QUESTION BANK

1. In a 3-phase slip ring induction motor (SRIM) has 4-pole stator and 2-pole rotor. With its stator energised from 50Hz source, the rotor would run at a no-load speed

(a) Somewhat less than 1500 rpm

(b) Somewhat less than 3000 rpm

(c) Reduce the torque

(d) of zero rpm

2. The stator of a 3-phase, 4-pole, SRIM is fed from 50Hz source and its rotor from 30 Hz source. The motor will run at

1. 1500 rpm **2.** 900 rpm

3. 600 rpm **4.** 2400 rpm

5. 2100 rpm

From these, the correct answer is

(a) 3 only (b) 4 only

(c) 1,2, 5 (d) 3, 4

3. A 6-pole, 50Hz, wound rotor induction motor (WRIM) when supplied at the rated voltage and frequency with slip rings open circuited, developed a voltage of 100 V between any two slip rings. If the rotor is driven by external means at 1000 rpm opposite to the direction of stator field, the frequency of voltage across slip rings will be

(a) Zero (b) 50 Hz

(c) 100 Hz (d) 200 Hz

4. A 6-pole, 3-phase WRIM is driven by another machine at 1800 r.p.m. The rotor of the induction machine is connected to a 50 Hz system. If the mechanical rotation of the rotor is in the same direction as the rotor winding flux rotation, then the frequency of the stator voltage will be

(a) 50 Hz (b) 140 Hz

(c) 150 Hz (d) 200 Hz

5. Three-phase induction motors with open slots have

1. More starting torque T_{est} more starting current I_{st}, and improved pf

2. More T_{est} more I_{st} and worsened pf

3. More T_{est} more breakdown torque and improved pf

4. More T_{est} more breakdown torque and worsened pf

5. More T_{est} more slip at which maximum torque occurs

From these, the correct answer is

(a) 2 and 3 (b) 1,3 and 5

(c) 2 and 4 (d) 2,4 and 5

6. In case of 3-phase IM, shaft power is 2700 W and mechanical losses are 180 W. At a slip of 4% the rotor ohmic losses, are

(a) 115.2W (b) 120 W

(c) 108 W (d) 105 W

7. Semi closed slots or totally enclosed slots are used in 3-phase induction motors, essentially to

(a) Improve starting torque

(b) Increase pull out torque

(c) Increase efficiency.

(d) Reduce magnetizing current and improve pf

8. A 3-phase IM is driving a constant torque load of 1 pu at 5% slip. It has a maximum torque of 2 pu at 10% slip. Torque speed variation in stable zone is assumed to be linear. For the stable operation of the motor, the minimum p.u. supply voltage is approximately.

(a) 0.25 (b) 0.50

(c) 0.707 (d) 0.80

9. A prime mover drives a 6-pole, 3-phase induction frequency converter. The converter is connected to 60 Hz, 3-phase supply on the primary. If the prime mover speed is 3000 rpm. the frequencies of the possible outputs from the converter are

(a) 120 Hz, 60 Hz (b) 90Hz, 210Hz

(c) 176 Hz, 86 Hz (d) 180 Hz, 210 Hz

10. 6-pole, 3-phase Induction motor develops maximum torque at 1000 rpm when operated from a 60 Hz supply. Rotor resistance per phase is 1.2 Ω. Neglect stator impedance. The speed at which it will develop maximum torque when operated from 50 Hz source is

(a) 1200 rpm (b) 1000 rpm

(c) 800 rpm (d) 960 rpm

11. 3-phase Induction motor is connected to a 3-phase supply. One of the line fuses is blown out when the motor is running. Consequently.

 1. The motor will come to a standstill

 2. The motor will continue to run at the same speed with line current unchanged

 3. The motor will continue to run at slightly reduced speed with an increased current

 4. The rotor current will have both sf and (2-s)f component frequencies, where s is slip and f is the supply frequency

 From these, the correct answer is:

 (a) 1 alone (b) 2 and 4

 (c) 3 and 4 (d) 3 alone

12. A 3-phase, 50 Hz Induction motor takes a power input of 30 kW at its full load speed of 1440 rpm. Total stator losses are lkW. The slip and rotor ohmic losses at full load are

 (a) 0.02,600 W (b) 0.04,580 W

 (c) 0.04, 1160W (d) 0.04, 1200 W

13. The stator of a 4-pole, 3-phase induction machine is supplied from 3-phase,. 50 Hz supply and a prime mover drives its rotor at a speed of 750 rpm. The slip-rings of the machine are open circuited. The frequency of voltage across any two slip rings is

 1. 50 Hz

 2. 75 Hz

 3. 100 Hz

 4. 25 Hz

 From these, the correct answer is

 (a) 1 and 2 (b) 1 and 3

 (c) 2 and 3 (d) 2 and 4

14. A 4-pole, 50 Hz 3-phase synchronous motor, and 8-pole, 50 Hz 3-phase SRIM are coupled to each other mechanically and operate on the same 3-phase, 50 Hz supply system. The slip rings of the induction machine are left open-circuited. The frequency of the voltage across any two slip rings would be

