(a) convection (b) radiation
(c) conduction
(d) radiation and conducton
(e) radiation and convection.

4.198. Relative percentage of heat absorbed through the heat transfer of (i) furnace water wall, (ii) boiler bank, (iii) superheater, (iv) economiser, (v) airheater of a typical boiler of 200 MW capacity would be of the order of
(a) 48:20:15:7:10 (b) 10:7:15:20:48
(c) 20:48:7:15:10 (d) 7:15:20:10:48
(e) 48:15:10:7:20.

4.199. The feed check valve is used in order to
(a) regulate flow of boiler water
(b) check level of water in boiler drum
(c) recirculate unwanted feed water
(d) allow high pressure feed water to flow to drum and not allow reverse flow to take place
(e) none of the above.

4.200. The size of a boiler drum in pulverised fuel fired boiler,as its size and capacity, (steam pressure and flow ratings) increase
(a) increases
(b) decreases
(c) remains unchanged
(d) increases/decreases depending on steam temperature requirements
(e) unpredictable.

4.201. Feed water conditioning in thermal power plants in done to
(a) reduce hardness and for removal of solids
(b) increase efficiency of thermal power plant
(c) increase heat trnasfer rate
(d) increase steam parameters
(e) all of the above.

4.202. The basic job of feed water treatment in boilers is to overcome the problem of
(a) corrosion (b) scale
(c) carryover (d) embrittlement
(e) all of the above.

4.203. Scale is formed on heat transfer surfaces when
(a) water is acidic
(b) water is alkaline
(c) water contains dissolved gases
(d) water contains dissolved calcium and magnesium salts
(e) water contains oil and suspended soilds.

4.204. Hardness of water refers to
(a) the presence of scale-forming calcium or magnesium salts in water
(b) its shear strength
(c) its pH value
(d) presence of ions in water
(e) presence of insoluble compounds.

4.205. Blow down from boiler drum is carried with a view to
(a) control the solids concentration in boiler water
(b) to control drum level
(c) lower steam pressure
(d) increase steam temperature
(e) supply hot water for emergency needs.

4.206. Internal treatment of boiler water is the feeding of chemicals directly to the boiler. It is done in order to
(a) precipitate impurities as a sludge in the water rather than as scale on the boiler metal
(b) condition the sludge to keep it from sticking to the metal so that it can be removed by blowdown
(c) adjust the water composition to make it non-corrosive
(d) all of the above
(e) none of the above.

4.207. Why is it desitable to turn the ejector on for 15-20 minutes daily when a steam turbine is not running
(a) to increase efficiency
(b) to cool the turbine
(c) to draw moisture out of casing
(d) to avoid bending of shaft
(e) to avoid jamming of parts.

4.208. Most serious energy loss in impulse steam turbine is
(a) steam leakage between diaphragms and shaft
(b) leakage over blade ends through radial clearance passages
(c) frictional resistance between steam and nozzle side
(d) impact loss as steam enters the moving blades

(*e*) bearing friction.

4.209. Most serious energy loss in reaction steam turbine is
(*a*) steam leakage between diaphragms and shaft
(*b*) leakage over blade ends through radial clearance passages
(*c*) frictional resistance between steam and nozzle side
(*d*) impact loss as steam enters the moving blades
(*e*) bearing friction.

4.210. Velocity compounding in an impulse turbine results in shorter turbine because this stage
(*a*) is most efficient
(*b*) absorbs much kinetic energy
(*c*) reduces maximum pressure
(*d*) handles steam at high pressure
(*e*) none of the above.

4.211. The blowdown cock in boiler is used for
(*a*) regulating drum level by blowing unwanted water
(*b*) emptying the boiler in case of shut down
(*c*) maintaining constant pressure in drum by blowing unwanted steam
(*d*) to remove sludge or sediments from drum
(*e*) none of the above.

