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Roll No. .....

324352(24)

BE (3rd Semester)
Examination, April - May, 2017

[New Scheme]

Electrical Machines-I

Time Allowed : 3 hours *Maximum Marks :* 80
Minimum Pass Marks : 28

Note : (*i*) **All** questions are compulsory. Part (*a*) of each question is compulsory. Attempt any **two** parts from (*b*), (*c*) and (*d*).

(*ii*) The figures in the right-hand margin indicate marks.

1. (*a*) Why the rating of transformer is in kVA ? [2]

(*b*) Describe the various losses in a transformer. Explain how each loss varies with the load current, supply voltage and frequency. [7]

(*c*) Draw and explain phasor diagram for no-load, lagging and leading power factor. [7]

(*d*) A 1-phase, 250/500 V transformer gave the following results :

Open-circuit test : 250 V, 1 A, 80 W on LV side

Short-circuit test : 20 V, 12 A, 100 W on HV side

Calculate the circuit constants and show them on an equivalent circuit. [7]

2. (*a*) What is distribution transformer ? [2]

(*b*) What is an autotransformer ? State its merits and demerits over two-winding transformer. Give the constructional features and explain the working principle of a single-phase autotransformer. [7]

(*c*) Discuss the essential and desirable conditions to be fulfilled for operating two single-phase transformers in parallel. [7]

(*d*) Two single-phase transformers share a load of 400 kVA at power factor 0.8 lagging. Their equivalent impedances referred to secondary windings are $(1 + j2.5)\ \Omega$ and $(1.5 + j3)\ \Omega$ respectively. Calculate the load shared by each transformer. [7]

3. (*a*) Write any two applications of three-phase transformer. [2]

(*b*) Explain with the help of connection and phasor diagram, how Scott connections are used to obtain two-phase supply from three-phase supply mains. [7]

(*c*) State the necessary conditions for satisfactory operation before two and three-phase transformer may be connected in parallel and the conditions for satisfactory parallel operation on load. [7]

(*d*) Explain the construction and working principle of three-phase transformer. [7]

4. (*a*) What is the function of commutator in d.c. machine ? https://www.csvtuonline.com [2]

(*b*) What do you understand by demagnetizing and cross magnetizing effects of armature reaction in d.c. machine? [7]

(*c*) Draw a neat sketch of a d.c. generator. State the functions of each part. Derive the emf equation of a d.c. generator. [7]

(*d*) A lap wound d.c. shunt generator having 80 slots with 10 conductors per slot generates at no-load an emf of 400 V when running at 1000 r.p.m. At what speed should it be rotated to generate a voltage of 220 V on open circuit? [7]

5. (*a*) Explain any three applications of d.c. series motor. [2]

(*b*) Describe Swinburne's test with the help of a neat diagram to find out the efficiency of a d.c. machine. [7]

(*c*) Write short notes on : [3+4=7]

(*i*) Four-point starter

(*ii*) Speed control of d.c. motor

(*d*) A 250 V d.c. shunt motor having an armature resistance of 0.25 Ω carries an armature current of 50 A and runs at 750 r.p.m. If the flux is reduced by 10%, find the speed. Assume that load torque remains the same. [7]

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