Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70479

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2021.

Fifth Semester

Electrical and Electronics Engineering

EE 6504 — ELECTRICAL MACHINES II

(Regulations 2013)

(Common to PTEE 6504 — Electrical Machines II for B.E. (Part-Time) — Fourth Semester — Electrical and Electronics Engineering - Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the equation for frequency of emf induced in an alternator.

2. Identify the type of synchronous generators that are used in hydroelectric plant.

3. When is synchronous motor is said to receive 100% excitation?

4. What are the causes of hunting?

5. How can the direction of rotation of 3 phase induction motor be reversed?

6. What is the advantages of skewing the rotor slots?

7. What is the effect of change in input voltage on starting torque of induction motor?

8. State two advantages of speed control of induction motor by injecting an e.m.f in the rotor circuit.

9. What is the function of centrifugal switch in a single phase induction motor?

10. Mention the applications of stepper motor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain step by step method of potier triangle method of determining the regulation of an alternator. (6)

(ii) A 30MVA, 15KV, 60Hz ac generator has a synchronous reactance of 1.2 pu and a resistance of 0.02 pu. Calculate

(1) the base voltage, base power and base impedance of the generator,

(2) the actual value of the synchronous reactance,

(3) the actual winding resistance, per phase

(4) the total full-load copper losses. (7)

Or

(b) A 3 phase Y-connected, 1000 KVA, 2000 V, 50 Hz alternator gave the following open-circuit and short circuit test readings :

Field current (A) :	10	20	25	30	40	50
O.C. Voltage (V) :	800	1500	1760	2000	2350	2600
S.C. armature current (A) :	–	200	250	300	–	–

The armature effective resistance per phase is 0.2 Ω. Draw the characteristic curves and determine the full load percentage regulation at

(i) 0.8 p.f lagging,

(ii) 0.8 p.f leading by MMF method. (13)

12. (a) Explain V-curves and inverted V-curves.

Or

(b) Explain briefly the features and principle of operation of three-phase synchronous motor.

13. (a) Sketch and explain the torque slip characteristics of the 3 phase cage and slip-ring induction motors. Show the stable region in the graph. (13)

Or

(b) (i) A 3 phase induction motor has a starting torque of 100% and a maximum torque of 200% of the full load torque. Determine:

(1) Slip at which maximum torque occurs;

(2) Full load slip;

(3) Rotor current at starting in per unit of full-load rotor current. (7)

(ii) Explain the working principle of 3 phase induction motor. (6)

14. (a) Explain the speed control methods of a three phase induction motor. (13)

Or

(b) With neat diagrams, explain the working of

(i) Star-Delta Starter

(ii) Auto Transformer Starter for 3 phase induction motor. (13)

15. (a) (i) Derive the equivalent circuit of a single phase induction motor with the help of double field revolving theory. (8)

(ii) Describe the working of repulsion motor. (5)

Or

(b) (i) Draw and explain the schematic diagram and torque-speed characteristic of capacitor-start, capacitor-run single phase induction motor. (6)

(ii) Write short notes on 'AC servo-motors'. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the V/F control technique in 3ϕ IM. (15)

Or

(b) With neat diagram, explain the construction and operation of shaded pole induction motor. (15)

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