



## GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **EE252U - DC Machines and Transformers**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

- 1) Solve any TWO sub-questions:
  - a) Derive the expression for energy in singly excited magnetic field circuit. [6]
  - b) Explain the process of commutation in dc machines and describe the method to improve it. [6]
  - c) A lap wound dc generator having 80 slots with 10 conductors per slot, generates emf of 400 V at no load. At what speed should it be rotated to generate a voltage of 220 V on open circuit? [6]
- 2) Solve any TWO sub-questions:
  - a) Develop the exact equivalent circuit of single phase transformer. From this, derive approximate and simplified equivalent circuit. [6]
  - b) Draw the Scott connection of transformers and mark the terminals and turns ratio. what are the applications of it? [6]
  - c) A single-phase, 100 kVA, 222/200 V, 50 Hz transformer has an impedance drop of 10 % and resistance drop of 5 %. Calculate the (i) regulation at full load at 0.8 pf lagging and (ii) the value of power factor at which regulation is zero. [6]
- 3) Solve any TWO sub-questions:
  - a) Explain various losses occurring in transformers and derive the condition for maximum efficiency for a single phase transformer. [6]
  - b) A single phase transformer working at unity power factor has an efficiency of 90 % at both half load and at full load of 500 W. Determine the efficiency at 75 % of the full load and the maximum efficiency. [6]
  - c) discuss the essential and desirable conditions to be fulfilled for operating two single phase transformers in parallel. [6]
- 4) Solve the following sub-questions:
  - a) Explain Torque-Speed characteristics of DC motors. [6]
  - b) A 200 V dc shunt motor takes a 12 A when running on No Load. At higher loads the brush drop is 2 V and at light load it is negligible. The stray losses at a line current of 105 A is 50 % of no load losses. Calculate the efficiency at a line current of 105 A if armature and field resistances are 0.2 and 100 ohms respectively. [6]
- 5) Solve the following sub-questions:
  - a) State the factors affecting the choice of connections for three phase transformer and draw a neat sketch of four possible connections of three phase transformer. [6]
  - b) Two single phase transformers share a load of 400 kVA at 0.8 power factor lagging. Their equivalent impedance referred to secondary winding are  $(1+j2.5)$  ohms and  $(1.5+j3)$  ohms respectively. Calculate the load shared by each transformer. [6]

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