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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DEEE—SIXTH SEMESTER EXAMINATION

AC MACHINES—II

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Draw the phasor diagram of synchronous motor at lagging power factor and indicate the component vectors and different angles in it.

2. What is the significance of V and inverted V curves of synchronous motor?

3. List out the applications of synchronous motor.

4. Compare squirrel cage rotor with slip ring rotor in any three aspects.

5. Derive the condition for starting torque to be maximum in 3-phase induction motor.

6. Draw a neat sketch of DOL starter used for starting a 3-phase induction motor and label the parts.

7. Why a single-phase induction motor needs an auxiliary winding?

8. List out the characteristic features of 1 phase capacitor start motor.

9. List out the applications of split phase motors.

10. Write down the applications of stepper motors.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Explain the working principle of a synchronous motor.

(b) A 3-phase, 11 kV star-connected synchronous motor draws a current of 50 amp. The effective resistance and synchronous reactance per phase are 0 8 and 22 respectively. Calculate the back e.m.f. and retardation angle at *(i)* 0 8 pf lagging and *(ii)* 0 8 pf leading.

12. *(a)* Explain the phenomenon of hunting and how it is prevented.

(b) An industrial installation having induction motors taking 2000 kW from a 3-phase, 3300 V supply at 0 8 pf lagging. It is desired to improve the pf to 0 9 lagging by using a synchronous condenser. Determine the rating of synchronous condenser and the total kVA rating of the installation.

13. *(a)* Explain the working principle of 3-phase induction motor.

(b) A 3-phase slip-ring induction motor having star-connected rotor has induced e.m.f. of 100 volt between slip rings at standstill. The rotor has resistance and reactance per phase of 1 2 and 5 respectively. Calculate current per phase and power factor when slip rings are short circuited and slip rings are connected to a rheostat of 4 per phase.

14. *(a)* Explain the torque/slip characteristic of 3-phase induction motor.

(b) A 20 HP, 4-pole, 50 Hz, 3-phase induction motor has friction and windage losses of 3 percent of full-load output. The full-load slip is 5%. Calculate for full-load *(i)* the rotor copper losses, *(ii)* the shaft torque and *(iii)* the gross electro-magnetic torque.

15. A 10 kW, 440 volt, 3-phase, 50 Hz, 4-pole star-connected induction motor gives the following results :

No-load test data :

Line voltage 440 volt, line current 6 A, total input 800 watt

Blocked rotor test data :

Line voltage 200 volt, line current 36 A, total input 3600 watt

Construct the circle diagram for the motor and find the *(a)* full-load current, *(b)* efficiency at full-load and *(c)* slip at full-load.

Rotor copper losses at standstill may be taken equal to stator copper losses.

16. *(a)* Explain the construction and working of double-cage induction motor.

(b) Explain the working of star-delta starter with a neat sketch.

17. *(a)* Explain the working of shaded pole induction motor with a neat sketch.

(b) Explain the working of capacitor-start and capacitor-run motor.

18. *(a)* Explain the speed control methods used for universal motor.

(b) Explain the construction and working of brushless DC motor.

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