BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(EE)]-2021/B.Tech.(EE)-2023
Course Name – Electric Machine-I
Course Code - PCC-EE401
(Semester IV)

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)   Name of the following law/rule can he used to determine the direction of rotation of D.C. motor

   a) Lenz's law
   c) Coloumb's law
   b) Faraday's law
   d) Fleming's left-hand rule

(ii)   Choose the correct option: The speed of a D.C. series motor is

   a) proportional to the armature current
   b) proportional to the square of the armature current
   c) proportional to field current
   d) inversely proportional to the armature current

(iii)   Identify the DC motor has got maximum self-loading property

   a) Series motor
   c) Cumulatively compounded motor
   b) Shunt motor
   d) Differentially compounded motor

(iv)   Express the ratings of a transformer are usually expressed in terms of

   a) Volt
   c) kW
   b) Ampere
   d) kVA

(v)   Express the main advantage of auto transformer over a two winding transformer is

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

(vi)   Choose the correct option: A transformer transforms

   a) frequency
   c) current
   b) voltage
   d) voltage and current

(vii)   Select the correct option: In an ideal transformer

   a) windings have no resistance
   c) core has infinite permeability
   b) core has no losses
   d) all of these

(viii)   Identify the main purpose of using core in a transformer is to

87 - 4

a) Decrease iron losses

b) prevent eddy current loss

c) eliminate magnetic hysteresis

d) decrease reluctance of the common magnetic circuit

(ix) Identify purpose of no-load test on a transformer.

a) Copper loss

b) Magnetising current

c) Magnetising current and loss

d) Efficiency of the transformer

(x) Choose the proper consequence if a dc shunt motor is started at no load, the speed will be

a) rated value

b) too low

c) too high

d) fluctuating

(xi) Select the correct option: Eddy current loss in a transformer varies as

a) square of frequency

b) reciprocal of frequency

c) directly with frequency

d) root of square frequency

(xii) Indicate the purpose of using field winding in DC machine

a) producing magnetic field

b) producing electric field

c) both (a) and (b)

d) none of these

(xiii) Identify that the brushes of electrical machines are made of

a) Carbon

b) wood

c) Cast iron

d) Steel

(xiv) Identify the purpose of the open circuit test in a transformer-

a) Cu loss

b) Core loss

c) Total loss

d) Insulation resistance

(xv) Identify the function of the breather in a transformer.

a) to provide oxygen inside the tank

b) to cool the coils during a reduced load

c) cool the transformer oil

d) to arrest flow of moisture when outside air enters the transformer.

Group-B
(Short Answer Type Questions)

3 x 5=15

2. State and explain back emf in D.C. motors. (3)
3. DC series motor could not be started at no-load-explain the statement. (3)
4. Explain the speed-torque characteristics of a DC shunt motor. (3)
5. State the function of commutator, pole and brush arrangement of a DC machine. (3)
6. Classify different types of losses in a transformer. (3)

OR

Derive the E.M.F equation of a 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 E.M.F equation of DC generator. (5)
9. Discuss about the armature reaction in the DC machine. (5)
10. The EMF per turn of a single phase 10KVA , 2200/220V, 50 Hz transformer is 10V. Calculate: (5) a) the number of primary & secondary turns, b) the net cross-sectional area of core for a maximum flux density of 1.5T.
11. Draw and explain the phasor diagram for: a) Dd6, b) Dy11. (5)
12. The no-load ratio required in a single phase 50 Hz transformer is 6600/300V. If the maximum value of flux in the core is to be about 0.09 weber. Determine the number of turns in each winding. (5)

OR

The no load current of a transformer is 15A at a power factor of 0.2 when connected to a (5) 460V, 50 Hz supply. If the primary winding has 550 turns Calculate: i) The magnetizing component (I), ii) Iron loss (Wo).

****