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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE5PCMC2 **Max Marks: 100**
Course: ELECTRICAL MACHINES - II **Date: 21.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) With Neat diagram explain the phenomenon of armature reaction is a D.C. generator. Discuss its effect. **10**

b) The brushes of a lap connected 400 kW, 6 pole generator are given a lead of 21°(E) degree electrical. From the data given, calculate **10**

i) The demagnetising AT.
ii) The cross magnetising AT and
iii) Series turns required to balance the demagnetising component. The full load current is 750 A and total number of conductors are 900 and the leakage coefficient is 1.4.

OR

2 a) Explain clearly the process of commulations in a D.C. machine. What causes sparking at the commutators surface? **10**

b) Determine the reactance voltage for D.C. machine with data as follows assuming Linear commutation. **10**

Self inductance of coil : 15 mH
Current per conductor : 40A
Brush span : 3 commutator segments
Number of commutator segment = 50
And speed of the machine : 600 rpm

UNIT - II

3 a) Explain with neat sketch, Swinburnes test for finding the efficiency of a D.C. machine. Can this method be applicable to D.C. series motors? **10**

b) The following results were obtained during Hopkinson's test on two similar 230V D.C. machine : armature current 37A and 30A; Field currents 0.85A and 0.8 A respectively, Calculate the efficiencies of machines if each has armature resistance of 0.33Ω. **10**

UNIT - III

4 a) Derive power flow in synchronous motor and hence deduce efficiency of the motor. **08**

b) A 3 phase, 4 pole, 50 Hz star connected alternator has flux per pole of 0.12 wb. The slot per phase per pole is 4 and the number of conductor per slot are 4. If the winding coil span is 150°, Calculate the emf generated. **08**

c) List the difference between salient type and non salient type of rotor construction. **04**

UNIT - IV

5 a) Explain step by step method to deduce potier triangle to obtain potier reactance. **06**

b) The open circuit and short circuit test results for 3ϕ Y connected, 1000 kVA, 1905 V, 50Hz alternator are: **14**

Open circuit terminal Vg (Voc) line V	760	1500	1700	1905	2300	2600
Short circuit current Isc A	-	220	-	335	-	-
Filed current I_f A	10	20	25	30	40	50

The armature resistance per phase is 0.2Ω. Draw the OCC and SC characteristics and find the regulation at full load 0.8 p.f. lag by i) Amp-Turn method and ii) Synchronous impedance method.

OR

6 a) What are the conditions to be satisfied before a 3-phase alternator is synchoronised to infinite bus. Describe a method of synchronizing the 3-phase alternator to the infinite bus giving the relevant circuit diagram. **10**

b) A salient pole alternators has direct axis and Quadrature axis reactance of 0.8 p.u. and 0.5 p.u. respectively. The effective resistance is 0.02 p.u. Compute percentage regulation when the generators is delivering rated load at 0.8 p.f. lag and lead. Assume rated voltage and rated current as (1 p.u.). **10**

UNIT - V

7 a) A synchronous generator is connected to an infinite bus. Discuss with the help of phasor diagram i) Effect of changing Excitation at constant mechanical input. ii) Effect of changing the input at constant Excitation. **10**

b) A 3-phase, 3300V, star connected synchronous motors has an effective resistance and synchronous reactance of 2.0 Ω and 18.0Ω per phase respectively. If the open circuit generated EMF is 3800V between lines, calculate: **10**

i) The maximum mechanical power that the motor can develop.

ii) The current and power factor at the maximum mechanical power.

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