) Draw the phase diagram of synchronous motor and explain in detail the effect of load changes on 07 a synchronous motor.
    b) A 6600v, 3 – phase, star connected synchronous motor draws a full load current of 80A at 0.8 p.f. 08 leading. The armature resistance is 2.2Ω and synchronous reactance 22Ω per phase. If stray losses of the machine are 3200W, determine the
        i. The e.m.f induced
        ii. The output power
        iii. The efficiency

Q.10 Write short note on following (<u>any 3 </u>) 15
    a) Methods of synchronizing in alternator
    b) Voltage regulation in alternator
    c) Synchronous motor V – curves
    d) Synchronous motor as synchronous condenser.

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