

57 FREE SUPPLY NLU

G 1050

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 702—SYNCHRONOUS MACHINES (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks



Part A

Answer all questions.

Each question carries 3 marks.

1. Define distribution factor and coil span factor.
2. Explain armature reaction of a synchronous machine.
3. Define synchronization of an alternator and mention the condition for synchronization.
4. Explain with a diagram damper winding.
5. Draw a phasor diagram of a synchronous machine.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Calculate the r.m.s. value of the induced e.m.f. per phase of 10-pole, 3 ϕ , 50 Hz alternator with 2 slots per phase per pole and 4 conductors per slot in two layers. The coil span is 150°. The flux per pole of 0.12 μ s.
7. Explain any *one* method of synchronization of alternator.
8. Explain the methods of increasing the response of an excitor.
9. Explain briefly transient and sustransient reactance current variation during short-circuit.
10. Explain starting of synchronous motors.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. With neat sketches, explain constructional details of salient and non-salient pole alternators.

Or

Turn over

12. (a) Derive an expression for distribution factor and coil span factor. (6 marks)
 (b) Explain briefly revolving magnetic field. (6 marks)
13. (a) Explain the two reaction theory of salient pole synchronous machine. (6 marks)
 (b) Define voltage regulation of an alternator. Explain MMF method of determining regulation of alternator. (6 marks)

Or

14. (a) Describe the slip test method for the measurements of X_d and X_q of synchronous machines. (6 marks)
 (b) Find the regulation by the zero-power factor method of 5000 kVA, 6600 V, 3-phase, 50 Hz, star-connected alternator at full-load, UPF having the following test data :—

Field current in amps.	:	32	50	75	100	140
Open-circuit terminal voltage in volts	:	3100	4900	6600	7500	8300
Full-load current zero pf test line Pd in volts:		0	1850	4250	5800	7000

Neglect armature resistance.

- (6 marks)
15. (a) Explain methods of starting of synchronous motors. (6 marks)
 (b) Explain Hunting in synchronous machine and with a neat sketch, explain damper winding. (6 marks)

Or

16. (a) With a neat sketch, explain principles of operation of synchronous motors. (6 marks)
 (b) Explain different torques of a synchronous motor. (6 marks)
17. (a) Explain V and inverted V curves. (6 marks)
 (b) With a neat sketch, explain synchronous condenser. (6 marks)

Or

18. (a) Explain symmetrical short-circuit of unloaded alternator. (8 marks)
 (b) Explain briefly steady-state reactance. (4 marks)
19. (a) Explain different types of exciter ceiling voltage. (6 marks)
 (b) Explain the method of increasing the response of an exciter. (6 marks)

Or

20. (a) Explain with a diagram principle of operation of brushless alternators. (6 marks)
 (b) Explain different methods of excitation of brushless alternators. (6 marks)

[5 × 12 = 60 marks]

