Code No: R1621022 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2019
ELECTRICAL MACHINES – I
(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 **FOUR** Questions from **Part-B**

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PART –A

1. a) Discuss briefly the principle of energy conversion (2M)
b) Explain back emf with respect to DC motor (2M)
c) Explain what would happen if the DC Motor is directly switched on to the supply without any starter (3M)
d) Distinguish between core type and shell type transformers (3M)
e) Explain the condition for maximum regulation of a transformer (2M)
f) Explain the effects of third harmonic component in a three phase transformer (2M)

PART –B

2. Show that the field energy in a linear magnetic system can be given as (14M)
$$W_f = ½ Li^2 = ½ \psi I = 1/2L \psi^2$$

3. a) Explain with relevant diagrams, the different methods of excitation of DC machines (7M)
b) A separately excited dc generator has armature circuit resistance of 0.22 Ω and a total drop at brushes is 2.5 V. When running at 1200 rpm, it delivers a current of 120 A at 220 V to a load of constant resistance If the generator speed drops to 750 rpm, with field current unaltered, find the current delivered to load. (7M)

4. a) Discuss the effect of speed and size on the efficiency of DC Machines (7M)
b) A 8 kW, 220 V, 4 – pole wave connected dc motor has 450 armature conductors. At full load, the useful flux per pole is 0.023 Wb and rotational losses are 110 W. Find the full load speed (7M)

5. a) Explain about the short circuit test of a single phase transformer and give its significance? (7M)
b) A single phase transformer is rated at 120 kVA, 5000/250V. The full – load copper losses are 2200W and iron losses are 1400 W. Find efficiency at i) full – load 0.8 power factor leading ii) full – load 0.6 power factor lagging (7M)

6. a) Explain the operation of transformer on no load with a neat vector diagram (7M)
b) Derive the condition for maximum efficiency of a single phase transformer (7M)
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7. a) Explain the distinguishing features of Y – Y and Δ – Δ, three phase connections? Compare their advantages and disadvantages (7M)
   b) A 3-phase step down transformer takes 18 A when connected to 4400 V mains. The turn's ratio per phase is 12. Neglecting losses find the secondary line voltage, line current and output if the transformer windings are connected in delta / star (7M)