

TEST2 SOLUTION 2024-25 Sem 1

Question 1 (20 marks)

Ultra-cap:	Extreme high-power	Extreme acceleration and regenerative braking
Metal Air:	mechanical recharge	Ultra-fast recharge by swapping the plates
Fly Wheel:	High power from kinetic energy	Assist acceleration and regen brake in formula E
Fuel Cells:	High energy storage by H ₂	Use gas (H ₂) station infrastructure. Quick refuelling
Lithium Batt.	Best overall performer	Most prefer storage in EV, with all forms of charger.

Question 2 (20 marks)

(a)

1. When the temperature rises above the critical level.
2. When the battery voltage-rise (dV/dt) turns negative (i.e. voltage decline)
3. When the rate of temperature (T) rise (dT/dt) exceeds the alarm level.

(b)

1. More safe, durable, and reliable, due to absence of oil pipe, pump mechanics etc.
2. More energy efficient, because pump in electrohydraulic system needs to be on all the time.

Question 3 (20 marks)

- (a) 1. Battery swapping faster than recharging. 2. Can use night time charge for low energy cost
- (b) 1. Setup and running cost more expensive. 2. Complicate logistics on delivering/relocating of batteries.
- (c) Large vehicles that run on regular schedule and long trip: e.g. bus, intercity coach and trucks

Question 4 (20 marks)

CO: damage lungs cause permanent damage, even death

NO₂: cause Lungs damage and respiratory disease

Noise: affect daily lives of people living near the busy road.

Lead molecules: Cause brain damage

Solid substance (dust): cause dirty environment and human respiratory disease.

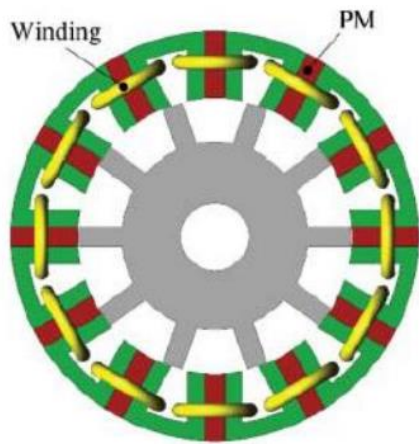
SO₂: Cause acid rain and water pollution

CO₂: Cause green house effect, extreme weather, temperature rise, and sea level rise.

(Choose 5 out of 7)

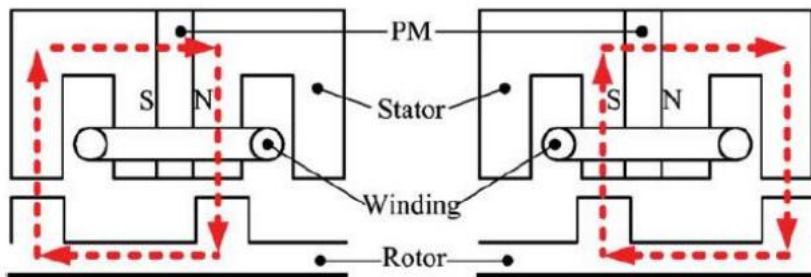
Question 5 (20 marks)

(a)



Adds a bit of explanation

(b)



Adds a bit of explanation

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