Hall Ticket Number:

Time: 3 hours



Code No. : 32212

## VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (E.E.E.) III Year II-Semester Main Examinations, May-2017

## **Electrical Machinery-III**

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

## Part-A $(10 \times 2 = 20 \text{ Marks})$

- 1. Explain how harmonics are suppressed in synchronous machine.
- 2. List out the advantages of fractional slot windings.
- 3. What are direct axis reactance  $(X_d)$  and quadrature axis reactance  $(X_q)$ ?
- 4. What are the conditions to be satisfied for parallel operation of synchronous generators?
- 5. Explain about hunting in a synchronous motor
- 6. What is reluctance power?
- 7. Draw the complete wave form of symmetrical short circuit current in a synchronous machine.
- 8. Mention any two applications of switched reluctance motor.
- 9. Explain why a single phase motor is not self starting.
- 10. Explain what happens if a DC series motor is connected to AC supply.

## Part-B (5 × 10 = 50 Marks)

11. a) Derive the EMF equation of an alternator.

b) A 3-phase, 16 pole star connected synchronous generator has a resultant air gap flux of 0.06 Wb per pole. The flux is distributed sinusoidally over the pole. The stator has three slots per pole per phase and 4 conductors per slot. The coil span is 150° electrical. Calculate the phase and line induced voltages when the machine runs at 375 rpm.

- 12. a) Discuss the potier triangle method of finding voltage regulation of an alternator. [7]
  - b) Explain the synchronization of two alternators by using three dark lamp method. [3]
- 13. a) Describe the effect of varying excitation upon armature current and power factor of a [5] synchronous motor when input power to the motor is maintained constant.
  - b) A 3-phase, 3300 V, 50 Hz star connected synchronous motor takes 40 A current. Its [5] synchronous reactance is 20  $\Omega$  per phase. Find the power supplied to the motor and induced e.m.f for 0.8 lagging power factor. Neglect armature resistance.
- 14. a) A 100 MVA, 11 kV, 3-phase star connected alternator is running at synchronous speed [6] with rated voltage. Its terminals are open circuited. A sudden 3-phase fault develops at its terminals. The per unit reactances are X<sub>d</sub> = 1.0, X<sub>d</sub><sup>1</sup> = 0.25, X<sub>d</sub><sup>11</sup> = 0.12. The time constants are T<sub>d</sub><sup>1</sup> = 1.1sec, T<sub>d</sub><sup>11</sup> = 0.04sec. The initial dc component of current is such that the total current is 1.5 times of the initial ac component of current. Find
  - i) AC component of current at the instant of short-circuit.
  - ii) Total current at the instant of short-circuit.
  - iii) AC component of current after 2 cycles.
  - b) Discuss construction and principle of operation of permanent magnet stepping motor. [4]

[5]

	15. a) Explain double field revolving theory and obtain the equivalent circuit of single phase motor.	[5]
	b) Explain the construction and principle of operation of permanent capacitor single phase induction motor and its applications.	[5]
	16. a) Explain, why synchronous impedance method of computing the voltage regulation leads to pessimistic values.	[3]
	b) Explain two reaction theory of salient pole alternator.	[7]
	17. Answer any two of the following:	
	a) Write short notes on synchronous condenser.	[5]
	b) Explain briefly construction and principle of operation of switched reluctance motors.	[5]
	c) Explain construction and principle of operation of shaded pole motor.	[5]
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	8 Minutes any two applications of switched educations works	
	9 Explain why a single phase moust is on soll sections.	
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	b) Explain the synchronization of two attenuours by oring unnerdant lang, and od.	
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	<ol> <li>AC component of contents after 2 contents.</li> </ol>	
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