# BRAINWARE UNIVERSITY

**Term End Examination 2024-2025**
**Programme – Dip.EE-2022/Dip.EE-2023**
**Course Name – Electrical Machine II**
**Course Code - DEEPC401**
**( 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) Identify that slip of an induction motor increases with
a) Increase in current and decrease in torque b) Increase in current and torque
c) Decrease in current and torque d) One by slip times the frequency of supply

(ii) Identify a 3-phase 440 V, 50 Hz induction motor that has a 4% slip. The frequency of the rotor current will be
a) 2Hz b) 5Hz
c) 25Hz d) 50Hz

(iii) Select with the increase in load, the speed of the induction motor will
a) Increase b) Decrease
c) Remains constant d) Not related

(iv) Choose when the rotor of a three-phase induction motor is blocked its rotor frequency will become
a) zero b) half of supply frequency
c) very high d) equal to supply frequency

(v) Select the another name of three phases slip ring induction motor is
a) controlled motor b) wound rotor motor
c) synchronous motor d) series motor

(vi) Identify when the rotor resistance of a three-phase induction motor becomes equal to its rotor reactance, its starting torque will be
a) zero b) maximum
c) minimum d) none

(vii) Select that the crawling is a phenomenon mainly associated with
a) 2nd Harmonic b) 3rd Harmonic
c) 5th Harmonic d) 7th Harmonic

(viii) Choose the type of induction motor which is best for the pole-changing method

a) SCIM
b) WRIM
c) Single-phase IM
d) Linear IM

(ix) Choose the option: when a rotor resistance starter is used with an induction motor then

a) Only starter current is limited
b) Only starting torque is limited
c) Both starting current and starting torque are limited
d) Neither starting current nor starting torque is limited

(x) Identify the number of electrical degrees passed through in one revolution of a six-pole synchronous alternator is

a) 360
b) 720
c) 1080
d) 2160

(xi) Select the type of rotor which is most suitable for turbo alternators designed to run at high speed

a) Salient pole type
b) Cylindrical type
c) Both (a) and (b)
d) None of these

(xii) Select the type of source which generates the rotor Cu losses in a synchronous motor

a) Motor input
b) Armature input
c) Supply lines
d) D.C. source

(xiii) Select the motor used for the compressors is

a) Reluctance motor
b) Shaded pole motor
c) DC series motor
d) Capacitor start-capacitor run motor

(xiv) Choose the correct occurrence if the capacitor of a single-phase motor is short-circuited

a) The motor will not start
b) The motor will run in the same direction at reduced speed
c) The motor will run in reverse direction
d) None of the above

(xv) Identify that in a split-phase motor, the running winding should have

a) High resistance and low inductance
b) High resistance and High inductance
c) Low resistance and high inductance
d) Low resistance and Low inductance

## Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the operation of induction generator. (3)
3. Explain how to calculate slip in induction motors. (3)
4. Differentiate the turbo alternator and hydro alternator. (3)
5. Explain why the synchronous motor is not self-starting. (3)
6. Explain the working principle of BLDC Motor. (3)

**OR**

Explain the application of split-phase induction motors. (3)

## Group-C

(Long Answer Type Questions) 5 x 6=30

7. Define slip and explain three conditions of slip. (5)
8. Determine nature of the Torque Vs. Slip curve in low slip and high slip regions. (5)
9. Describe the role of stator resistance to reduce the starting current of 3 phase induction motor. (5)
10. Calculate the electrical angle of 4 pole synchronous motor if the mechanical angle is 30 degree. (5)
11. Explain the conditions for maximum torque for a 3-phase induction motor. (5)
12. A 3-phase, 50Hz, star connected alternator has 180 conductors per phase and flux per pole is 0.0543 Wb. Find i. E.M.F. generated per phase and ii. E.M.F. between line terminals. (5)

Assume the winding to be full pitched and distribution factor to be 0.96.

**OR**

Evaluate the number of armature conductors in series per phase required for the armature of a 3-phase, 50Hz, 10-pole alternator. The winding is star-connected to give a line voltage of 11000V. The flux per pole is 0.16Wb. Assume the winding to be full pitched and distribution factor to be 0.96. (5)

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