4.212. Relative percentage of heat transfer surface of (*i*) furnace water wall, (*ii*) boiler bank, (*iii*) superheater, (*iv*) economiser, (*v*) air heater in a typical boiler of 200 MW capacity would be of the order of
(*a*) 42:6:10:33:9 (*b*) 42:33:9:10:6
(*c*) 33:9:10:42:6 (*d*) 9:6:10:33:42
(*e*) 9:33:10:6:42.

4.213. The correct sequence of location of equipment in the flue gas path from furnace exit upto chimney is
(*a*) superheater, economiser, air heater (AH), electrostatic precipitator (EP), induced draft fans (ID)
(*b*) superheater, economiser, EP, ID, AH
(*c*) superheater, EP, economiser, AH, ID
(*d*) superheater, AH, ID, economiser, EP
(*e*) economiser, superheater, AH, EP, ID.

4.214. What type of fuel is best adapted to the chain or travelling grate stoker
(*a*) caking coal (*b*) pulverised coal
(*c*) non-caking or free burning coal
(*d*) high-ash content coal
(*e*) none of the above.

4.215. A dense white smoke from a chimney indicates
(*a*) insufficient air (*b*) too much air
(*c*) correct air (*d*) less turbulance
(*e*) none of the above.

4.216. In warming up a boiler, the temperature is increased
(*a*) uniformly and gradually
(*b*) first slowly and then rapidly
(*c*) first rapidly and then slowly
(*d*) at any rate
(*e*) none of the above.

4.217. In warming up a boiler, the pressure is increased
(*a*) uniformly and gradually
(*b*) first slowly and then rapidly
(*c*) first rapidly and then slowly
(*d*) at any rate
(*e*) none of the above.

4.218. Formation of scale on a boiler tube
(*a*) protects it (*b*) increase its life
(*c*) decreases its life
(*d*) life is unaffected
(*e*) suspended salts.

4.219. Which impurity in water requires critical attention on very high pressure boilers
(*a*) hydrogen (*b*) ammonia
(*c*) silica (*d*) dissolved salts
(*e*) suspended salts.

4.220. A thermal power plant designed to operate in cold climate is operated in hot climate; it will develop
(*a*) more power (*b*) less power
(*c*) same power
(*d*) more or less depedning on the size
(*e*) unpredictable.

4.221. Caking is represented by
(*a*) the left pure carbon whem coal is heated and volatile matter driven off
(*b*) the formation of lumps or masses of coke
(*c*) fusing of ash (*d*) high ash content
(*e*) ease in burning.

4.222. Free burning coal is one which
(*a*) burns freely (*b*) burns completely
(*c*) shows little or no fusing action
(*d*) leaves no unburnt carbon
(*e*) does not burn.

4.223. Which of the following coal variety has low calorific value
(*a*) bituminous coal
(*b*) lignite (*c*) anthracite
(*d*) steam coal (*e*) washed coal.

4.224. Orsat apparatus is used to determine the
(*a*) combustion efficiency
(*b*) leakage of air into boiler
(*c*) conductivity of water
(*d*) analysing the flue gas on the spot
(*e*) ultimate analysis of fuel.

4.225. Orsat apparatus is used to determine the
(*a*) combustibles in flue gases
(*b*) percentage of CO_2, O_2 and CO by volume in flue gases
(*c*) percentage of CO_2, O_2, and CO by weight in flue gases
(*d*) O_2 in flue gases
(*e*) CO_2 in flue gases.

4.226. The chief advantage of reheat cycle is
(*a*) increase efficency
(*b*) obtain more work
(*c*) increase number of turbine cylinders
(*d*) to decrease moisture content in low pressure stages
(*e*) to avoid corrosion.

4.227. In Orsat apparatus, the gases, CO_2, O_2 and CO are absorbed in first three pairs of bulbs by filling them with
(*a*) sodium hydroxide solution, pyrogallol, and cuprous chloride solutions respectively
(*b*) pyrogallol, sodium hydroxide, cuprous chloride respectively
(*c*) cuprous chloride, sodium hydroxide, pyrogallol respectively
(*d*) sodium hydroxide, cuprous chloride, pyrogallol respectively
(*e*) in any order.

