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Question

&

Answers

HVAC

Engineer Interview

(Mechanical engineer)

Q.1) What is the Unit of Heat?(1M)

Units: BTU (British Thermal Units) 1 BTU: It is the amount of energy required to raise 1 Degree Fahrenheit temperature of 1 Pound of water (OR) It is the amount of heat when added to 1 Pound of water increases the temperature of water to 1 Degree Fahrenheit 1 lb = 0.45 Kgs (or) 1 kg = 2.2 Lbs. Types of Heat:- Sensible Heat: It can be sensed or measured by an ordinary dry bulb thermometer. Eg: Human body temperature can be measured using thermometer Latent Heat: It can't be sensed or measured by an ordinary dry bulb thermometer. It is a hidden heat. Latent heat is absorbed or released whenever there is a change in phase. E.g.: When the water becomes vapor and vice versa

Q.2) What is TON & 1 TON = ?(2M)

TON or Ton of refrigeration: It is the amount of energy required to Freeze 1 pound of water in 24 hours (or) it is the amount of energy required to Melt 1 Ton of Ice in 24 Hours

Q.3) Volume Of Air is measured in?(2M)

Volume of air is measured in terms of: CFM = Cubic Feet per Minute CMH = Cubic Meter per Hour M^3/Sec = Cubic Meter per Second $/Sec$ = Liters per second $CMH = 1.7 \times CFM$
 $CFM = 2118 \times m^3/sec$ $CFM = 2.119 \times l/sec$

Q.4) What is ASHRAE?

ASHRAE: American Society of Heating Refrigeration and Air-conditioning Engineers

Q.5) What is the Room Temperature that you maintain in any room?(1M)

24 Degree Celsius or 76 Degree Fahrenheit

Q.6) $CFM = Velocity(usually 1500) * Area \text{ in sqft } \{ \{d/2\}^2 * 3.1416 / 144 \}$

Q.7) 1 ton = 12000 BTU/hr. = 3.516 KW.

Q.8) Heat Transfer Coefficient (U):

$$1 \text{ (Btu/hr. sqft. } ^\circ\text{f)} = 5.6782 \text{ (watt/m}^2\text{. Calvin)}$$

Thermal Conductivity (K):

$$1 \text{ (Btu/hr.ft.} ^\circ\text{f)} = 1.73 \text{ (watt/m. Calvin)}$$

Q.9) What is CFM

Cubic feet minute, it is the unit of air flow.

Q.10) What is Aspect Ratio?

It is the ratio between height and length of the duct generally we take 1:2 can vary with space and size up till 1:4.

Q.11) What is Collar Length?

It is the strip left at the joining of duct and machine.

Q.12) What are the important things to be considered before selecting devices like AHUs and Chillers?

For AHU/FCU for chilled water system = CFM, Static pressure, Ton (capacity), Air Temp, water flow (gpm).

For AHU/FCU for direct system = CFM, Static Pressure, Ton, Sensible.

For Chiller: Ton, outside air temp, GPM,

Note:

(Sensible/3.4 = heating capacity.)

Static pressure to be considered to make fan selection.

1GPM = 2.4 Ton (we need gpm in finding pipe size)

Q.13) What is Pumps supply fittings?

Thermometer, Shutoff valve, pressure gauge, strainer, test point, drain cock, union flexible connector, and Eccentric reducer.

Q.14) What is Pumps return fittings?

Eccentric reducer, flexible connector, union test point, check valve, strainer, gate valve, check valve, temp sensors,

Q.15) CFM distribution wrt the given floor plan?

Use ductulator.

Q.16) Calculating loads wrt any plan by using software.

Use Hap-4.32 or any to find the loads.

Q.17) Type of Dampers?

Fire dampers = Butterfly damper, Non Return Damper, Motorized Damper, Fire damper, Smoke damper, Gravity damper.

Q.18) Types of motorized damper?

Motorized volume damper, Motorized fire and smoke damper.

Q.19) Types of grills and diffusers?

2-way, 3-way, 4-way, 1-way, jet diffusers with fan.

Q.20) What is VFD?

Variable frequency drive-it is use to control the speed of motor by controlling the frequency applied to it. It is used with Chillers; AHU etc. (use to control the RPM of pumps)

Q.21) How do you control or balance the chilled water

Double regulating valve in main line return (usually controlled from return using dry)

Q.22) How do you control the noise or vibration in the duct?

Lining (nc-35) and Reinforcement.

