Seat No:_____ **Enrollment No:_____**

PARUL UNIVERSITY

FACULTY OF AGRICULTURE

B.Tech. (Dairy Technology) Summer 2018 - 19 Examination

Semester: 2 **Date: 24/04/2019**
Subject Code: 20104152 **Time: 02:00pm To 04:00pm**
Subject Name: Basic Electrical Engineering **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 Mark) **(05)**

i) The period of a sine wave is _____ seconds. Its frequency is
(a) 20 Hz (b) 30 Hz (c) 40 Hz (d) 50 Hz

ii) Transformer_____.
(a) Changes dc to AC
(b) Changes ac to DC
(c) Steps up or down AC Voltages & Current
(d) Steps up or down DC Voltages & Current

iii) In an Auto Transformer, The Primary and Secondary are_____Coupled.
(a)Only Electrically (b) Only Magnetically
(c) Magnetically as well as Electrically (d) None of the above

iv) (i) Power Factor (Cos θ) =_____?
(a) MW/VA (b) kW/kVA (C)KVA/KW (d) MW/KVA

v) (ii) Power in a Three Phase Circuit = _____.
(a) P = √3 V I CosΦ (b) P = 3 V I CosΦ
(c) P = 1/3 V I CosΦ (d) P = 3 VPh IPh CosΦ

vi) (iii) For a polyphase system, the number of Wattmeter required to measure power is equal to ——
(a) One less than number of wires (b) One more than number of wires
(c) Two less than number of wires (d) Two more than number of wires

vii) (iv) What is the rating of transformer_____
(a) KW (b) KVA (c) Volt-Ampere (d) MVA

viii) In the step up transformer the value of current in secondary side_____.
(a) Increase (b) Decrease (c) Equal to primary (d) None

ix) What is the unit of reactive power……?
(a) VAR (b) KW (c) KVA (d) KVAR

x) What is the formula of synchronous speed of R.M.F……?
(a) Ns = 120 π/p (b) Ns = 100 P/f (c) Ns = 120 p/f (d) Ns = 120 f/p

B) Multiple Choice Questions (Each of 0.5 Mark) **(10)**

i) The form factor is the ratio of
(a) peak value to r.m.s. value (b) r.m.s. value to average value
(c) average value to r.m.s. value (d) none of the above

ii) Root mean square value of current is equal to
a. 1.414 times the maximum value b. 1.732 times the maximum value
c. Twice the maximum value d. 0.707 times the maximum value

iii) The amplitude or peak value or maximum value of an alternating voltage is given by the coefficient of the
a. Sine of the time angle b. Cosine of the time angle
c. Tangent of the time angle d. Cotangent of the time angle

iv) The two wattmeter method is applicable for
a. Only star connected system b. Only delta connected system
c. Both star connected and delta connected system d. None of these

v) In a 3 - phase star connected balanced induction motor, the line voltage is equal to the
a. 3 times the phase voltage b. √3 times the phase voltage
c. 1/√3 times the phase voltage d. 1/3 times the phase voltage

vi) For a single phase no load transformer, which among the following losses will be minimum?
a. hysteresis losses b. eddy current losses
c. copper losses d. mechanical losses

vii) In order to improve the power factor of equipment operating at lagging power factor, a capacitor is connected
a. In series with the equipment b. In parallel with the equipment
c. In series-parallel with the equipment d. Either (a) or (b)

viii) Power factor of a load can be improved by using
a. Static capacitors b. Synchronous condenser
c. Phase advancer d. All of the above

ix) In DOL fuses are provided to protect against
a. Short circuit protection b. Over voltage
c. Over current d. Over load

x) 3 - point starter is used to start the
a. Series motor b. Shunt motor
c. Compound motor d. Only (b) and (c)

xi) The efficiency of the transformer will be maximum when
a. Iron losses is equal to the twice of the copper losses
b. Copper losses is equal to the twice of the iron losses
c. Iron losses is equal to the copper losses
d. All of these

xii) In a balanced 3-phase system, if one of the two wattmeter's reading is negative then the
a. Reading should be taken as it is
b. Reading should be taken after reversing the pressure coil
c. Reading should be taken after reversing the current coil
d. All of these

xiii) When the motor runs on no load, then
a. Back emf is almost equal to applied voltage
b. Back emf will be greater than applied voltage
c. Back emf will be less than applied voltage
d. None of these

xiv) The potential difference between two points is given by
a. V = E / Q b. V = W / Q c. V = Q / E d. V = Q / W

xv) The unit of electrical energy is / are
a. Joules b. Watt – sec c. Kilowatt – hour d. All of these

xvi) In India, direct - on - line starter can be used for 3 - phase squirrel cage induction motor up to the rating of
a. 5 HP b. 10 HP c. 15 HP d. 25 HP

xvii) For induction motors,
a. Should be essentially a constant speed motor
b. Its speed reduces to some extent with increase in load
c. Does not need to be synchronized
d. All of these

xviii) Three - phase induction motor is more suitable than single - phase because
a. It is self-starting
b. Better efficiency compared to single - phase
c. Better power factor compared to single - phase
d. All of these

xix) Alternating voltage can be generated by
a. By rotating a coil in a magnetic field
b. By rotating a magnetic field within a stationary coil
c. Either (a) or (b)
d. Neither (a) or (b)

xx) Wattmeter is a / an
a. Indicating instrument b. Integrating instrument
c. Recording instrument d. All of these

Q.2 A) Define the following (Any five out of seven questions) (05)

(1) Define the following
(i) R.M.S. value
(ii) maximum value

(2) List interconnection of three phase system.

(3) Define about two wattmeter method for power measurement.

(4) What is relation between voltage and current in three phase star connection?

(5) Determine the following terms related to an alternating quantity
(i) Amplitude (ii) Cycle

(6) Determine the following terms related to an alternating quantity
(i) Time period (ii) Frequency

(7) Define the auto transformer.

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

(1) What do you understand by efficiency of a transformer?

(2) Explain the principle of operation of a d.c. generator.

(3) List the difference between squirrel cage rotor and slip ring rotor.

(4) What is rotating magnetic field? Explain in brief.

(5) Discuss the types of losses in a transformer.

(6) Discuss about the disadvantage of low power factor

(7) Define the load factor.

Q.3 Write Short notes (Any five out of six questions) (10)

(1) Explain the principle of working a single phase transformer and also derive the e.m.f. equation.

(2) State the relationship between voltage and current on primary side and secondary side of a single phase transformer.

(3) Discuss the difference between core type and shell type of construction.

(4) Explain the types of dc machine.

(5) Differentiate between lap winding and wave winding.

(6) Discuss the various methods to improve the low power factor.

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

(1) Three coils each having resistance of 10 ohms and inductance of 0.02 H are connected in star across 440 V, 50 Hz, three phase supply. Calculate
(i) Phase voltage (ii) phase current (iii) line current and (iv) total power consumed

(2) A 4 pole, lap wound DC generator has a useful flux of 0.07 Wb per pole. Calculate the generated e.m.f. when it rotating at a speed of 900 r.p.m. with the help of prime mover. Armature consist of 440 number of conductors. Also calculate the generated e.m.f. if lap wound armature is replaced by wave wound armature.

(3) Give the constructional details of stator and rotor of a 3 phase induction motor.

(4) Discuss the working principle of alternator. Also explain different parts of an alternator.