Commercial multi-engine Homework questions:

1) **Calculate the following for the day of your check ride:**
    a. Take off and landing distance over a 50 ft obstacle at your airport
    b. Take off and landing distance over a 50 ft obstacle at KRIL on a 60 degree F day
    c. Single engine climb performance at max gross at your airport
        i. At max gross on a 70 F day
        ii. With you and ½ fuel on 70 F day.
        iii. At KRIL on a 50 F day
    d. Weight and balance with you and the examiner
    e. Accelerate-Stop Distance at your airport.
    f. Single engine service ceiling for day of check ride.
2) Describe the Gear system on your aircraft and how you would handle the following
    a. Lowering the gear, you feel aircraft slow and hear the gear motor but notice the down light indication is not on.
    b. The gear fails to come up and lock on a departure.
3) Describe how the propellor feathering mechanism works.
    a. Why doesn't the prop feather during normal shut down on the ground?
    b. When air restarting a secured engine, what is the minimum RPM needed get prop to un-feather and restart the engine?
4) How would you handle a prop that is resisting unfeather?
5) Describe the fuel system on your aircraft and how an icing encounter where the fuel vents become plugged might affect fuel flow to engine
6) Describe the cross feed and how and when you might use it. What are the limitations for flight in cross feed? Is it permissible to run both engines on one tank (ie one engine in cross feed)?
7) Describe how you would handle the following loss of an engine:
    a. Just before Rotation
    b. Just after rotation at 100 ft AGL
    c. After climbing to 500 ft AGL in flat land area (Midwest of USA)
    d. After climbing to 500 ft AGL from an airport at 5000 ft elevation and surrounding mountainous or rising terrain
8) If you use "wheels up to go up"
    a. What is your criteria for bringing gear up?
    b. What is the lowest altitude you might bring the gear up? 50, 100, 200 ft?
    c. Given a 10 to 15 second reaction time after an engine failure, likely over banked/rudder use (non-zero side slip) for additional 20 or 30 seconds before you get prop feathered, what is your rate of descent for nearly a minute?
    d. Given the above scenario, is survival more likely hitting an obstacle/ground at Vyse trying to climb out or pulling power and landing at Vso?
9) IF faced with an engine failure enroute, you secure the engine. What is the minimum length and width runway you would feel comfortable landing at? Why? What airspeeds would you use for approach and landing? When would you deploy gear? Flaps?
10) What is your short field take off technique in this aircraft? How much does take off distance over a 50ft obstacle decrease using flaps?

11) Consider an engine failure right after Vr, What is the risk of using flaps on take-off ? Risk of climb out at Vx?
12) What is the shortest runway you would feel comfortable landing? Taking off? Why?
13) You are on an instrument approach and lose an engine. As you break out and become visual you are somewhat high and fast. You are concerned you will not be able to land and stop before you run out of runway. Would you attempt a go around? Or land straight in and accept an overrun? Why?
14) After you take off and lose an engine on climb out, you decide to continue the climb to safe altitude and return to airport to land. Describe how you would:
    a. Maximize your climb rate? (think airspeed & zero side slip and how to achieve)
    b. What would you want to accomplish before starting any turns toward a landing runway? (consider aircraft configuration, prop, altitude, and airspeed)
    c. what are the critical factors you can control (after airborne) to reduce the risk of VMC loss of control and make for a safe maneuvering to land in the event of an engine loss?
15) Bank Angle and One Engine In-operative
    a. What bank angle and rudder input will give maximize climb ability?
    b. How does increasing bank toward good engine affect Vmc?
    c. How does increasing bank toward good engine affect Climb rate?
    d. Estimate how much Vmc will increase by leveling wings (Vmc increases 3 kts per degree of bank less than 5^0).
    e. Estimate how much Vmc increases if bank 10 degrees into UNFEATHERED prop (after wings level, banking into dead engine, Vmc increase is >> 3kts per degree)
16) how much ballast would we have to add to the aircraft luggage compartment area to move the planned CG aft 1 inch?
17) Describe the concept of Zero Fuel weight and how you might use it in a situation where you wanted to maximize passenger and payload and minimize the amount of fuel you would take on (taking off from a high elevation airport on a hot day traveling a relatively short distance away)
18) Calculate your takeoff and landing distances at KGIF on a standard day and compare them to Taking off and landing at KRIL on a 70 F-degree day with baro=29.92 inch Hg.
19) Explain why takeoff and landing distances are longer at the higher density altitudes.
20) what airspeeds would you use for takeoff and landing at a high-density altitude airport and why?
21) Describe how you would maximize performance taking off from a high-density altitude airport: How you would lean, how load aircraft, determine abort point on takeoff, climb performance considering terrain, time of day consider departing.
22) Consider losing an engine at 500 ft AGL at KRIL under the conditions listed above. How would you handle it? Would you feather the prop and try to make it back to the airport? What other options would you consider?
23) Approximately how far does Vmc drop after feathering the prop on in-op engine? There is not a published answer to this, but think about how much have we changed the Yaw/ROLL forces by feathering? Is it ever safe to turn into dead engine? If so, when?
24) Calculate single engine climb performance at density altitude of 3000 feet at max gross and also minimum weight (one pilot and ½ fuel load). Compare this to both engines

operative and minimum gross weight. Why the difference? How will this change your plan for take off if you lose and engine?

Common errors on Multi-engine check ride:

1) **Not trouble shooting in-op engine before feathering when at a safe altitude (ie 3000 feet AGL and higher)
2) Feathering engine, but not securing when at safe altitude (ie above 3000 ft AGL)
3) Saying check list out loud or by memory but not touching or moving knobs and levers.
4) **Feathering wrong prop
5) **Turning off fuel or mags to wrong engine
6) aggressive control inputs. Jambing throttle to full when below Vmc. In event of real engine failure, aggressive throttle at low airspeeds is dangerous and makes the examiners heart rate rapid. Apply throttle smoothly and slowly please,
7) ***Failure to maintain heading, altitude (or Vyse) while trouble shooting an engine***
8) En-route engine failure under simulated IMC, pitching for blue line too aggressively results in 200 to 300 foot climb above assigned altitude. Goal is to MAINTAIN altitude or minimum of blue line.
9) ***Not adding full power after simulated engine failure***. At low power settings, we are not able to maintain any altitude and also is difficult to determine which engine is in-op. Full power it a lot easier to determine which engine is in-op. (some use "Cram and Control, then Identify and verify", then decide if fix or feather).
10) **Maneuvering aircraft (turns) before prop feathered, safe altitude, and airspeed (Vyse)- hint, turning into in-op engine with unfeathered prop is instant Vmc roll and check ride fail.
11) Approach with in-op engine faster than normal approach speed and too high. A 5000 ft runway may not be enough.
12) Normal approach and landing too fast
13) Forcing aircraft on runway- starts porpoise or flat touch down at high speed. Aircraft becomes untamable, squirrelly and increases examiners heart rate.
14) Engine failure in IMC-
    a. Unfamiliar with navigation equipment, improper programming
    b. Trying to brief approach at the FAF
    c. Trying to get ATIS at FAF
15) Improper task prioritization – as above
16) **Doing steep turns, Vmc demo and other maneuvers NOT looking outside. If your head is not turning, you are not looking for traffic. This is unsat on a check ride.

**Any of the red highlights will be reason for immediate unsat and check ride termination. Cumulative and repetitive occurrence of any of the above could lead to unsat and check ride failure.