18135

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(EE)-2024
Course Name – Electrical Machine I
Course Code - BTE30101
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the condition for maximum efficiency for a D.C. generator.

a) eddy current losses = stray losses
b) hysteresis losses = eddy current losses
c) copper losses = 0
d) variable losses = constant losses

(ii) In a DC machine, name the form of armature mmf waveform

a) Triangular
b) Sinusoidal
c) Saw tooth
d) Rectangular

(iii) The D.C. series motor should always be started with load. Explain

a) at no load, it will rotate at dangerously high speed.
b) it will fail to start.
c) it will not develop high starting torque.
d) all are true.

(iv) Choose a series motor is best suited for driving

a) Lathes
b) Cranes and hoists
c) Shears and punches
d) Machine tools

(v) Choose the value of efficiency of a distribution transformer is

a) 1
b) 0.98
c) 0.5
d) 0.25

(vi) Identify the function of conservator in a transformer is

a) to project against internal fault
b) to reduce copper as well as core losses
c) to cool the transformer oil
d) to take care of the expansion and contraction of transformer oil due to variation of temperature of surroundings

(vii) Choose the reason that is depends on the resistance of armature winding.

a) length of conductor
b) cross-sectional area of the conductor
c) number of conductors
d) All of these

(viii) Examine Eddy current loss in a transformer varies

a) square of frequency
b) reciprocal of frequency
c) directly with frequency
d) root of square frequency

(ix) Identify voltage equation of a dc motor is:

a) V = Eb + IaRa
b) Eb = V + IaRa
c) V = Eb/IaRa
d) V = Eb + Ia2Ra

(x) Identify a D.C. series motor is that which

a) has its field winding is of low resistance compared to shunt field resistance
b) has a poor torque
c) can be started easily without load
d) has almost constant speed

(xi) Identify the technical name of the frame of DC motor that provide path to the magnetic flux lines

a) Yoke
b) Shaft
c) Commutator
d) compensating winding

(xii) Identify the condition for maximum power developed in a D.C. motor

a) Back emf=supply voltage
b) Back emf=supply voltage/2
c) Back emf=supply voltage/3
d) Back emf=supply voltage/4

(xiii) In a D.C. series motor, if the armature current is reduced by 50%, estimated torque of the motor

a) 100% of the previous value
b) 50% of the previous value
c) 25% of the previous value
d) 10% of the previous value

(xiv) Identify the measuring instrument by which iron loss of a transformer can be measured

a) low power factor wattmeter
b) unity power factor wattmeter
c) frequency meter
d) any type of wattmeter.

(xv) Select the main advantage of an auto-transformer over a two-winding transformer

a) Hysteresis losses are reduced
b) Saving in winding material
c) Copper losses are negligible
d) Eddy's current losses are totally eliminated.

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Express why the secondary of a current transformer is always short-circuited under operating conditions (3)
3. State and explain back emf in D.C. motors. (3)
4. Calculate the terminal voltage of the DC series motor if the generated voltage is 10 V, current delivered to output is 1 A and series field resistance is 1 Ohm, armature resistance is 1 ohm. (3)
5. Describe the different methods of speed control of D.C shunt motors. (3)
6. Write a short note on PT. (3)

OR

Describe short note on parallel operation of single-phase transformer. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. A shunt generator delivers 450 A at 230 V and the resistance of the shunt field and armature are 50 Ω and 0.03 Ω respectively. Calculate the generated EMF. (5)
8. Explain the method of improving commutation. (5)
9. Explain why breathers used in transformers. (5)
10. Describe the NO-Load test of the transformer. (5)
11. Illustrate the phasor diagram of a transformer at no load condition. (5)
12. Analyze an equivalent impedance referred to as the primary or secondary side. (5)

OR

The EMF per turn of a single phase 10KVA , 2200/220V, 50 Hz transformer is 10V. Calculate: a) the number of primary & secondary turns, b) the net cross-sectional area of core for a maximum flux density of 1.5T. (5)

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