



Department of Electrical and Electronics Engineering

EE8601 – SOLID STATE DRIVES

UNIT III

INDUCTION MOTOR DRIVES

1. Calculate the output frequency for the two-pulse converter if the supply frequency is 20 Hz.

- a) **40 Hz**
- b) 20 Hz
- c) 60 Hz
- d) 90 Hz

Answer: a

2. Calculate the pulse number if the supply frequency is 2π and the output frequency is $\pi \div 3$.

- a) 4
- b) 2
- c) **6**
- d) 8

Answer: c

3. In 3- Φ Fully controlled rectifier calculate the average value of the voltage if the supply is 400 V and firing angle is 15° .

- a) 521.2 V
- b) **522 V**
- c) 523 V
- d) 524 V

Answer: b

4. Calculate the value of the Input power factor for 3- Φ Fully controlled rectifier if the firing angle value is 70° .

- a) **.32**
- b) .38
- c) .31
- d) .33

Answer: a

5. Calculate the value of THD value for 3- Φ Fully controlled rectifier.

- a) 48.43 %
- b) 47.25 %
- c) 39.26 %
- d) **31 %**

Answer: d

6. In 3- Φ Semi-controlled rectifier calculate the average value of the voltage if the supply is 440 V and firing angle is 22° .

- a) 571.5 V
- b) **572.8 V**
- c) 548.3 V
- d) 524.1 V

Answer: b

7. Calculate the circuit turn-off time for 3- Φ Fully controlled rectifier if the firing angle is 20° and supply frequency is 60 Hz.

- a) 8.8 msec
- b) 7.4 msec
- c) **10.1 msec**
- d) 6.5 msec

Answer: c

8. Calculate the circuit turn-off time for 3- Φ Fully controlled rectifier if the firing angle is 110° and supply frequency is 50 Hz.

- a) **3.8 msec**
- b) 5.2 msec
- c) 9.3 msec
- d) 8.7 msec

Answer: a

9. Calculate peak-peak voltage if $V_{\max}=80$ V and $V_{\min}=20$ V.

- a) **60 V**
- b) 50 V
- c) 70 V
- d) 10 V

Answer: a

10. Calculate the value of Crest factor if $V_{\text{peak}}=12$ V and $V_{\text{r.m.s}}=24$ V.

- a) .2
- b) .3
- c) .4
- d) **.5**

Answer: d

11. Calculate the output voltage of the Buck converter if the supply voltage is 11 V and duty cycle value is .4.

- a) **4.4 V**
- b) 2.2 V
- c) 4.8 V
- d) 6.4 V

Answer: a

12. Calculate the output voltage of the Boost converter if the supply voltage is 8 V and duty cycle value is .6.

- a) 40 V
- b) 20 V**
- c) 48 V
- d) 51 V

Answer: b

13. Calculate the output voltage of the Buck-Boost converter if the supply voltage is 78 V and duty cycle value is .1.

- a) 7.2 V
- b) 4.5 V
- c) 8.6 V**
- d) 5.1 V

Answer: c

14. The principle of Boost converter can be applied for the regenerative braking.

- a) True**
- b) False

Answer: a

15. The unit of angular acceleration is Joule.

- a) True
- b) False**

Answer: b

16. In the rotor voltage injection method, when an external voltage source is in phase with the main voltage then speed will _____

- a) Increase**
- b) Decrease
- c) Remain unchanged
- d) First increases then decrease

Answer: a

17. A 2-pole, 3-phase, _____ Hz induction motor is operating at a speed of 550 rpm. The frequency of the rotor current of the motor in Hz is 2.

- a) 9.98
- b) 9.71
- c) 9.12
- d) 9.37**

Answer: d

18. Calculate the average value of the sinusoidal waveform $x(t)=848\sin(1.65\pi t+2\pi \div 0.68)$.

- a) 0**
- b) 78 V
- c) 15 V
- d) 85 V

Answer: a

19. R.M.S value of the periodic square waveform of amplitude 72 V.

- a) 72 V**
- b) 56 V
- c) 12 V
- d) 33 V

Answer: a

20. In the rotor voltage injection method, when an external voltage source is in opposite phase with the main voltage then speed will _____

- a) Increase
- b) Decrease**
- c) Remain unchanged
- d) First increases then decrease

Answer: b

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21. The rotor injection method is a part of the slip changing technique.

- a) **True**
- b) False

Answer: a

22. The slip recovery scheme is a part of the synchronous speed changing technique.

- a) **True**
- b) False

Answer: a

23. The slope of the V-I curve is 9.1° . Calculate the value of resistance. Assume the relationship between voltage and current is a straight line.

