Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8016

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020
Fifth Semester
Electrical and Electronics Engineering
U15EE518 – ELECTRICAL MACHINES - II
(Regulation 2015)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Name the various methods for predetermining the voltage regulation of 3-phase Alternator.
2. Why do cylindrical Alternators operate with steam turbines?
3. How the synchronous motor can be used as synchronous condenser?
4. What is the role of synchronous motor in a transmission line? How?
5. Explain how rotating magnetic field is produced in three phase winding with three phase supply.
6. What are the inferences that can be obtained from blocked rotor test in a 3-phase I M?
7. What is voltage/frequency method of induction motor?
8. The stator output of a 3-Φ induction motor is 59 kW. The stator losses total 1 kW, total rotor copper loss 1.77 kW. What is the mechanical power developed?
9. Is single phase induction motor self starting? Why?
10. Given two advantages and two applications of stepper motor?

PART – B

(5 x 13 = 65 Marks)

11. a) Explain slip test explain the method of measurement of direct axis reactance and quadrature axis reactance of a salient pole alternator.

(OR)

b) The open and short circuit test readings for a 3-phase star connected 100 kVA, 2000 V, 50 Hz, synchronous generator are:

Field current in amperes	10	20	25	30	40	50
Open circuit terminal voltage in volts	800	1500	1760	2000	2350	2600
SC armature current in amperes	--	200	250	300	--	--

The armature effective resistance is 0.2 Ω per phase. Draw the characteristics curves and estimate the full load percentage regulation 0.8 p.f lagging and 0.8 p.f leading.

12. a) Explain in detail about V-curves and inverter V-curves on synchronous motor.

(OR)

b) A 400 V, 6 pole, 3-phase, 50 Hz, star connected synchronous motor has stator resistance and synchronous reactance of 0.2 ohm and 3.0 ohm per phase, respectively. It takes 20 Amps at u.p.f. when operating with a certain field current. If the load torque is increased until the current is 60 A, the field current remaining the same, find the gross torque developed and the power factor.

13. a) Derive an expression for the torque produced by a 3Φ Induction Motor and also derive the conditions for maximum torque.

(OR)

b) Take $R_1 = 1.75\ \Omega$, $X_1 = 5.5\ \Omega$, $R'_2 = 2.25\ \Omega$ and $X'_2 = 6.6\ \Omega$ for an Induction Motor. When the motor is tested at no load, it is observed that it takes 3.8 A(line current) and the total core loss is 310 W. By using approximate equivalent circuit at 4% slip, calculate) i) the rotor current, ii) supply current and power factor, iii) mechanical power developed iv) Gross load torque and v) Draw the equivalent circuit.

14. a) i. A 4 pole 50Hz, 3 phase slip ring induction motor when fully loaded runs with a slip of 3%. Determine the value of the resistance to be inserted in series per phase in the rotor circuit to reduce the speed by 10% and the rotor resistance per phase is 0.2 Ω.

ii. An 8 pole, 50 Hz, 3 phase induction motor is running at slip when delivering full torque. It has a standstill rotor resistance of 0.1 Ω per phase, calculate the speed of the motor if an additional resistance of 0.5 Ω per phase is added in the rotor circuit. Assume full load torque remains constant.

(OR)

b) Discuss the various types of starters methods used in 3 phase induction motor.

15. a) Derive the equivalent circuit of single phase induction motor with the help of double revolving field theory.

(OR)

b) Explain the principal of operation and constructional details of Linear Induction Motor. List some applications for the same.

PART – C

(1 x 15 = 15 Marks)

16 a) Explain in detail about :

i. Split-phase Induction Motors
ii. Capacitor start Induction Motor
iii. Capacitor Start and Run Motor

(OR)

b) A 3-phase, star connected, alternator has an open circuit line voltage of 6599 Volts. The armature resistance and synchronous reactance are 0.6 Ω and 6 Ω per phase respectively. Find terminal voltage, voltage regulation and δ if load current is 180 A at a power factor of

i. 0.9 lagging and
ii. 0.8 leading.