Code No: RT31024 **R13** SET - 1

III B. Tech I Semester Supplementary Examinations, May - 2017
ELECTRICAL MACHINES – III
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Why the single phase inductor motor is not self starting?	[3M]
	b)	Is it possible to make a balanced three-phase, 6-pole with 48 slots? If not possible state the reasons.	[4M]
	c)	What are the conditions to be satisfied for parallel operation of alternators?	[4M]
	d)	Two reaction theory is applied only to salient pole machines. State the reasons.	[4M]
	e)	What is the function of synchronous condenser?	[4M]
	f)	What is power circle of a synchronous motor?	[3M]

PART -B

2	a)	Explain the role of compensating winding in the operation of AC series motor.	[8M]
	b)	Using double field revolving theory, explain the torque-slip characteristics of a single phase induction motor and prove that it cannot produce any starting torque.	[8M]
3	a)	What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator.	[8M]
	b)	Calculate the EMF of a 4 pole, 3-phase, star connected alternator running at 1500 r.p.m from the following data: Flux per pole = 0.3 Wb, Total number of slots= 48, Conductors per slot (in two layers) = 4, coil span = 150^0.	[8M]
4	a)	What is voltage regulation? Explain the synchronous impedance method for the determination of voltage regulation of an alternator.	[8M]
	b)	A 3-phase generator rated at 25 MVA, 0.8 power factor lag, 13.8 kV is operating at normal voltage and rated load. The direct axis synchronous reactance is 7.62 Ω, quadrature axis synchronous reactance is 4.57 Ω and armature resistance is 0.15 Ω per phase. Determine the direct axis and quadrature axis components of armature current and internal induced voltage. Also find the regulation.	[8M]
5	a)	What is meant by synchronization? Explain the way of synchronizing an alternator to the infinite bus bars.	[8M]
	b)	The EMFs of two alternators are $3000\angle 20^0$ V and $2900\angle 0^0$ V. Their synchronous impedances are (2 + j20) Ω/phase and (2.5 + j30) Ω/phase. The load impedance is (10 + j4) Ω/phase. Find the circulating current.	[8M]
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6 a) Explain the variation of current and power factor of a synchronous motor with excitation. [9M]

b) Derive an expression for torque developed in a synchronous motor. [7M]

7 a) What is hunting in a synchronous motor? Explain how it can be suppressed. [8M]

b) A 660V, 3-phase star-connected synchronous motor draws 50 kW at a power factor of 0.8 lagging. Calculate new current and power factor when the back e.m.f increases by 50%. The machine has synchronous reactance of 3 ohm and effective resistance is negligible. [8M]

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