Q.23) Temperature of water at outlet of chiller and inlet of AHU?

@ Outlet of chiller - 6-7°C & @ inlet of AHU - 7 - 8°C

@ Outlet of AHU - 10 - 11°C & @ inlet of Chiller - 13-15°C.

Q.24) What are primary pumps and secondary pumps

The pumps from chiller to building is Primary and in building transfer is Secondary.

Q.25) AHU & FCU Valve connection details?

Check my AHU installation details video.

Q.26) What is CFM value?

CFM = 0.417 L/s.

Q.27) What are the refrigerants used in split unit?

R22, R12, R34 (Depends).

Q.28) What are duct heaters and why do we use them if we already have heating option in AHU?

Just to provide heating in some specific areas.

Q.29) What is VAV and its working?

- Pressure dependent & Pressure independent:
 - To control the flow of air and temp. (Variable air volume).
 - Pressure dependent: - The volume of air supplied by the terminal unit varies depending upon the static pressure (SP) in the primary air duct.
 - Pressure independent terminal units: - have flow-sensing devices that limit the flow rate through the box. They can control the maximum and minimum cfm that can be supplied and are therefore independent of the SP in the primary air duct.
 - Almost all HVAC systems installed or retrofitted at present have pressure independent VAV terminals. Pressure independent systems can be balanced and will allow the correct airflow from each terminal.

Q.30) What is 3 way valve and 2 way valve? Where we will use them and why?

2 way valve = it will regulate the flow as per demand and it will be fitted in the return line.

3 way valve = if the AHU is closed and is running on min load then it will by-pass (Connected to BMS).

Q.31) What is duct gauge normally we use in buildings for cooling and for exhaust ducts?

For supply we use 22 gauge and for exhaust we use 18 gauge.

Q.32) Types of Duct joints?

Slip joint, flange joints etc... See '*internet*'

Q.33) Standard books for HVAC?

We follow in duct designing are Ashrae and Smacna.

Q.34) What is smoke and light test?

Check 'HVAC smoke test and light test in internet'.

Q.35) What are the different method used for duct sizing?

Equal Friction, Velocity, Static Regain.

Q.36) How do you measure & control the noise level in A/C system?

Noise level can be measured by dB meter. It can be controlled by providing acoustic to the unit panels, if the sound crosses the set noise criteria we have to go for sound attenuates.

Q.37) What are the recommended pressure drop in Chilled water pipes?

210 PASCAL'S per meter (0.84 inches).

Q.38) Where do you use Fire Damper, Splitter Damper & Non Return Damper?

Fire dampers (FD) are used to stop the fire wherever duct passes through fire wall.

Splitter dampers (SD) are used to split the main duct for proportional air balancing

Non Return Dampers (NRD) are used to stop the back flow of air in the duct. NRD's used in exhaust and ventilation system only.

Q.39) What are the different types of exhaust fans used to extract the air?

Axial type propeller fan, forward curved, twin fan, direct driven centrifugal fan.

Q.40) What are different duct shapes normally used?

Rectangular, Round, Spiral, Oval.

Q.41) How do you control vibration of AHU & Chillers?

Spring vibration isolators, Rubbers pads, Kinetic Chain, flexible bellows.

Q.42) What is the difference between VAV & CAV?

Variable Air Volume & Constant Air Volume.

Q.43) Mention typical valve arrangement for chiller connection?

Check internet for 'HVAC'.

Q.44) What do you consider while making plant room layout explain briefly?

Space, site orientation, plant room location, A/C unit (ready-made or tailor made).

Q.45) What are the different type of Louvers used?

Fresh air louvers, sand trap louvers, door louvers, acoustic louvers, supply air and return air louvers, back draft louvers.

Q.46) Classify the different types of chillers?

Air Cooled & Water Cooled. With Compressors - Reciprocating, screw, centrifugal & scroll chillers.

Q.47) What are the standard test pressure for chilled water piping for Industrial application?

Test pressure 1.5 times of working pressure.

Q.48) What are the Securities checking in chillers?

Flow switch, Chiller and Pump interlocking, High Pressure cut-out, Oil Pressure switch, High Suction superheat, Anti-Freeze.

Q.49) What are the temperature & RH required for human comfort?

22 ±2 degree Celsius & 50%RH.

Q.50) At what temperature degree Ferhenite & degree Celsius are same?

-40°C.

Q.51) Which gas is used to purge the refrigerant line during the brazing?

