# SMPS-UPS MCQs - Unit 4 and 5

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## 1 UNIT-4 1 mark MCQ

1. **What is the primary purpose of using SVPWM in a three-phase inverter?**
   A. To increase the output frequency
   B. To reduce the switching losses
   C. **To maximize the DC link utilization**
   D. To simplify the control circuit

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2. **Which type of multilevel inverter uses capacitors to clamp the voltage to different levels?**
   A. Diode clamped
   B. **Flying capacitor**
   C. Cascaded H-bridge
   D. None of the above

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3. **In sine PWM, the reference signal is typically a:**
   A. Square wave
   B. Sawtooth wave
   C. **Sine wave**
   D. Triangle wave

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4. **Which harmonic elimination technique involves adjusting the switching angles?**
   A. SVPWM
   B. PSPWM
   C. **ShePWM**
   D. None of the above

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5. **A cascaded H-bridge inverter requires which of the following for operation?**
   A. **Multiple DC sources**
   B. A single DC source
   C. No DC sources
   D. AC sources

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6. **Which type of inverter is most suitable for high-power applications?**

A. Single-phase inverter
B. **Three-phase inverter**
C. Both are equally suitable
D. Neither is suitable

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7. **What is a common application of multilevel inverters?**

A. Small household appliances
B. High-frequency signal generation
C. **Large electric drives and grid interfacing**
D. Low power mobile devices

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8. **PSPWM stands for:**

A. **Phase Shifted Pulse Width Modulation**
B. Power Series Pulse Width Modulation
C. Pulse Skip Pulse Width Modulation
D. None of the above

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9. **Flying capacitor multilevel inverters are known for:**

A. Their simple structure
B. Requirement of many diodes
C. **Balancing voltage across various levels**
D. High switching frequencies only

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10. **Which PWM technique is known to produce the least Total Harmonic Distortion (THD)?**

A. Sine PWM
B. Modified Sine PWM
C. **Space Vector PWM**
D. Triangle PWM

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11. **In a diode clamped inverter, the clamping diodes are used to:**

A. Increase the output voltage
B. Reduce the output voltage
C. **Clamp the voltage to safe levels**
D. Convert AC to DC

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12. **Which type of filter is most commonly used with PWM inverters?**

A. **Low-pass filter**
B. High-pass filter
C. Band-pass filter

D. Band-stop filter

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13. **The main disadvantage of a single-phase inverter compared to a three-phase inverter is:**

A. Higher cost
B. More complex control
C. **Lower power output**
D. Higher power output

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14. **Which of the following is a feature of multilevel inverters?**

A. **Lower electromagnetic interference**
B. Higher switching losses
C. Simpler gate driving circuits
D. Fewer output voltage levels

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15. **Space Vector PWM improves the inverter performance by:**

A. Reducing the modulation index
B. Increasing the modulation index
C. **Optimizing the switching sequence**
D. Decreasing the switching frequency

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16. **Harmonic elimination in inverters can be achieved by:**

A. Increasing the frequency of the input DC signal
B. Using a single level inverter structure
C. **Proper selection of switching angles**
D. Decreasing the load resistance

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17. **A typical application of cascaded multilevel inverters is:**

A. Mobile charging
B. **Electric vehicle drivetrains**
C. Battery charging for low voltage devices
D. Small scale residential solar installations

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18. **Which technique is used to control the output voltage of inverters by adjusting the duty cycle of the switches?**

A. Frequency modulation
B. Amplitude modulation
C. **Pulse-width modulation**
D. Phase modulation

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19. **The main reason for using multilevel inverters in high power applications is to:**

A. Reduce the size of the inverter
B. **Increase efficiency by reducing switching losses**
C. Simplify the control strategy
D. Increase the heat dissipation

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20. **In terms of output quality, multilevel inverters offer:**

A. Higher harmonic content
B. **Lower harmonic content**
C. Unchanged harmonic content
D. None of the above

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# 2 UNIT-4 2 mark MCQ

21. **In a three-phase inverter using Space Vector PWM, what is the effect of increasing the switching frequency on the output waveform?**

A. Increases the harmonic distortion
B. **Reduces the harmonic distortion**
C. No change in harmonic distortion but increases efficiency
D. Reduces efficiency due to higher switching losses

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22. **What is a key advantage of using a cascaded H-bridge multilevel inverter with separate DC sources for each H-bridge?**

A. It can utilize higher switching frequencies without significant losses.
B. It allows for independent control of each phase.
C. It simplifies the overall control system.
D. **It enables the use of lower voltage rated components for high voltage applications.**

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23. **How does the use of a flying capacitor multilevel inverter help in managing the switching stress on semiconductor devices?**

A. **By reducing the voltage across each switch with the help of flying capacitors.**
B. By completely eliminating the need for external clamping diodes.
C. By allowing higher frequencies to be used without additional cooling.
D. By simplifying the gate drive requirements.

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24. **In the context of harmonic elimination using ShePWM, what is the primary method to determine the optimal switching angles?**

A. Fourier series analysis to minimize specific harmonic orders.
B. Trial and error in real-time operations.
C. **Use of genetic algorithms or other optimization techniques.**
D. Implementing fixed angles based on the number of levels in the inverter.

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25. **What is the primary challenge when implementing SVPWM in a three-phase inverter system?**

A. It requires transformation of three-phase quantities to two-phase quantities.
B. The switching losses are significantly higher than other PWM techniques.
C. **It is computationally intensive due to the need for real-time calculation of space vectors.**
D. It cannot be used with multilevel inverters.