4.228. The function of a flywheel is to
(*a*) facilitate start of machine
(*b*) smooth out power impulses
(*c*) act as pulley for belt drive
(*d*) to store energy for periods of failure of main supply
(*e*) none of the above.

4.229. The efficiency ratio or relative efficiency is defined as
(*a*) thermal efficiency/rankine efficiency
(*b*) indicated thermal efficiency/rankine efficiency
(*c*) mechanical efficiency/rankine efficiency
(*d*) thermal efficiency/overall efficiency
(*e*) indicated thermal efficiency/brake thermal efficiency.

4.230. In a cross compound steam engine
(*a*) one high and one low pressure cylinder are set side by side, driving the same shaft, cranks being set 90° apart
(*b*) two cylinders are centred on the same piston rod, the l.p. cylinder being placed nearest the crankshaft
(*c*) two cylinders are set at 90°, usually to save floor space
(*d*) two cylinders are set in V-arrangement
(*e*) none of the above.

4.231. Diagram factor is defined as the ratio of
(*a*) actual m.e.p. and swept volume
(*b*) theoretical m.e.p. and swept volume
(*c*) actual m.e.p. and theoretical m.e.p.
(*d*) theoretical m.e.p. and actual m.e.p.
(*e*) diagram area and swept volume.

4.232. The average value of diagram factor for various types of steam engines is approximately
(*a*) 1.0 (*b*) 0.7
(*c*) 0.9 (*d*) 1.1
(*e*) 0.8.

4.233. The steam admission pressure in case of steam locomotives is of the order of
(*a*) 1-3 kg/cm^2 (*b*) 4- 6kg/cm^2
(*c*) 8-18 kg/cm^2 (*d*) 25-40 kg/cm^2
(*e*) 50-80 kg/cm^2.

4.234. The back pressure in a locomotive steam engine is of the order of
(*a*) atmospheric pressure
(*b*) 0.5 ata (*c*) 0.2 ata
(*d*) 1.3 ata (*e*) 2 ata.

4.235. The saturation curve of a steam engine represents

(a) the saturated state of steam
(b) the quantum of missing quantity
(c) the curve drawn through the points of dry volume
(d) the condition of steam at exhaust corresponding to various inlet conditions
(e) does not exist.

4.236. The steam trap is employed to
(a) condense the steam
(b) separate condensate from steam
(c) drain off condensate resulting from partial condensation
(d) keep steam superheated
(e) filter the steam.

4.237. Steam admission pressure remains constant in following governing system of steam engine
(a) throttle governed steam engine
(b) cut-off governed steam engine
(c) hit and miss governed engine
(d) all of the above
(e) none of the above.

4.238. All steam engines work on
(a) principle of conservation of energy
(b) principle of conservation of momenum
(c) Zeroth law of thermodynamics
(d) First law of thermodynamics
(e) Second law of thermodynamics.

4.239. The expansion process in the steam engines is
(a) isentropic
(b) adiabatic at constant pressure
(c) adiabatic at constant volume
(d) hyperbolic
(e) not truly hyperbolic.

4.240. In a tandem compound steam engine
(a) one high and one low pressure cylinder are set side by side, driving the same shaft, cranks being set 90° apart
(b) two cylinders are centred on the same piston rod, the l.p. cylinder being placed nearest the crankshaft
(c) two cylinders are set at 90° usually to save floor space
(d) two cylinders are set in V-arrangement
(e) none of the above.

4.241. Cut off point remains unaltered in following governing system of steam engine
(a) throttle-governed steam engine
(b) cut-off governed steam engine
(c) hit and miss governed engine
(d) all of the above
(e) none of the above.

4.242. Which is varied in throttle governing in steam engine
(a) pressure of intake steam
(b) volume of intake steam
(c) temperature of intake steam
(d) dryness fraction
(e) superheat of steam.

4.243. Which is varied in cut off governing in steam engine
(a) pressure of intake steam
(b) volume of intake steam
(c) temperature of intake steam
(d) dryness fraction
(e) superheat of steam.