Nitrogen gas.

Q.52) 1 TR= 365 to 400 CFM, 3.516KW.

Q.53) How much design velocity required in the main duct of an office building?

900-1100 FPM

Q.54) How we install internal insulation in Ducts?

And what is the insulation thickness of inside and outside ducts?

25mm inside and 50mm outside and ducts passing thru unconditioned spaces.

Q.55) Difference between nominal capacity and Actual capacity?

Check on internet.

Q.56) Is this nominal capacity equal in every country?

Yes.

Q.57) How to find Weight of Duct?

Wt. in Kg = $8.0318 \times \text{Thickness} \times \text{Perimeter} = \text{___Kg.}$

Where Perimeter of Duct = $(W \times D)^2 / 1000$

Q.58) What are the different materials used for underground chilled water supply?

Pre-insulated Black steel pipe sch-40 with rubber cladding.

Q.59) How to find velocity (FPM)?

We need to know GPM and Friction. Then coincide them in a graph and you will get velocity. And for chilled water we need to know no. of cycles per year (in ksa = $6\text{months} \times 30\text{days} \times 24\text{hrs} = 4320$) search for this value in the annexure of Ashrae to find the FPM. The fpm you get will be for the roof, to get the fpm in risers take 20% of roof and to get in runners take 20% of risers.

Q.60) What Is The FCU?

A Fan Coil Unit (FCU) is a simple device consisting of a heating and/or cooling heat exchanger or 'coil' and fan. It is part of an HVAC system found in residential, commercial, and industrial buildings

Q.61) What Is The Function Of AHU?

An Air Handling Unit (AHU) is used to re-condition and circulate air as part of a heating, ventilating and air-conditioning system. The basic function of the AHU is take in outside air, re-condition it and supply it as fresh air to a building.

Q.62) What Are The Types Of Air Conditioning Systems?

Types of Air Conditioning Systems The choice of which air conditioner system to use depends upon a number of factors including how large the area is to be cooled, the total heat generated inside the enclosed area, etc. • Window Air Conditioner. • Split Air Conditioner. • Packaged Air Conditioner. • Central Air Conditioning System.

Q.63) What Does A HVAC Engineer Do?

An HVAC engineer's job duties can include the design, installation, maintenance, and repair of heating, ventilation, air conditioning, cooling, and refrigeration systems.

Q.64) What Is The HVAC System?

While the Energy Center usually tries to avoid the use of acronyms, HVAC is in common use in the heating and cooling industry. It stands for 'heating, ventilation and air conditioning,' three functions often combined into one system in today's modern homes and buildings

Q.65) What Is The Meaning Of Btu In Air Conditioners?

Btu – British thermal unit (Btu) is the international measure of energy. A Btu is the amount of heat needed to raise 1 (one) pound of water by 1(one) degree Fahrenheit. In HVAC industry, Btu's measure the quantity of heat a conditioning unit can remove from a room per hour. One BTU per hour is equal to 0.293 watts

Q.66) What Is Variable Air Volume System & Dual Duct System?

Variable Air Volume (VAV) is a type of heating, ventilating, and/or air-conditioning (HVAC) system. Unlike constant air volume (CAV) systems, which supply a constant airflow at a variable temperature, VAV systems vary the airflow at a constant temperature.

Q.67) What Is Constant Volume System?

Constant Air Volume (CAV) is a type of heating, ventilating, and air-conditioning (HVAC) system. In a simple CAV system, the supply air flow rate is constant, but the supply air temperature is varied to meet the thermal loads of a space. Most CAV systems are small, and serve a single thermal zone.

Q.68) What Is Centralized Air System?

The most common central cooling system is a split system, which includes an outdoor cabinet containing a condenser coil and compressor, and an indoor evaporator coil, usually installed in conjunction with your furnace, or air handler, the compressor pumps a chemical called refrigerant through the system.

Q.69) What Is The Meaning Of FAHU?

FAHU is the abbreviation used for FRESH AIR HANDLING UNIT. These are usually centralized units employed to induce fresh air quantities to the confines spaces. They come into picture wherever there are limitations to fresh air intake either directly or through AHUs.

Q.70) What Is Cfm & Infiltration?

The infiltration rate is the volumetric flow rate of outside air into a building, typically in cubic feet per minute (CFM) or liters per second (LPS). The air exchange rate, (I), is the number of interior volume air changes that occur per hour, and has units of 1/h. 4

Source: <http://gsul.me/8neq>