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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

DEEE - FIFTH 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. Why is synchronous motor not self-starting?

2. What is meant by synchronous condenser? State its uses.

3. Define slip and slip speed.

4. State the methods of speed control of induction motors.

5. Write the classification of 1-ϕ induction motor.

6. State the function of centrifugal switch in a single-phase induction motor.

7. Write the advantages of electric drive.

8. State the types of loads based on time of operation.

9. State the advantages electric braking over other forms of brake.

10. Define regenerative braking.

PART—B

10×5=50

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

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

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

11. *(a)* A 660 V, 50 HP, 3-ϕ star connected synchronous motor has a resistance of 0·2 Ω and synchronous reactance of 4 Ω. Calculate the induced emf per phase if the motor works on full load with an efficiency of 90% and having a leading p.f of 0·8.

(b) A synchronous motor absorbing 60 kW is connected in parallel with a factory load of 240 kW having a lagging p.f of 0·8. If the combined load has a power factor of 0·9 lag, what is the leading kVAR supplied by the motor and at what power factor is it working?

12. *(a)* State the methods of starting of synchronous motor and explain any one method.

(b) Derive the expression relating torque, power and slip.

13. A 3-ϕ, 440 V, 50 Hz, 4-pole star connected induction motor has rotor resistance of 0·1 Ω and reactance of 0·9 Ω per phase. The ratio of stator to rotor turns is 4. Calculate *(a)* the total rotor copper loss, *(b)* the gross output at a slip of 4% and *(c)* the maximum torque and the corresponding slip.

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

(b) Explain the working of rotor resistance starter with circuit diagram.

15. *(a)* Explain the working principle of 1-ϕ induction motor by double field revolving theory.

(b) Explain the construction and working of 1-ϕ capacitor start induction motor.

16. *(a)* Explain the construction and working series motor.

(b) Explain variable reluctance stepper motor with a diagram.

17. *(a)* A motor operates continuously on the following cycle. Load rising from 0 to 40 kw for 6 seconds, constant load of 120 kw for 6 seconds, constant load of 80 kw for 10 seconds and idle for 14 seconds. Draw the load cycle and suggest a suitable continuous rated motor.

(b) Compare between group drive and individual drive.

18. A 220 V DC shunt motor drives 800 N-m torque load when running at 1200 rpm. The armature and shunt field resistances are 0·2 Ω and 200 Ω respectively. The motor efficiency is 90%. Calculate the value of the dynamic braking resistor that will be capable of 400 N-m torque at 1025 rpm. The friction and windage losses are assumed to be constant.

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