

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****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)

$$W_f = \frac{1}{2} Li^2 = \frac{1}{2} \Psi I = \frac{1}{2} L \Psi^2$$
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 0.22Ω 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 , $5000/250 \text{ V}$. The full – load copper losses are 2200 W 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. (7M)
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