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# 3 UNIT-5 1 mark MCQ

26. **What is the main purpose of an online UPS?**

A. To provide power during short interruptions
B. To condition the power supply
C. **To provide backup power without interruption**
D. To filter high-frequency noise

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27. **A voltage filter in a PWM VSI primarily serves to:**

A. Convert DC to AC
B. **Reduce the voltage ripple**
C. Increase the output voltage amplitude
D. Modulate the frequency

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28. **Which type of UPS provides power to the load only when the mains supply fails?**

A. **Offline UPS**
B. Online UPS
C. Line-interactive UPS
D. None of the above

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29. **In designing inductors for power electronics applications, which factor is most critical?**

A. Resistance
B. Capacitance
C. **Inductance**
D. Conductance

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30. **Series-parallel resonant filters are used to:**

A. Increase the efficiency of power conversion
B. Minimize the effect of load variations
C. Enhance the power factor
D. **Suppress specific harmonic frequencies**

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31. **A DC filter in a power electronic circuit is used to:**

A. Convert AC to DC
B. **Smooth out the DC output**
C. Increase the DC voltage
D. Decrease the DC voltage

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32. **The primary function of a current filter in a power electronic system is to:**

A. Increase current flow
B. Decrease current flow
C. **Stabilize current fluctuations**
D. Convert AC current to DC current

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33. **What is a common application of power conditioners?**

A. To charge batteries
B. To drive electric motors
C. **To improve power quality for sensitive electronics**
D. To reduce power consumption

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34. **The design of a voltage module regulator for electrical drive applications is aimed at:**

A. Reducing the input voltage
B. **Stabilizing the output voltage**
C. Increasing the efficiency of the motor
D. Decreasing the power factor

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35. **Which UPS feature is critical for data centers requiring high availability?**

A. High power capacity
B. Extended battery life
C. **Seamless power transfer**
D. Low noise operation

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36. **In power electronics, what is the primary role of filters?**

A. To convert energy
B. To store energy
C. **To improve the quality of the output signal**
D. To regulate voltage

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37. **Which component is essential for designing an inductor used in power electronic applications?**

A. Diode
B. Capacitor
C. **Core material**
D. Resistor

38. **What distinguishes an online UPS from an offline UPS?**

A. Online UPS is cheaper
B. **Online UPS provides continuous power**
C. Offline UPS uses more energy
D. Offline UPS has no batteries

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39. **Which type of resonant filter is used to eliminate the need for series capacitors?**

A. Voltage filter
B. Series-parallel resonant filter
C. **Filter without series capacitors**
D. Current filter

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40. **Power line disturbances are primarily dealt with using:**

A. UPS systems
B. Low-pass filters
C. **Power conditioners**
D. Voltage regulators

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41. **What is the main benefit of using an offline UPS for home appliances?**

A. **Cost-effectiveness**
B. High power output
C. Continuous power supply
D. High-speed switching

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42. **The design of transformers for power electronic applications should primarily focus on:**

A. **Minimizing core losses**
B. Maximizing resistance
C. Reducing capacitance
D. Enhancing inductance

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43. **Which filter type is specifically designed to handle the high frequency switching of PWM VSI?**

A. DC filter
B. Voltage filter
C. Current filter
D. **Filter for PWM VSI**

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44. **A major advantage of using series-parallel resonant filters in power conditioners is:**

A. They can operate at very low frequencies

B. They are less expensive than other filters
C. **They offer precise control over the frequency range**
D. They require no maintenance

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45. **The purpose of designing a voltage module regulator for electrical drive applications is to:**

A. Increase the torque output
B. **Regulate the voltage supplied to the drive**
C. Convert AC to DC efficiently
D. Reduce electromagnetic interference

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# 4 UNIT-5 2 mark MCQ

46. **How does an online UPS differ from a line-interactive UPS in terms of voltage regulation?**

A. **Online UPS continuously regulates the voltage, whereas line-interactive UPS only adjusts during significant voltage drops or surges.**
B. Online UPS uses passive filtering, while line-interactive uses active power conditioning.
C. There is no difference; both provide continuous voltage regulation.
D. Line-interactive UPS provides better regulation due to the presence of an autotransformer.

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47. **In designing a filter for a PWM VSI, what is the main consideration to effectively reduce the output voltage ripple?**

A. The filter must have a high Q-factor to resonate at the switching frequency.
B. The cutoff frequency of the filter must be well below the fundamental frequency of the inverter.
C. **The inductance and capacitance values must be chosen to minimize impedance at the fundamental frequency.**
D. The filter must be able to handle high power without significant losses.

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48. **What is the primary benefit of using a multistage filtering approach in a power electronic system?**

A. It allows for modular design and easier maintenance.
B. **It can target and suppress multiple harmonic frequencies more effectively.**
C. It reduces the overall cost of the system by using cheaper components.
D. It increases the power handling capacity of each filter stage.

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49. **In a power conditioner, what is the impact of non-linear loads on the power quality, and how does the conditioner mitigate this?**

A. Non-linear loads increase the reactive power; conditioners use capacitors to correct the power factor.
B. **Non-linear loads introduce harmonics; conditioners use harmonic filters to clean the power.**
C. Non-linear loads cause voltage sags; conditioners use boost converters to maintain voltage levels.
D. Non-linear loads lead to frequency variations; conditioners use PLLs to stabilize the frequency.

50. **Considering the design of transformers for power electronic applications, what specific characteristic is crucial for minimizing energy losses at high frequencies?**

A. High permeability core material
B. Low core saturation flux density
C. High thermal conductivity of the core
D. **Low core loss materials**