4.244. William's line for steam engine is the straight line relationship between mass rate of steam flow and
(a) IHP (b) BHP
(c) efficiency (d) compression ratio
(e) inlet pressure of steam.

4.245. The William's line equation (mass rate of steam flow=constant1 + constant2 (IHP) holds good for
(a) cut off governing
(b) throttle governing
(c) partial admission governing
(d) all of the above
(e) none of the above.

4.246. The uniflow steam engine is also known as
(a) the static flow engine
(b) single direction steam engine
(c) radial engine
(d) mid-cylinder exhaust engine
(e) does not exist.

4.247. Clearance ratio in steam engine is the ratio of clearane volume to
(a) swept volume (b) cylinder volume
(c) volume at cut off
(d) swept volume – cut off volume
(e) cylinder volume – cut off volume

4.248. In a compound steam engine, if cranks are placed at 90° to each other, then steam

from HP cylinder to LP cylinder can be transferred
(*a*) directly (*b*) indirectly
(*c*) through a receiver
(*d*) in the middle of the stroke
(*e*) can't be transferred till cranks are arranged at 180° to each other.

4.249. Cut off ratio in steam engine is the ratio of volume at cut off to the
(*a*) clearance volume
(*b*) swept volume
(*c*) cylinder volume
(*d*) clearance volume plus swept volum
(*e*) cylinder volume/clearance volume.

4.250. In an agnle-compounded engine
(*a*) one high and one low pressure cylinder are set side by side driving the same shaft, cranks being set 90° apart
(*b*) two cylinders are centred on the same pistion rod, the l.p. cylinder being placed nearest the crankshaft
(*c*) two cylinders are set at 90° usually to save floor space
(*d*) two cylinders are set in V-arrangement
(*e*) various cylinders are arranged radially.

4.251. Compound steam engine is one in which
(*a*) steam expands twice
(*b*) two engines are combined together
(*c*) major parts are repeated twice
(*d*) two units are put together
(*e*) steam expands in several stages.

4.452. Pick up the wrong statement.

Diagram factor of a steam engine can be defined as ratio of
(*a*) m.e.p. of actual and hypothetical indicator diagrams
(*b*) areas of actual and hypothetical indicator diagrams
(*c*) spring constants of springs used to calculate area
(*d*) mean vertical intercepts of actual and hypothetical indicator diagrams
(*e*) all of the above.

4.253. Superheating of steam for steam engine results in
(*a*) heating up of all the parts thereby reducing missing quantity
(*b*) increase in efficiency of rankine cycle
(*c*) more work (*d*) less work
(*e*) balanced engine.

4.254. The function of a reheater in a steam reciprocating engine is
(*a*) to heat steam again if it is not at proper temperature
(*b*) to heat steam in two stages
(*c*) to reduce condensation before steam is admitted into low pressure cylinder
(*d*) produce very high pressure
(*e*) reheater is not used in steam engines.

4.255. Missing quantity in steam engines occurs due to
(*a*) cylinder condensation
(*b*) leakage past the valves
(*c*) leakage past the piston
(*d*) all of the above
(*e*) none of the above.

4.256. The expansion ratio in steam engines is the ratio of
(*a*) clearance volume to swept volume
(*b*) swept volume to clearance volume
(*c*) cut off volume to swept volume
(*d*) swept volume to volume at cut off
(*e*) cut off volume to clearance volume.

4.257. Missing quantity per stroke in steam engines is equal to
(*a*) cylinder feed – indicated weight of steam
(*b*) indicated weight of steam–cylinder feed
(*c*) cylinder feed – weight of cushion steam
(*d*) indicated weight of steam– weight of cushion steam
(*e*) indicated weight of steam+ weight of cushion steam.

4.258. Condensation or excessive carry over is dangerous to reciprocating engine, because
(*a*) it reduces efficiency
(*b*) it makes difficult for steam to be discharged fully in exhaust
(*c*) it cools down parts, thereby introducing thermal stresses
(*d*) water being incompressible, excess of it may wreck the engine
(*e*) it results in wastage of steam.

