SUBJECT CODE:- 463
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(EEP/EE/EEE) Examination Nov/Dec 2015
Transformers & DC Machines
(Revised)

[Time: Three Hours]   [Max. Marks: 80]

"Please check whether you have got the right question paper."
N.B i) Q.No.1 and Q.No.6 are compulsory.
    ii) Solve any two questions from Q.No.2 to Q.No.5.
    iii) Solve any two questions from Q.No.7 to Q.No.10.
    iv) Assume suitable data wherever necessary.

SECTION- A

Q.1 Attempt the following. (any five)   10
   a) Discuss the working principle of transformer.
   b) Emf per turn of single phase 10KVA, $\frac{2200V}{220V}$, 50Hz, transformer is 10 volts. Calculate number of primary and secondary winding terms.
   c) What do you mean by no load current in transformer?
   d) Why core of transformer is laminated.
   e) Why rating of transformer is in KVA.
   f) State the necessary conditions for parallel operation of two transformer
   g) What are the applications of stepper motor?
   h) Define voltage regulation of transformer how does it changes with load.,

Q.2 a) Derive e m f equation of transformer.   05
   b) Draw the approximate equivalent circuit of transformer refers to primary side and indicate how it differs from exact equivalent circuit.   05
   c) A single phase transformer has 400 primary turns and 100 secondary turns. The net cross sectional area of core is 60 cm^2. It the primary winding is connected to 50Hz, 500volts supply. Calculate.   05
       i) Peak value of flux density in the core
       ii) The voltage induced in the secondary winding.

Q.3 a) Draw the physical connections and phasor diagram of following connection.   05
       i) Dzo   ii) Yd11
   b) Derive an expression for saving of copper in autotransformer as compare to conventional transformer.   05
   c) A 10 KVA, 200/400 volts, 50Hz, single phase transformer gives the following test results.   05

   | O.C | Test | H. V wdg | 200 volts | 1.3 A | 120 watt |
   | S.C | Test | L.V. wdg | 22 volts | 30 A | 200 watt |

   Find the parameters of equivalent circuit.

Q.4 a) What is scott connection. Draw its connection diagram.   05
   b) Compare three phase transformer with bank of three single phase transformers.   05
   c) Discuss back to back test for separation of losses in two identical single phase transformers.   05

Q.5 Explain the following (any three)   15
   a) Stepper motor
   b) Brushless D.C. motor
   c) P.M.D.C motor
   d) V.V. connection of transformer
   e) Tertiary winding

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SECTION-B

Q.6 Attempt the following (any five)   10
    a) State the working principle of D.C generator.
    b) Why armature winding in D.C machines placed on rotating parts.
    c) Give two comparisons of lap and wave winding.
    d) Draw power flow diagram of D.C machines.
    e) Draw the external characteristics of D.C shunt generator.
    f) What do you mean by back emf give its significance?
    g) It the applied voltage of D. C machine is 230volts. Then what will be back emf for maximum power developed.
    h) Calculate voltage induced in armature winding of 4 pole lap wound. D.C machine having 728 conductors and running at 1800 rpm. The flux per pole is 30 mwb.

Q.7 a) Discuss with suitable sketch the main parts of D.C machine with their function.   05
     b) Derive emf equation of D. C generator.   05
     c) An 8 pole D.C shunt generator has 778 wave connected armature conductor running at 500rpm. Supplies a   05
         load of 12.5 ohms. Resistance at terminal voltage of 250 volts. The armature resistance is 0.24 ohm and
         field resistance 250 ohms. Find out armature current & the induced emf.

Q.8 a) What do you understand by armature reaction? Explain the concept of demagnetizing and cross   05
         magnetizing ampere turns.
     b) Define and explain process of communication in D.C generator with neat sketch.   05
     c) Discuss the advantages of using several small D.C generators in parallel over the use of single large   05
         generator.

Q.9 a) Derive the torque equation of D.C motor.   05
     b) Explain speed current, torque current and speed torque characteristics of D.C shunt motor.   05
     c) A 250 volt D.C shunt motor on load runs at 1000 rpm and takes 2A. The field and armature resistances are 05
         250ohm and 0.25 ohms respectively. Calculate the speed when motor is loaded such that it takes 41 A and
         at the armature reaction weaken filed by 3%.

Q.10 Explain the following (any three)   15
    a) Three point starter
    b) Swinburne test
    c) Voltage build up of D.C generator
    d) Losses in D.C machines
    e) Speed control of D.C shunt motor.

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