Adamson University
Mechanical Engineering Department
Reviewer (Board Exam Type Question)

FANS AND BLOWERS

1. Which of the following devices is typically used for moving large volumes of air at low pressure?
   a. Compressor
   b. ***Fan***
   c. Blower
   d. Pump
2. What is the primary function of a blower?
   a. Cool down electronics
   b. Compress air to high pressure
   c. Move gas with a moderate pressure rise
   d. Generate vacuum
3. Which type of fan is most suitable for high-flow, low-pressure applications?
   a. Axial fan
   b. Centrifugal fan
   c. Mixed flow fan
   d. Radial fan
4. In a centrifugal fan, the air flows:
   a. Parallel to the shaft
   b. Perpendicularly to the shaft
   c. In spiral motion
   d. Inward along the shaft
5. The performance of a fan is generally evaluated in terms of:
   a. Noise level
   b. Static pressure and flow rate
   c. Material of construction
   d. Vibration level
6. Which law is used to predict the performance of geometrically similar fans?
   a. Bernoulli's Principle
   b. Fan Affinity Laws
   c. Boyle's Law
   d. Darcy-Weisbach Equation
7. Which component imparts kinetic energy to the air in a centrifugal fan?
   a. Diffuser
   b. Shaft
   c. Impeller
   d. Motor
8. What is the typical shape of blades in a backward-curved centrifugal fan?
   a. Bent forward
   b. Radially straight
   c. Curved opposite to rotation
   d. Curved along the rotation

9. Which fan type usually generates the highest noise levels?
   a. Axial fan
   b. Backward-inclined fan
   c. Forward-curved fan
   d. Mixed-flow fan

10. In terms of fan performance, what does the static pressure measure?
   a. Kinetic energy of air
   b. Resistance to airflow
   c. Heat transfer
   d. Power loss
11. What is the effect of increasing impeller diameter in a centrifugal fan?
   a. Decreases static pressure
   b. Reduces noise
   c. Increases flow and pressure
   d. Slows motor speed
12. Which of the following fans is best suited for clean air and high-volume flow applications?
   a. Radial blade fan
   b. Forward-curved fan
   c. Backward-curved fan
   d. ***Tube axial fan***
13. Blowers typically operate in the pressure range of:
   a. Below 100 mmHg
   b. 0.1 to 0.5 bar
   c. Above 1 bar
   d. Vacuum range

   Note: In Chapter 14 (Compressible Flow and Fluid Machinery), the authors explain that **blowers typically operate in the pressure range of 0.1 to 0.5 bar**, which places them between fans (low pressure rise, <0.1 bar) and compressors (>1 bar pressure rise).

   Cengel & Cimbala (2014), Fluid Mechanics: Fundamentals and Applications, 3rd Edition, McGraw-Hill, Chapter 14.

14. What is the role of a volute casing in a centrifugal fan?
   a. Increase air speed
   b. Convert velocity head into pressure head
   c. Reduce temperature
   d. Act as a bearing support
15. Which parameter most affects fan noise level?
   a. Air temperature
   b. Impeller material
   c. Blade tip speed
   d. Voltage rating
16. What does the term "surge" refer to in fan operation?
   a. Flow exceeding rated capacity
   a. Sudden change in rotation
   b. Instability due to mismatch in pressure and flow
   c. Thermal overload
17. Which type of blower uses rotating lobes to trap air and move it?
   a. Centrifugal blower

b. Roots blower
c. Screw blower
d. Vane blower

18. In axial fans, increasing blade pitch angle generally results in:
    a. Lower flow rate
    b. Higher flow rate
    c. Reduced efficiency
    d. Increased noise only

