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

II B. Tech I Semester Supplementary Examinations, October/November - 2020
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) If the direction of rotation is reversed, will the generator voltage build up or not? Comment up on your answer. (2M)
   b) Which losses of a DC shunt motor are constant and Why? (2M)
   c) Distinguish between cumulative and differential compound motors along with suitable examples of each type. (3M)
   d) Define voltage regulation of a transformer. (2M)
   e) Explain why the open circuit test on a transformer is conducted at a rated voltage. (2M)
   f) List the advantages of three – phase transformer over three single – phase transformers. (3M)

PART -B

2. Derive an expression for the torque in a doubly excited system having salient - pole type of stator as well as rotor. State the assumption made. (14M)

3. a) Sketch and explain the load characteristics of the shunt and series generator. (7M)
   b) A 20 kW, 250 V, 6 pole lap connected dc generator runs at 1250 rpm. Armature has 550 conductors. For full load armature – ohmic loss of 250 W, find the useful flux per pole. Take 2 V as the brush drop at full load. (7M)

4. a) Explain the speed torque characteristics of DC shunt, series and cumulative compound motors. (7M)
   b) A DC series motor, with unsaturated magnetic circuit and negligible resistance, when running at a certain speed on a given load, takes 60 A at 600 V. If the load torque varies as the cube of the speed, find the resistance to be inserted to reduce the speed by 50 %. (7M)

5. a) Explain about core and shell type of transformers and their relative merits with respect to other. (7M)
   b) Derive the emf equation of a transformer. (7M)

6. A 4.5 kVA, 400/210 V,50 Hz single phase transformer has the following test data: (14M)

   O.C. test (l.v.side) 210V, 1A,70 W
   S.C. test (h.v.side) 15 V, 10.8A, 100 W

   Calculate (i) Equivalent circuit referred to l.v side and
   (ii) Secondary load voltage on full load at 0.8 power factor lagging
   (iii) Efficiency of transformer at ¾ th load and 0.7 power factor (lag).

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7. a) Explain the concept of Scott connection (three phase to two phase) conversion with a neat circuit diagram. (7M)
   b) A balanced 3-phase, 250 kW load at 415 V and 0.88 power factor lagging is to be supplied from a two – phase 1100 V supply. Determine voltage and current rating of each winding of scott connected transformers and kVA rating of each unit. (7M)

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