4.259. In steam engines, cylinder condensation is caused by

(a) alternate heating and cooling of steam between the cylinder admission and exhaust
(b) radiation losses to atmosphere
(c) conduction through metal parts
(d) steam not being superheated
(e) none of the above.

4.260. The missing quantity in steam engines refers to
(a) heat content in steam led to exhaust
(b) heat loss by radiation
(c) condensation of steam in cylinder and leakage past the piston
(d) leakage steam
(e) none of the above.

4.261. Pick up the wrong statement. If expansion ratio in a simple steam engine is high then
(a) leakage past the piston will be high
(b) variation in tractive effort will be high
(c) condensation of steam entering the cylinder will be high
(d) stroke of the engine will be very large
(e) work done will be maximum.

4.262. The p-V diagram of a steam engine can be produced automatically by
(a) fitting pressure and volume sensors on cylinder
(b) air indicator
(c) piezo electric crystals
(d) digital meters (e) not possible.

4.263. The presence of loop in the indicator diagram of reciprocating engine indicates
(a) there is loss of power in engine because steam has expanded and then been compressed by the piston
(b) the variable value of the exhaust pressure
(c) low thermal efficiency
(d) some change in settinigs is réquired
(e) none of the above.

4.264. The function of a governor on a steam engine is to
(a) regulate load
(b) match steam parameters with reference to load
(c) provide safety of engine under abnormal conditions
(d) maintain a fairly constant speed for all loads
(e) control pressure of steam.

4.265. In inertia-type governors on steam engines
(a) the point of cut-off is shifted, thereby adjusting mass rate of steam flow to match load requirements
(b) the steam pressure at inlet to cylinder is throttled
(c) the stroke length is adjusted to meet load changes
(d) speed is adjusted in line with load changes
(c) none of the above.

4.266. For given inlet pressure, cut off point and same law of expansion, work done per kg of steam in a reciprocating steam engine as compared to steam turbine will be
(a) same (b) more
(c) less
(d) more or less depending upon capacity of engine and turbine
(e) unpredictable.

4.267. In reciprocating steam engines the live steam is passed through the jackets of steam cylinders in order to
(a) increase temperature of steam
(b) maintain cylinder steam at constant temperature
(c) bypass the unwanted steam
(d) reduce condensation of steam in cylinders
(e) it is never done.

4.268. The effect of wire drawing of steam on the area of indicator diagram is to
(a) increase (b) decrease
(c) no effect
(d) increase/decrease depending on steam pressure
(e) none of the above.

4.269. In the tandem compound steam engine, the axes of the two cylinders
(a) are at 90° to each other
(b) are inclined at 45°
(c) are in the same straight line
(d) lie in different planes
(e) none of the above.

4.270. In receiver type of compounding, the cranks are placed
(a) 45° apart (b) 90° apart
(c) 180° apart (d) 270°apart
(e) 360° apart.

4.271. In a tandem compound engine, the high pressure and low pressure cylinders
(*a*) have common piston rod
(*b*) have separate piston rods
(*c*) are set at 90°
(*d*) are set in V-arrangement
(*e*) have no piston rod.

4.272. In Wolf type as well as receiver type compound engines, the high pressure, and low pressure cylinders
(*a*) have common piston rod
(*b*) have separate piston rods
(*c*) are set at 90°
(*d*) are set in V-arrangement
(*e*) have no piston rod.

4.273. The cranks of high pressure and low pressure cylinders in a Woolf type compound steam engine are placed
(*a*) 0°apart (*b*) 45° apart
(*c*) 90° apart (*d*) 180° apart
(*e*) 270° apart.

4.274. In tandem type compound steam engine the cranks are palced
(*a*) 0° apart (*b*) 45° apart
(*c*) 90° apart (*d*) 180° apart
(*e*) 270° apart.