- a) **.16 Ω**
- b) .26 Ω
- c) .25 Ω
- d) .44 Ω

Answer: a

24. If induction motor air gap power is 1.8 KW and gross developed power is .1 KW, then rotor ohmic loss will be _____ KW.

- a) **1.7**
- b) 2.7
- c) 3.7
- d) 4.7

Answer: a

25. The power factor of a squirrel cage induction motor is _____

- a) High at light load only
- b) **High at heavy loads only**
- c) Low at the light and heavy loads both

d) Low at rate load only

Answer: b.

26. At low values of slip, the electromagnetic torque is directly proportional to _____

- a) s
- b) s^2
- c) s^3
- d) s^4

Answer: a

27. Calculate the time period of the waveform $v(t)=12\sin(8\pi t+8\pi\div 15)+144\sin(2\pi t+\pi\div 6)+445\sin(\pi t+7\pi\div 6)$.

- a) 8 sec
- b) 4 sec**
- c) 7 sec
- d) 3 sec

Answer: b

28. Calculate the total heat dissipated in a resistor of $44\ \Omega$ when 0 A current flows through it.

- a) 0 W**
- b) 2 W
- c) 1.5 W
- d) .3 W

Answer: a

29. The value of slip at which maximum torque occurs _____

- a) $R_2\div X_2$**
- b) $4R_2\div X_2$
- c) $2R_2\div X_2$
- d) $R_2\div 3X_2$

Answer: a

30. A three-phase slip ring induction motor is fed from the rotor side with the stator winding short-circuited. The frequency of the current flowing in the short-circuited stator is _____

- a) Slip frequency
- b) Supply frequency
- c) The frequency corresponding to rotor speed
- d) Zero

Answer: a

31. An 8-pole, 3-phase, 50 Hz induction motor is operating at a speed of 720 rpm. The frequency of the rotor current of the motor in Hz is _____

- a) 2
- b) 4
- c) 3
- d) 1

Answer: a

32. Calculate the phase angle of the sinusoidal waveform $z(t)=78\sin(456\pi t+2\pi\div 78)$.

- a) $\pi\div 39$
- b) $2\pi\div 5$
- c) $\pi\div 74$
- d) $2\pi\div 4$

Answer: a

33. Calculate the moment of inertia of the disc having a mass of 54 kg and diameter of 91 cm.

- a) 5.512 kgm^2
- b) **5.589 kgm^2**
- c) 5.487 kgm^2
- d) 5.018 kgm^2

Answer: b

34. Calculate the moment of inertia of the thin spherical shell having a mass of 73 kg and diameter of 36 cm.

- a) **1.56 kgm²**
- b) 1.47 kgm²
- c) 1.38 kgm²
- d) 1.48 kgm²

Answer: a

35. A 50 Hz, 4poles, a single phase induction motor is rotating in the clockwise direction at a speed of 1425 rpm. The slip of motor in the direction of rotation & opposite direction of the motor will be respectively.

- a) 0.05, 0.95
- b) 0.04, 1.96
- c) **0.05, 1.95**
- d) 0.05, 0.02

Answer: c

36. The frame of an induction motor is made of _____

- a) Aluminum
- b) Silicon steel
- c) **Cast iron**
- d) Stainless steel

Answer: c

37. The slope of the V-I curve is 5°. Calculate the value of resistance. Assume the relationship between voltage and current is a straight line.

- a) 3254 Ω
- b) 3608 Ω
- c) 3543 Ω
- d) **3443 Ω**

Answer: d

38. In an induction motor, when the number of stator slots is equal to an integral number of rotor slots

- a) There may be a discontinuity in torque slip characteristics
- b) A high starting torque will be available
- c) The maximum torque will be high
- d) The machine may fail to start**

Answer: d.

39. A 3-phase induction motor runs at almost 1000 rpm at no load and 950 rpm at full load when supplied with power from a 50 Hz, 3-phase supply. What is the corresponding speed of the rotor field with respect to the rotor?

- a) 30 revolution per minute
- b) 40 revolution per minute
- c) 60 revolution per minute
- d) 50 revolution per minute**

Answer: d

40. Calculate the active power in a 487 H inductor.

- a) 2482 W
- b) 1545 W
- c) 4565 W
- d) 0 W**

Answer: d

41. Calculate the active power in a 788 ω resistor with 178 A current flowing through it.

- a) 24.96 MW**
- b) 24.44 MW
- c) 24.12 MW
- d) 26.18 MW

Answer: a

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