ROLL NO:	

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20% Max Marks: 40 Max Time: 1 hr. Tuesday, 25th September, 2018

TEST – 1

Odd Semester 2018-19 Course: **EEE 302 Electrical Machine Design** V Sem. EEE

Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

(3 Q x 4 M = 12 Marks)

1. Define the terms specific magnetic and electric loadings in the design of electrical machines.
2. Discus the factors which imposes limitation on electrical machine design.
3. Summarise the advantages of large length of air gap in DC machine and derive how to design the air gap length in dc machine.

Part B

(2 Q x 8 M = 16 Marks)

4. List out the classification of insulating materials based on thermal considerations with two examples on each class.
5. A 350 kW, 500 Volts, 450 rpm, 6-pole dc generator is built with an armature diameter of 0.87 mt and core length of 0.32 mt. The lap wound armature has 660 conductors. Estimate the specific electric loading and magnetic loading.

Part C

6. A 4-pole, 25 HP, 500 Volts, 600 rpm, series motor has an efficiency of 82%. The pole facesare square and the ratio of pole arc to pole pitch is 0.67. Take B_{av}= 0.55 Wb/m^2 and ac=17000 amp.cond. /m. Obtain the main dimensions of the core and particulars of suitable armature winding.

ROLL NO:

PRESIDENCY UNIVERSITY, BENGALURU

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TEST 2

Odd Semester: 2018-19 | **Date**: 28 November 2018

Course Code: EEE 302 | **Time**: 1 Hour

Course Name: Electrical Machine Design | **Max Marks**: 20

Branch & Sem: EEE & V Sem | **Weightage**: 20%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts
(iii) Scientific and Non-programmable calculators are permitted.
(iv) Assume the suitable missing data.

Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3x4=12)

1. Discuss in brief the various factors to be considered during the optimal design of transformer.
2. Prove that EMF/turn of single phase transformer is =K$\sqrt{kVA}$
3. Calculate the core and window areas required for a 500 kVA, 3300V/440V, 50-Hz, 1-ϕ core type transformer. Assume a maximum density of 1.25 wb/mt^2 and a current density of 2.5 A/mm^2, Voltage per turn is 30 Volts and window space factor is 0.32

Part B

Answer **all** the Questions. **Each** question carries **eight** marks. (2x8=16)

4. With usual notations derive an output equation of single phase transformer with necessary diagram.
5. Explain usual notations and diagram, design the transformer tank with cooling tubes, starting from the determination of temperature rise in transformer.

Part C

Answer the Question. Question carries **twelve** marks. (1x12=12)

6. Estimate the main dimension including winding conductor area of 3-ϕ, Δ-Y core type transformer rated at 300 kVA, 6600/440V, 50-Hz. A suitable core with 3-steps having a Circumscribing circle of 0.25m diameter and a leg spacing of 0.4m is available. EMF/Turn is 8.5 V, current density=2,5 A/mm^2 Kw=0.28 and Sf=0.9.

Roll No.												

PRESIDENCY UNIVERSITY
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END TERM FINAL EXAMINATION

Odd Semester: 2018-19 | **Date**: 29 December 2018

Course Code: EEE 302 | **Time**: 2 Hours

Course Name: Electrical Machine Design | **Max Marks**: 80

Programme & Sem: EEE & V Sem | **Weightage**: 40%

Instructions:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts
(iii) Scientific and Non-programmable calculators are permitted.
(iv) Assume the suitable missing data.

Part A

Answer **all** the Questions. **Each** question carries **five** marks. (4Qx5M=20)

1. Select the appropriate answer for the following questions;
   i. What factor does the output coefficient depend upon?
      a. Specific magnetic loading. c.Specific electric loading or specific magnetic loading.
      b. Specific electric loading. d.Specific electric loading and specific magnetic loading.
   ii. Which type of slots are generally used in induction motors?
      a. Open type. c. Closed type
      b. Semi-closed type. d. None of the above.
   iii. In case of induction motors, the ratio of length to pole pitch for good efficiency is taken as
      a. 5.0. b. 2. c. 1.5. d. None of the above.
   iv. The synchronous speed is estimated as
      a. n_s=2*P/f rps. b. n_s =2*f/P rps. c. ns =f*P/2 rps. d. n_s=2*P/f*n rps.
   v. The main dimensions of rotating machines are
      a. D, L & Xs. b. L, D & Xr. c. Ss, Sr & R. d. D & L.
2. Fill in the blanks of the following;
   a. The difference between (Ss-Sr) should not equal to _____ for 3-ϕ machine to avoid magnetic locking.
   b. The stator turns per phase (Ts) is given by_____.
   c. The area of cross-section of stator conductors is _____.

d. The _____ in alternator is decided by the frequency & speed of operation.

e. In alternator as the Specific magnetic loading increases results in _____ increase & _____ decreases.

3. Define the Short circuit ratio? Briefly explain with the necessary diagram the effect of SCR in the alternators.
4. List out the various factors that should be considered while the choice of length of air gap in the Induction motor.

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (4Qx10M=40)

5. Determine the stator core dimensions, number of stator slots and number of stator conductors/slots for 100Kw,3300 Volts, 50 Hz, 12-Pole,Y-Connected slipring IM, Bav=0.4 Wb/mt^2, ac=25000 Amp-Cond/mt, Efficiency=0.9, power factor=0.9. Choose dimension to give best power factor. The slot loading should not exceed 500 Amp-cond.
6. With usual notations derive an Output equation of Synchronous machine in terms of its main dimensions and specific loadings.
7. For a 250 kVA, 1100 Volts, 12 Pole, 500 rpm, 3-ϕ alternator is having the air gap density is 0.6 Wb/mt^2 and Specific electrical loading is 30,000 Amp-Cond /mt and L/τ=1.5. Estimate the air gap diameter, core length, number of stator conductors, number of stator slots and cross section of stator conductor.
8. What are the factors to be considered for the choice of specific magnetic loading and electrical loading in synchronous machines also explain in brief?

Part C

Answer the Question. Question carries **ten** marks. (1Qx20M=20)

9. Estimate the main dimensions of, air gap, stator slots, stator turns/phase and cross sectional area of stator and conductors for a three phase 15HP, 400 V, 6-Pole, 50 Hz, 975 rpm Induction motor is suitable for Star-Delta starting. Bav=0.45 Wb/mt^2, ac=20000, amp-Cond/mt, L/τ=0.85, η=0.9, power factor=0.85, Kw=0.96.