Code No: RT22025 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November-2018
ELECTRICAL MACHINES - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain the basic principle of the transformer (3M)
   b) On what factors do hysteresis loss and eddy current loss depend? Why can these losses be assumed constant? (4M)
   c) List the conditions to be fulfilled for parallel operation of three phase transformers. (4M)
   d) Why the power factor of a three phase induction is motor is lagging? (3M)
   e) Explain why a small voltage is applied to the stator during blocked rotor test (3M)
   f) Define stacking factor or iron factor (3M)

PART -B

2. a) Starting from first principles develop the equivalent circuit of a transformer. (8M)
   b) A 30 KVA , 3000/300 V, 50 Hz, single –phase transformer has the following winding resistances and leakage reactances: (8M)
   $R_1 = 2.5\ \Omega$ $R_2 = 0.018\ \Omega$
   $X_1 = 3.8\ \Omega$ $X_2 = 0.52\ \Omega$
   Calculate the following: i) Equivalent resistance, leakage reactance and impedance referred to high voltage side. ii) Equivalent resistance, leakage reactance and impedance referred to Low voltage side. Iii)Total copper loss of the transformer at full load condition

3. a) Explain how and why open circuit and short circuit tests are conducted on a single phase transformer with a neat diagram (8M)
   b) Prove that by use of an auto – transformer, in place of a two – winding transformer, results in saving in copper to the extent of 1/a times the weight of copper in two – winding transformer. Where a is the transformation ratio of the transformer (8M)

4. a) Explain the concept of open Delta (or V – V) connection with neat diagrams (8M)
   b) In a sumpner's test on two identical single – phase transformers rated 500 KVA, 11/0.4 KV, 50 Hz the wattmeter reading on h.v side is 6000 W and on the l.v side is 15000W. Find the efficiency of each transformer on half full load and 0.8 Power factor. What will be its maximum efficiency? (8M)
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5. a) Explain how the rotating magnetic field is created in three phase induction motor. (8M)

   b) The power input to the rotor of a 3 – phase, 440 V, 50 Hz, 6 – pole induction motor is 80 Kw. The rotor emf is observed to make 100 complete alternations per minute. Calculate i) slip, ii) motor speed, iii) mechanical power developed iv) rotor copper loss per phase v) rotor resistance per phase if rotor current is 60 A. (8M)

6. a) Discuss the various methods of starting the wound rotor and cage rotor Induction motor (8M)

   b) A three-phase, 10Kw, six-pole, 50Hz, 400V of delta-connected induction motor run at 960 rpm or full-load. If it draws 85A on direct on-line starting. Calculate the ratio for the starting torque to full-load torque with Y-Δ starter. Power factor and full-load efficiency are 0.88 and 90% respectively. (8M)

7. a) Write a short note on Stator Design aspects. (8M)

   b) Which types of windings are commonly used in core type transformers? What are the factors that influence the choice of type and arrangement used for windings for core type transformers? (8M)