(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2017

Paper Code: ETEE 202 **Subject: Electrical Machines-II**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.No. 1 which is compulsory. Select one question from each unit.

Q1. Write short, up to the point and clear answer of the following: **(10x2.5=25)**

a) Why does an induction motor not develop torque at synchronous speed?
b) What is the frequency of the rotor current of a 415 V, 50 Hz, 4-pole induction motor running at 1440 rpm?
c) What are cogging and crawling in squirrel cage induction motors. How can their effect be minimized?
d) What are the advantages of rotating field and stationary armature of synchronous generator?
e) Define pitch factor and distribution factor of a synchronous machine.
f) What is short circuit ratio(SCR) of synchronous generator and what advantages are of high value of SCR?.
g) Why speed of single-phase induction motor is not reversed if connection of supply terminal are interchanged, but is reversed, if terminals of either main winding or auxiliary winding or auxiliary winding are interchanged?
h) What improvements should be made to run single-phase ac series motor satisfactorily?
i) State the principle of working of a reluctance motor.
j) What are the pull-in torque and pull-out torque of synchronous motors?

Unit-I

Q2. Name the different methods of speed control of 3-phase inductions motors and describe the Kramer system of speed control with neat diagram. Also state its merits and demerits. **(3+5.5+4=12.5)**

Q3. What is slip in induction motors? Derive relation between slip, rotor copper loss and rotor input power. A 3-phase, 2-pole, 50 Hz induction motor is running at 2800 rpm with an input power of 15 kW and a terminal current of 22A. The stator resistance is 0.2Ω per phase. Calculate copper loss of rotor. **(2+4+6.5=12.5)**

Unit-II

Q4. Describe two-reactance theory for synchronous machines. Explain why it is not applicable for cylindrical rotor machines. Also explain and draw neat phasor diagram of an alternator based on it. **(5+2.5+5=12.5)**

Q5. What is synchronous reactance? How is it determined from OCC and SCC of an alternator? Calculate the saturated synchronous reactance of a 85 kVA synchronous machine which achieves its rated open-circuit voltage of 460 V at a field current 8.7A and which achieves the rated short-circuit current at field current of 11.2 A. **(3+4+5.5=12.5)**

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Unit-III

Q6. State the principle of working of synchronous motor and explain why it is not self-starting. Describe any two methods of its starting. **(3.5+3+6=12.5)**

Q7. Explain and draw the neat phasor diagram of a synchronous motor at lagging power factor. Also derive the expressions for the power developed by synchronous motor. **(5+7.5=12.5)**

Unit-IV

Q8. What is double-revolving-field theory? On its basis draw torque-slip characteristics, explain the working of single-phase induction motor and state why single-phase induction motors are not self-starting. **(3+3+3.5+3=12.5)**

Q9. Write short notes on:
a) Stepper Motor **(6.5)**
b) AC Servo Motor **(6)**

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