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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(EE)-2024

Course Name – Electrical Machine II

Course Code - BTE40106

(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) Select the slots provided in the stator core that are mainly used to
 - a) Reduce iron losses
 - b) Improve ventilation
 - c) Accommodate armature windings
 - d) Increase air-gap flux
- (ii) Identify concentrated windings; distributed windings result in
 - a) Higher space harmonics
 - b) Better MMF waveform quality
 - c) Higher torque ripple
 - d) Lower efficiency
- (iii) Identify the motor that will make the least noise
 - a) Hysteresis motor
 - b) Capacitor motor
 - c) Shaded-pole motor
 - d) Universal motor C.Shaded-pole motor
D.Universal motor
- (iv) Choose the happening if a three-phase induction motor connected to 2 phase supply
 - a) will run at a lower rpm
 - b) will run at a higher rpm
 - c) may run with fluctuation in speed and torque
 - d) may burn.
- (v) Identify the starting torque of an induction motor is maximum when
 - a) rotor resistance equals rotor reactance
 - b) rotor resistance is twice the rotor reactance
 - c) rotor resistance is $1/2$ the rotor reactance.
 - d) None of the above
- (vi) Choose the type of 3 phase induction motor whose rotor circuit is ended at slip rings
 - a) Slip ring type
 - b) Wound rotor type
 - c) both (a) and (b)
 - d) squirrel cage type
- (vii) Select the option from the following: air gaps in induction motor are kept very low to avoid _____
 - a) lower power factor
 - b) lagging nature
 - c) magnetizing current
 - d) all of the mentioned

- (viii) Select the happening if the relative speed between the rotating flux of stator and rotor of the induction motor is zero
- a) The rotor will not run
 - b) The slip of the motor will be 5%
 - c) The torque produced will be very large
 - d) The rotor will run at very high speed
- (ix) Select Which has an unsymmetrical rotor
- a) Shaded-pole motor
 - b) Split-phase motor
 - c) Reluctance motor
 - d) Universal motor
- (x) Select application of a linear induction motor
- a) Elevators
 - b) Conveyor systems
 - c) High-speed trains
 - d) All of the above
- (xi) Select the speed variation of a squirrel cage induction motor is closely resembles that of a
- a) synchronous motor
 - b) dc shunt motor
 - c) dc series motor
 - d) none of the above.
- (xii) Select the speed of the revolving magnetic field, which depends on
- a) Load current
 - b) Rotor resistance
 - c) Supply frequency and number of poles
 - d) Power factor
- (xiii) Select which machine principle directly depends on the revolving magnetic field.
- a) Transformer operation
 - b) DC generator operation
 - c) Induction motor operation
 - d) Rectifier operation
- (xiv) Identify a magnetic field that reverses its direction periodically but does not rotate is called:
- a) Constant field
 - b) Rotating field
 - c) Pulsating field
 - d) Leakage field
- (xv) Select the resultant magnetic field in a balanced three-phase system has:
- a) Varying magnitude and fixed axis
 - b) Constant magnitude and rotating axis
 - c) Varying magnitude and rotating axis
 - d) Constant magnitude and fixed axis

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Calculate the number of stator poles required for a three phase induction motor to operate with a synchronous speed of 1500 rpm when supplied from a 50 Hz supply. (3)
3. Express cogging of an induction motor. (3)
4. Describe the maximum torque of 3 phase induction motor. (3)
5. Explain why transformers are rated in kVA and not in kW. (3)
6. Differentiate Synchronous Motor with Induction Motor. (3)

OR

Deduce the relation between electrical and mechanical angle. If mechanical angle is 60 degree and electrical angle is also 60 degree then find the number of poles. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe the equivalent circuit of 3-phase induction motor and explain. (5)
8. A three-phase induction motor has the following ratings: Rated output power = 11 kW Rated line voltage = 415 V Rated line current = 20 A Rated speed = 1440 rpm Calculate: i) Apparent power ii) Power factor at full load iii) Full-load torque produced by the motor. (5)
9. Explain Pitch factor and Distribution factor. (5)

10. An 8-pole, 3-phase, 50 Hz induction motor is running at full load with a slip of 5 %. The rotor is (5)
star connected and its per phase resistance and standstill reactance are 0.35Ω and 2Ω
respectively. The EMF between slip rings is 150 V. Determine the rotor current per phase and
rotor power factor. Assuming the slip rings are short circuited.
11. Estimate a three-phase induction motor develops maximum torque at 20% slip. Compare the (5)
torque at 5% slip with maximum torque.
12. Draw and explain the vector and phasor diagram for a)Yd11, b)Yy6. (5)

OR

Draw and explain the phasor diagram for: a) Dd6, b) Dy11. (5)

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