Roll No ....

EE/EX-501-CBGS
B.Tech., V Semester
Examination, June 2020
Choice Based Grading System (CBGS)
Electrical Machine - II
Time : Three Hours

Maximum Marks : 70

Note: i)   Attempt any five questions

ii)   All questions carry equal marks.

iii)   In case of any doubt or dispute the English version question should be treated as final.

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1. a) Discuss the points of similarities between a transformer and an induction motor. Explain why an induction machine is called a generalized transformer.   7

b) Explain the principle of speed control of a 3-phase induction motor by V/f method and draw the corresponding torque-speed characteristics.   7

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PTO

2. a) A three phase, 400 V, 50 Hz induction motor takes a power input of 35 kW at its full load speed of 980 rpm. The total stator losses are 1 kW and the friction and windage losses are 1.5 kW. Calculate   7

    i) Slip   ii) Rotor ohmic losses

    iii) Shaft power   iv) Shaft torque

    v) Efficiency

980

35

b) Explain the construction, operating principle and characteristic of Brushless DC motor.   7

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3. a) The phase emf of a 3 phase, 50 Hz alternator consists of a fundamental, a 20% third harmonic and a 10% fifth harmonic. The amplitude of the fundamental voltage is 1000 V. Calculate the rms line voltage when the alternator windings are in (i) Star and (ii) Delta   7

20%

EE/EX-501-CBGS   Contd...

b) Explain the effect of variation of excitation and mechanical input on the parallel operation of alternators with necessary phasor diagrams.　　　　7

4. a) What are the differences between Synchronous motor and Induction motor? Explain the operation of synchronous motor with variable excitation at constant load.　　7

b) Describe the principle of operation of three phase induction motor. Explain why the rotor is forced to rotate in the direction of rotating magnetic field.　　　7
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5. a) Explain the constructional features and principle of operation of a capacitor start induction run motor. Draw the torque speed characteristics and list out its merits over resistance start split phase motor.　　　7

resistance start split phase motor

b) What is Synchronous condenser? What are the advantages of installing a synchronous condenser in an electrical system? Illustrate your answer with an example.　　7

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6. a) Sketch the circuit diagram of capacitor-start, capacitor-run induction motor and draw speed torque characteristics. 7

   b) Explain the constructional details and principle of operation of a split phase induction motor. List out its industrial applications. 7
   Split phase induction   a

7. a) What is Armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator at ZPF lag and ZPF lead with the help of necessary phasor diagram. 7

   b) Show that a synchronous motor has no net starting torque. Explain different methods of starting synchronous motor. 7

8. a) Explain how the circle diagram for a poly-phase induction motor can be drawn from its test data? 7

   b) Using revolving field theory explain the torque-slip characteristics of a single phase induction motor and prove that it cannot produce starting torque. 7

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