 1. 50 Hz

 2. 100 Hz

 3. 150Hz

 4. 25 Hz

From these the correct answer is:

(a) 2 and 3 (b) 2 and 4

(c) 1 and 4 (d) 1 and 3

15. The stator of a 3-phase, 6-pole SRIM is connected to 50 Hz source but its rotor is energised from 20 Hz source. The rotor would run at a speed of

 1. 1600 rpm

 2. 600 rpm

 3. 1400 rpm

 4. 400 rpm

 From these, the correct answer is

 (a) 2 and 3 (b) 2 and 4

 (c) l and 3 (d) 1 and 4

16. A starting torque of 100 Nm is developed in a 3-phase SCIM by an auto-transformer starter with a tapping 40%. If the tapping of the auto-transformer is changed to 80%, then the starting torque would be

 (a) 400 Nm (b) 200 Nm

 (c) 50 Nm (d) 25 Nm

17. A star delta starter is equivalent to an auto transformer starter with a tapping of

 (a) 86.6% (b) 57,73%

 (c) 57% (d) 58%

18. To improve the power factor of a 3-phase IM, the capacitor bank should be connected in delta to make

 (a) Capacitance calculation easy

 (b) Capacitance value small

 (c) The connection elegant

 (d) The pf correction more effective.

19. 3-phase induction machine runs at supersynchronous speed. For self-excitation, the machine

 (a) Draws real power from the mains

 (b) Draws reactive from the mains

 (c) Feeds, reactive power to the mains

 (d) Generates emf at the expense of residual magnetism

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20. In a self excited induction generator, to keep the , frequency of generated voltage constant with the increase in load, the speed of the induction machine should be

(a) Increased

(b) Decreased

(c) Maintained less than rated synchronous speed

(d) Maintained more than the rated synchronous speed

21. A 3-phase, star-connected SRIM is fed from 400 V, 50 Hz source. Stator to rotor effective turns ratio is 2. At a rotor speed of 1440 rpm, the rotor induced emf per phase would be.

(a) 4.62 V   (b) 46.2 V

(c) 8.0 V   (d) 9.24 V

22. When the supply voltage to a 3-phase SCIM is reduced by 20%, the maximum torque will decrease by

(a) 10%   (b) 20%

(c) 36%   (d) 40%

23. Starting torque of a 3-phase IM varies as

(a) f (b) $1/f$

(c) $1/f^2$ (d) $1/f^3$

24. Maximum torque in a 3-phase IM varies as

(a) f (b) $1/f$

(c) $1/f^2$ (d) $1/f^3$

25. The most common application of 3-phase induction generator can be in a

(a) Stream power station

(b) Hydro power station

(c) Wind power station

(d) Nuclear power station

26. Two 3-phase SCIMs are identical in every respect except that the slot depths in machine A are more than those in machine B. However slot areas in both the machine are the same. Machine B, as compared to machine A will have

(a) More pull-out torque but poor pf

(b) More pull out torque and better pf

(c) Less pull-out torque and poor pf

(d) Less pull out torque but better pf

27. A 3-phase overexcited synchronous motor is installed near a 3-phase induction motor (IM) with a view to improve the power factor. With this installation,

(a) IM pf improves and its current decreases

(b) IM pf does not change but its current decreases

(c) IM pf improves but its current does not change

(d) IM pf and its current do not change, pf of the combination improves

28. Which one of the parameters can't be determined from the circle diagram of 3 ϕ Induction motor ?

(a) Efficiency   (b) Slip

(c) Shaft power   (d) Speed regulation

29. If a synchronous motor is to be operated from stand-alone 3 ϕ Induction Generator, the synchronous motor should be

(a) At no-load   (b) Nominally excited

(c) Under excited   (d) Overexcited

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ANSWER SHEET

1. *Ans. (d)*

   Stator poles are intiger multiple of Rotor poles so there a possibility of cogging

2. *Ans. (d)*
3. *Ans. (c)*
4. *Ans. (b)*
5. *Ans. (d)*
6. *Ans. (a)*
7. *Ans. (d)*
8. *Ans. (c)*
9. *Ans. (b)*
10. *Ans. (c)*
11. *Ans. (c)*
12. *Ans. (c)*
13. *Ans. (d)*
14. *Ans. (c)*
15. *Ans. (a)*
16. *Ans. (a)*
17. *Ans. (b)*
18. *Ans. (b)*
19. *Ans. (b)*
20. *Ans. (a)*

21. *Ans. (a)*
22. *Ans. (c)*
23. *Ans. (d)*
24. *Ans. (c)*
25. *Ans. (c)*
26. *Ans. (a)*
27. *Ans. (a)*
28. *Ans. (a)*
29. *Ans. (d)*

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