19. What is the purpose of inlet guide vanes in fan design?
    a. To prevent backflow
    b. To control flow direction and improve efficiency
    c. To support the shaft
    d. To remove noise
20. Which fan is best for systems with high resistance?
    a. Axial fan
    b. Forward-curved centrifugal fan
    c. Backward-inclined centrifugal fan
    d. Propeller fan
21. What type of impeller blade design is typically used in material handling fans?
    a. Backward-curved
    b. Airfoil
    c. Straight radial
    d. Mixed flow
22. What is the effect of air density on fan performance?
    a. No effect
    b. Affects motor speed
    c. Proportional to flow rate
    d. ***Affects pressure and power requirement***
23. In a fan curve, the intersection of system curve and fan curve represents:
    a. Maximum flow
    b. Shut-off point
    c. Operating point
    d. Surge point
24. The specific speed of a fan is used to:
    a. Determine the shaft size
    b. Estimate power factor
    c. Classify the type of fan
    d. Choose bearing type
25. The term “Total Pressure” in fan performance includes:
    a. Static + dynamic pressure
    b. Static – dynamic pressure
    c. Static pressure only
    d. Velocity pressure only
26. The noise from fans is primarily due to:
    a. Voltage fluctuations
    b. Mechanical imbalance
    c. Turbulence and blade passing

d. Temperature rise

27. Which test is commonly used to determine fan performance?
    a. Vibration analysis
    b. Wind tunnel test
    c. AMCA test
    d. Thermal imaging

Note: An AMCA test refers to performance testing conducted in accordance with standards set by the **Air Movement and Control Association International**, Inc. (AMCA). AMCA is a globally recognized authority that develops and maintains standards for fans, blowers, dampers, louvers, and related equipment.

28. Which of the following reduces fan power consumption without reducing airflow too much?
    a. Reducing blade length
    b. Using a variable frequency drive (VFD)
    c. Increasing inlet diameter
    d. Removing diffusers
29. In fan design, stall occurs when:
    a. Flow rate is maximum
    b. Air density is too low
    c. Flow separates from the blades
    d. Motor is undersized
30. Which AMCA standard defines laboratory methods for testing the aerodynamic performance of fans?
    a. AMCA 205
    b. AMCA 300
    c. AMCA 210 / ASHRAE 51
    d. AMCA 500
31. What does the AMCA Certified Ratings Seal indicate?
    a. The product is energy-efficient
    b. The product meets safety standards only
    c. The product has been tested and certified to meet AMCA performance standards
    d. The manufacturer is a member of AMCA
32. AMCA Standard 300 focuses on which of the following?
    a. Sound testing of fans
    b. Vibration levels
    c. Structural safety
    d. Air filtration efficiency
33. ANSI/ASHRAE Standard 90.1 primarily deals with:
    a. Fire safety in ventilation systems
    b. Energy efficiency in buildings, including fan power limitations
    c. Noise control for mechanical equipment
    d. Indoor air quality requirements
34. Which standard provides fan efficiency grade (FEG) classifications?
    a. ISO 5801
    b. AMCA 205
    c. AMCA 210
    d. ASME B73.1
35. ISO 5801 is an international standard for:
    a. Fan vibration and noise
    b. Testing fan safety features

c. Performance testing of fans using standardized methods

d. Material selection for HVAC fans

36. NFPA 91 provides safety standards for which type of systems?

a. Fire alarm systems

b. Industrial exhaust systems including fans

c. Lighting and electrical systems

d. Emergency lighting systems

37. Which AMCA standard focuses on damper and louver performance rather than fans?

a. AMCA 500

b. AMCA 210

c. AMCA 204

d. AMCA 300

38. According to AMCA 204, what type of fan is considered Class I?

a. A fan rated for explosive atmospheres

b. A low-speed, low-pressure fan

c. A high-efficiency axial fan

d. A mixed-flow fan

39. The Occupational Safety and Health Administration (OSHA) regulates which of the following in relation to fans and blowers?

a. Impeller blade curvature

b. Motor insulation class

c. Guarding of rotating equipment and noise exposure levels

d. Fan blade material specifications