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

II B. Tech II Semester Supplementary Examinations, November - 2017
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) Why is transformer core laminated? (3M)
   b) Why is magnetizing current of a transformer non – sinusoidal? (3M)
   c) How can the problems of unbalanced voltages and third harmonic current be overcome in Y – Y connection? (4M)
   d) Why are rotor core losses negligible in three phase induction motor? (3M)
   e) "The rotating fields of the stator and rotor are stationary with respect to each other." Justify the statement (3M)
   f) What are the windings that are used for shell type transformers? (4M)

PART -B

2. a) Derive the emf equation of a transformer (8M)
   b) A transformer has 2000 turns in high voltage windings. It is used to step down from 12 KV to 120 V. Find i)number of turns in low voltage winding and ii)peak value of flux for frequencies of 50 and 35 Hz. (8M)

3. a) Explain the principle of operation of an Auto – transformer and how come this is different from normal single phase transformer (8M)
   b) A single phase transformer is rated at 100 KVA, 5000/250V. The full – load copper losses are 2000W and iron losses are 1200 W. Find efficiency at i) full – load unity power factor ii) full – load 0.8 Power factor lagging (8M)

4. a) Explain the concept of three phase to two phase conversion(Scott connection) with a neat circuit diagram (8M)
   b) A 6600/400/110 V, star/star/mesh, three – phase transformer has a magnetizing current of 5.5 A and balanced 3 – phase loads of 1000 KVA at 0.8 lagging power factor on the secondary and 200 KVA at 0.5 leading power factor on tertiary. Neglect losses. Find primary current, KVA and Power factor (8M)

5. a) Explain and draw the equivalent circuit of three phase induction motor (8M)
   b) A 3 – phase, 6 – pole, 50 – Hz induction motor has 160 N-m as its useful torque. The rotor emf is observed to make 90 cycles per minute. Calculate: i) Motor output in KW, ii) Copper losses in rotor iii) Motor input and iv) Efficiency if the mechanical torque lost in friction and windage is 20 N-m and stator losses are 800 W (8M)

6. a) Explain the principle of induction generator operation (8M)
   b) A 3 – phase induction motor has a short circuit current equal to 5 times the full load current. Calculate the starting torque as a percentage of full load torque if full load slip is 3 percent (8M)
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7. a) Derive the output equation of a three phase transformer. (8M)

   b) Find the main dimensions of a 15 kW, three phase, 400V, 50 Hz, 28/o rpm squirrel cage induction motor having an efficiency of 0.88 and a full load power factor of 0.9. (8M)
   Assume:
   Specific magnetic loading=05W6/n^2; specific electric loading =25000 A/n. Take the rotor peripheral speed as approximately 20 n/s at synchronous speed.