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

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 19EE5PCMC2 **Max Marks: 100**
Course: ELECTRICAL MACHINES - II **Date: 17.05.2023**

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 diagrams and necessary expressions classify self-excited DC generators. **08**

   b) Discuss in detail i) T_a Vs I_a and ii) N Vs I_a characteristics with necessary plots and expressions for a DC series motor. **06**

   c) An 8 pole DC shunt generator with 778 wave connected armature conductors and running at 500 rpm, supplies a load of 12.5 Ω resistance at terminal voltage of 250 V. The armature resistance is 0.24 Ω and the field resistance is 250 Ω. Find the armature current, the induced emf and the flux per pole. **06**

OR

2 a) With neat diagrams discuss about speed control of DC shunt motors. **07**

   b) What is meant by armature reaction? Discuss with neat sketches the effects of armature reaction in a DC generator. **07**

   c) A 250 V, DC shunt motor takes 5 A on no load and runs at 1000 rpm. The total armature and shunt field resistances are 0.2 Ω and 250 Ω respectively. Determine the speed of the motor when on load taking a current of 50 A and the armature reaction weakens the field by 3%. **06**

UNIT - II

3 a) With a neat diagram derive expressions for motor and generator efficiency by conducting field test on a DC series motor. **10**

   b) With neat diagram obtain the expressions for efficiency of DC generator and motor using Back to back test. Also mention the advantages and disadvantages of this test. **10**

UNIT - III

4 a) Recommend any two methods of starting of synchronous motor with proper explanations. **08**

   b) Describe pitch factor and distribution factor. **06**

   c) A 12 pole, 500 rpm, star connected alternator has 60 slots. The flux per pole is 0.02 Wb. The winding factor is 0.93. Determine the number of turns per phase **06**

to give a line EMF of 1492 V. Also determine the number of conductors per slot.

UNIT - IV

5 a) Discuss about MMF method or Ampere turn method to determine voltage regulation of a synchronous generator considering lagging power factor of operation. **08**

   b) Justify why parallel operation of alternators is necessary. **04**

   c) A three phase star connected alternator is rated at 1600 kVA and 13500 V. The effective armature resistance and synchronous reactance per phase are 1.5 Ω and 30 Ω respectively. Calculate the percentage voltage regulation for a load of 1280 kW at following power factors **08**
       (i) 0.8 lagging   (ii) 0.8 leading

OR

6 a) With necessary circuit diagram, phasor diagram and expressions explain about pre-determination of voltage regulation using ZPF method. **10**

   b) Describe the method of determining voltage regulation using slip test for salient pole synchronous machine with neat circuit diagram and phasor diagram. **10**

UNIT - V

7 a) Describe about power angle characteristics with necessary circuit diagram and phasor diagram neglecting armature resistance. Also mark the steady state stability limit in the power angle characteristic plot. **08**

   b) Explain the effect of change in excitation at constant load for a synchronous generator connected to a bus bar with phasor diagram. **07**

   c) Briefly explain about V-Curves with a neat diagram. **05**

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