

R15

Code No: 125AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May - 2018

ELECTRICAL MACHINES – III
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) Why is a rotating field system used in preference to a stationary field? [2]
- b) What is the importance of fractional slot windings in Synchronous machines? [3]
- c) Compare voltage regulation methods in brief. [2]
- d) What do you mean by Synchronous reactance? Explain the term Synchronous Impedance of an Alternator. [3]
- e) What do you mean by synchronizing torque of power? [2]
- f) What are causes of transient reactance's in Synchronous Machines? [3]
- g) Why Synchronous motors are not Self Starting? [2]
- h) Give the applications of Synchronous Motors. [3]
- i) Give various types of 1- ϕ Machines. Give Examples. [2]
- j) Explain the operation of Stepper Motor. [3]

PART - B

(50 Marks)

- 2.a) Explain the terms coil-span factor and distribution factor in connection with alternator armature windings and deduce the e.m.f equation of an alternator incorporating the effects of these factors?
 - b) Explain the different methods of excitation system of alternators. [5+5]
- OR**
- 3.a) Explain why harmonics are there in the induced EMF of Alternators.
 - b) Give various methods to suppress the Harmonics in induced emf of Alternators. [5+5]

- 4.a) Define voltage regulation of an alternator. Explain the various factors which may affect the regulation of an alternator.
- b) From the following test results, determine the voltage regulation of a 2000v, 1- ϕ alternator delivering a current of 100A at (i) unit pf, (ii) 0.8 leading pf and (iii) 0.71 lagging pf. [5+5]

OR

- 5.a) Explain the Poitier- triangle method of determining the voltage regulation of an alternator.
- b) Describe the slip test method for the measurement of X_d and X_q of synchronous machines. [5+5]

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- 6.a) What do you mean by Synchronizing of alternator's? Describe any one method of synchronizing.
b) What conditions must be fulfilled before an alternator can be connected to an infinite bus? [5+5]

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- 7.a) Write a short notes on effect of change of excitation in alternators.
b) Deduce the expressions for transient, sub-transient and steady state reactance's in alternators. [5+5]

- 8.a) Explain the principal of operation of a 3-phase synchronous motor.
b) Compare synchronous motors with Induction motors. [5+5]

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- 9.a) Derive the expression for the power developed in a 3-phase synchronous motors.
b) Explain how Synchronous motor operates as a Synchronous Condenser? [5+5]

- 10.a) Draw the circuit diagram of a capacitor-start capacitor-run single phase induction motor and explain its working. Where this type of motor is commonly used?
b) What are the advantages of 1- ϕ induction motors when compared with 3- ϕ induction motors? [5+5]

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- 11.a) Explain simply why a universal motor can operate from d.c. as well as a.c supplies?
b) Explain the double revolving theory of 1- ϕ induction motors. [5+5]

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