C16-**EE-502**

6634

BOARD DIPLOMA EXAMINATIONS

SEPTEMBER/OCTOBER-2020

DEEE – FIFTH SEMESTER

A.C. MACHINES-II

Time: 3 hours Max. Marks: 80

PART – A **3 X 10 = 30**

Instructions: *1. Answer **all** questions.*
*2. Each question carries **Three** Marks.*
3. Answer should be brief and straight to the point and should not exceed five simple sentences.

1. List out any three applications of synchronous motor.
2. State how hunting is prevented.
3. Draw the Torque-Slip curves of 3- Phase induction motor for various values of rotor resistances.
4. List various methods of speed control of a 3-Phase induction motor.
5. State the applications of shaded pole motor.
6. Draw the circuit diagram of a single phase 'capacitor start induction motor'.
7. Classify the electric drives based on their applications.
8. State the use of fly wheels.
9. Define regenerate braking.
10. Compare mechanical braking and electrical braking in any three aspects.

[Cont..,

PART – B 5 x 10 = 50M

Instructions: *1. Answer any **Five** questions*
*2. Each question carries **TEN** Marks.*
3. Answer should be comprehensive and criteria for valuation are the content but not the length of the answer.

11. A 3-Phase 11kv star connected synchronous motor draws a current of 50amp. The effective resistance and synchronous reactance per phase are 0.8Ω and 22Ω respectively. Calculate the back emf and retardation angle at 0.8 p.f lagging.

12. a) Explain the performance of synchronous motor at load with phasor diagram.
b) Derive torque equation of 3- phase induction motor.

13. A 440 V, 50 Hz, 3-Phase, 4 Pole induction motor has a star connected stator of resistance 0.164 ohms per phase.
The test result are (Line values)
No. load test = 22 A, 440 v, p.f = 0.2 lag.
Blocked rotor test = 135 A, 200 V, p.f = 0.4 lag.
Plot the circle diagram and find maximum power output, maximum torque and starting torque.

14. a) Derive the relationship among rotor input, rotor copper loss and mechanical power developed in case of 3- Phase induction motor.
b) What are the different losses in an induction motor.

[Cont..,

15. Explain the construction and working principle of universal motor with a neat diagram.

16. Explain the working principle of a single phase induction motor by double revolving field theory.

17. A motor has following duty cycle.
100 HP for 10 minutes,
No load for 5 minutes,
60 HP for 8 minutes,
No load for 4 minutes which is repeated indefinitely. Determine a suitable size of a continuously rated motor.

18. A 37.3 kW, 440 V, DC shunt motor is braked by plugging .Calculate the value of the resistance to be placed in series with the armature circuit to limit the initial braking current to 150 A. Calculate the braking torque so obtained and also the torque when the speed of the motor has fallen by 40% . Armature resistance is 0.1 ohm, full load armature current is 100A and full load is 600 rpm.

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BOARD DIPLOMA EXAMINATION, (C–16)

NOVEMBER—2020

DEEE—FIFTH SEMESTER EXAMINATION

A.C. 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. State the applications of synchronous motor.

2. Draw $\vee$ and $\wedge$ curves of a synchronous motor.

3. Compare squirrel cage rotor with slip ring rotor.

4. State the principle of working of 3ϕ induction motor.

5. List any three applications of AC series motor.

6. State the various types of $1\text{-}\phi$ commutator motor with one application for each type.

7. State the need of load equalization.

8. List the advantages of electrical drives.

9. State different systems of braking of electric motors.

10. List different methods of electric braking.

PART—B 10×5=50

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

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

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

11. *(a)* 80 kW, 600 V, 1200 rpm, 3-ϕ star connected synchronous motor has an armature resistance of $0 \cdot 05\Omega$ per phase and leakage reactance of $0 \cdot 6\Omega$ per phase at rated load and 0·8 p.f leading. Determine the induced armature emf per phase at rated load and 0·8 p.f leading.

(b) Explain the principle of working of synchronous motors.

12. *(a)* A 3-ϕ star connected synchronous motor has a synchronous reactance per phase of 4Ω and negligible armature resistance. The generated emf is 500 V. Find the line current and power factor at which the motor would operate when taking 25 kW from 400 V supply.

(b) Explain the constructional features of double cage rotor motor.

13. A 4 pole, 400 V, 3 phase, 50 Hz induction motor runs at 1440 rpm at 0·8 power factor lagging and develops an output of 10·8 kW. The stator loss is 1060 watts, friction and windage losses are 390 watts. Calculate *(a)* slip *(b)* rotor copper loss *(c)* rotor efficiency *(d)* stator input *(e)* line current.

14. *(a)* A 3-ϕ induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate *(i)* the synchronous speed *(ii)* the speed of the rotor when slip is 4% and *(iii)* the rotor current frequency when the motor runs at 600 rpm.

(b) Explain the operation of star delta starter with a neat diagram.

15. *(a)* Explain why 1-ϕ induction motor is not self-starting.

(b) Explain the working of split phase induction motor with neat diagram.

16. *(a)* Explain the working of universal motor with diagram.

(b) Explain the working of stepper motor.

17. *(a)* A motor works on 2 minutes load cycle constituted as follows :

0–15 sec : load rising from 0 to 1050 HP

15 to 85 sec : constant load of 600 HP

85 to 95 sec : regenerative braking with the HP returned falling uniformly from 200 to 0 HP

95 to 120 sec : motor is at rest

Determine the continuous rating of the motor that would be suitable for the load cycle. Assume the rating to depend upon *(i)* the rms value of loading *(ii)* the average value of loading. Also plot the load cycle.

(b) Draw block diagram of electric drive and explain the function of each block.

18. A 220 V, 40 kW, 600 rpm DC shunt motor has full load efficiency of 90%. The field and armature resistances are 200Ω and $0 \cdot 2\Omega$ respectively. Find the speed at which the machine will develop an electromagnetic torque equal to rated value by dynamic braking. The external limiting resistance of $2 \cdot 6\Omega$ is inserted. Assume the field current is maintained constant.

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