PARUL UNIVERSITY
FACULTY OF AGRICULTURE
B.Tech., (Agriculture), Winter 2019 - 20 Examination

Semester: 3   Date: 2/12/2019
Subject Code: 20103208   Time: 10.30 am To 12.30 pm.
Subject Name: Electrical Machines and Power Utilizations   Total Marks: 50

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1

A)   **Fill in the blanks (Each of 0.5 marks)**   **(05)**

i)   For the parallel operation of single phase transformers it is necessary that they should have_____

ii)   The efficiency of transformer will be maximum when _____.

iii)   A transformer core is laminated to reduce _____ losses

iv)   A step-up transformer will ___ voltage to the secondary.

v)   Any motor may become hot when subjected to_____

vi)   The speed-torque characteristics of a repulsion induction motor resemble to that of dc _____ motor.

vii)   No-load on a transformer is carried out to determine _____

viii)   _____winding in a transformer has more number of turns ?

ix)   Efficiency of a power transformer is of the order of _____%

x)   The transformer ratings are usually expressed in terms of _____.

B)   **Multiple choice questions (Each of 0.5 marks)**   **(10)**

i)   The magnetizing current of a transformer is usually small because it has
        (a) small air gap
        (b) large leakage flux
        (c) laminated silicon steel core
        (d) fewer rotating parts

ii)   Which of the following does not change in an ordinary Transformer?
        (a) Frequency
        (b) Voltage
        (c) Current
        (d) Any of the above

iii)   The path of the magnetic flux in transformer should have
        (a) high reluctance
        (b) low reluctance
        (c) high resistance
        (d) low resistance

iv)   A transformer can have zero voltage regulation at
        (a) leading power factor
        (b) lagging power factor

(c) unity power factor

(d) zero power factor

v) The full-load copper loss of a transformer is 1600 W. At half load, the copper loss will be

(a) 6400 W

(b) 1600 W

(c) 800 W

(d) 400 W

vi) The value of flux involved m the e.m.f. equation of a transformer is

(a) average value

(b) r.m.s. value

(c) maximum value

(d) instantaneous value

vii) During short circuit test in a transformer iron losses are negligible because

(a) the current on secondary side is negligible

(b) the voltage on secondary side does not vary

(c) the voltage applied on primary side is low

(d) full-load current is not supplied to the transformer

viii) An ideal transformer will have maximum efficiency at a load such that

(a) copper loss = iron loss

(b) copper loss < iron loss

(c) copper loss > iron loss

(d) none of the above

ix) During open circuit test of a transformer

(a) primary is supplied rated voltage

(b) primary is supplied full-load current

(c) primary is supplied current at reduced voltage

(d) primary is supplied rated kVA

x) A transformer transforms

(a) voltage

(b) current

(c) current and voltage

(d) power

xi) In a transformer, Greater the secondary leakage flux,

(a) less will be the secondary induced e.m.f.

(b) less will be the primary induced e.m.f.

(c) less will be the primary terminal voltage

(d) none of the above

xii) While conducting short-circuit test on a transformer the following side is short circuited

(a) High voltage side

(b) Low voltage side

(c) Primary side

(d) Secondary side

xiii) A transformer core is laminated to

(a) reduce hysteresis loss

(b) reduce eddy current losses

(c) reduce copper losses

(d) reduce all above losses

xiv) No-load speed of which of the following motor will be highest?

(a) Shunt motor

(b) Series motor

(c) Cumulative compound motor

(d) Differentiate compound motor

xv) The direction of rotation of a D.C. series motor can be changed by

(a) interchanging supply terminals

(b) interchanging field terminals

(c) either of (a) and (b) above

(d) None of the above

xvi) If a D.C. motor is to be selected for conveyors, which of the following motor would be preferred?

(a) Series motor

(b) Shunt motor

(c) Differentially compound motor

(d) Cumulative compound motor

xvii) Starters are used with D.C. motors because

(a) these motors have high starting torque

(b) these motors are not self-starting

(c) back e.m.f. of these motors is zero initially

(d) to restrict armature current as there is no back e.m.f. while starting

xviii) For starting a D.C. motor a starter is required because

(a) it limits the speed of the motor

(b) it limits the starting current to a safe value

(c) it starts the motor

(d) none of the above

xix) If a D.C. motor is connected across the A.C. supply it will

(a) run at normal speed

(b) not run

(c) run at lower speed

(d) burn due to heat produced in the field winding by eddy currents

xx) In a D.C. shunt motor, speed is

(a) independent of armature current

(b) directly proportional to the armature current

(c) proportional to the square of the current

(d) inversely proportional to the armature current

Q.2

A) **Define the following (Any five out of seven questions)** (05)

(1) What is transformer?

(2) Which are the applications of transformer?

(3) What is the EMF equation of transformer? Only write the equation and state the various parameters.

(4) What is the main purpose of performing short circuit and open circuit test on a transformer?

(5) Give the names of various methods of speed control of DC Motors.

      (6)   Define reluctance in a magnetic circuit.

      (7)   What is the difference between reactive and apparent power?

B)   **Answer the following (Any five out of seven questions)**   **(05)**

      (1)   What is The Slip in induction motor?

      (2)   What is the difference between dc motors and the induction motors?

      (3)   How an induction motor is started? Why the starter is used?

      (4)   State the types of Induction motor ?

      (5)   What are the advantages of slip ring motor over squirrel cage motor?

      (6)   What is Synchronous speed in induction motor?

      (7)   List out the methods to improve the power factor of the induction motor

Q.3   **Write the short notes (Any five out of six questions)**   **(10)**

      (1)   What are different parts of a DC machine? Explain the use of commutator.

      (2)   Why transformer rating is in KVA?

      (3)   What do you mean by "All day efficiency" of the transformer?

      (4)   Why DC series motor can never be started on No-Load?

      (5)   Write applications of DC shunt and series Motor.

      (6)   Derive an emf equation for transformer with usual notation.

Q.4   **Long Questions (Any three out of four questions)**   **(15)**

      (1)   Explain the direct load test for determination of voltage regulation and efficiency of transformer with necessary diagram.

      (2)   Enlist different speed control methods of DC shunt motor. Explain any one method.

      (3)   Briefly describe the construction and working of Single phase induction motor.

      (4)   Explain O.C & S.C. test on 1-Φ transformer.