4.275. In centrifugal type governor steam engines
(*a*) the point of cut-off is shifted, thereby adjusting mass rate of steam flow to match load requirements
(*b*) the steam pressure at inlet to cylinder is throttled
(*c*) the stroke length is adjusted to meet load requirements
(*d*) speed is adjusted in line with load changes
(*e*) none of the above.

4.276. The function of piston rod is to
(*a*) transfer motion from piston to cross head
(*b*) transfer motion from piston to connecting rod
(*c*) provide reciprocating motion to slide valve
(*d*) convert reciprocating motion of piston to rotary motion
(*e*) to control cut off point.

4.277. According to William's law as applicable to throttle governed steam engines, the rate of steam consumption is propertional to
(*a*) IHP (*b*) BHP
(*c*) mechanical efficiency
(*d*) thermal efficiency
(*e*) ratio of IHP and BHP.

4.278. Inertia type shaft governors are preferred over centrifugal type in steam engine because
(*a*) they are more efficient as they control mass rate of steam flow
(*b*) they have greater sensitivity to load change
(*c*) they provide closer control of engine speed
(*d*) they are more reliable
(*e*) reverse of the given statements is true.

4.279. Steam lap is
(*a*) the distance that the edge of the valve closes off the port opening when it is in the centre of its travel
(*b*) the amount of opening in the steam port when the piston is exactly at the end of the stroke
(*c*) the amount of cam movement necessary to make the valve to be opened by a distance equal to lead and lap when the piston is at the top of dead centre
(*d*) there is nothing like steam lap
(*e*) similar to missing quantity.

4.280. In the simple reciprocating steam engine the admission and exhaust ports
(*a*) are on the same side of cylinder
(*b*) provide sealing at the end of cylinder
(*c*) translate linear motion into angular by oscillating about the wrist pin
(*d*) provide motion at the proper time to actuate the valve gear
(*e*) none of the above.

4.281. The function of an eccentric rod in steam engine is to
(*a*) convert rotary motion of crankshaft into to and fro motion of the valve rod
(*b*) provide SHM to D-slide valve
(*c*) impart sliding motion to slide valve
(*d*) convert reciprocating motion to rotary motion
(*e*) adjust and control cut off point.

4.282. The function of a valve rod in steam engines is to
(*a*) convert rotary motion of crankshaft into to and fro motion of the valve rod
(*b*) provide SHM to D-slide valve
(*c*) impart sliding motion to slide valve
(*d*) convert reciprocating motion to rotary motion
(*e*) adjust and control cut off point.

4.283. The purpose of crosshead in steam engines is to
(*a*) facilitate piston to reciprocate
(*b*) provide sealing at the end of cylinder
(*c*) translate linear motion into angular by ossillating about the wrist pin
(*d*) provide motion at the proper time to actuate the valve gear
(*e*) guide piston.

4.284. The main function of a stuffing box in a steam engine is to
(*a*) guide the pistion rod
(*b*) receive steam from engine
(*c*) operate valve in proper sequence
(*d*) prevent leakage
(*e*) minimise the missing quantity.

4.285. The function of a crosshead in steam engine is to guide the motion of
(*a*) piston rod (*b*) valve rod
(*c*) connecting rod
(*d*) D-slide valve (*e*) crank.

4.286. Valve lead is the
(*a*) distance that the edge of the valve closes off the port opening when it is in the centre of its travel
(*b*) amount of opening in the steam port when the pistion is exactly at the end of the stroke
(*c*) amount of cam movement necessary to make the valve to be opened by a distance equal to lead and lap when the piston is at the top of dead centre
(*d*) axial movement of valve due to wear and tear
(*e*) movement of valve to reduce missing quantity.

4.287. The cushion steam in a steam engine is the steam
(*a*) locked up in the cylinder after the exhaust valve has been closed
(*b*) not able to move out of cylinder
(*c*) locked up in the clearance volume of the cylinder
(*d*) locked up around piston and cylinder
(*e*) which does no work.

4.288. The missing quantity in steam engines is maximum
(*a*) at the point of release
(*b*) after the point of release
(*c*) at the point of cut off
(*d*) after the point of cut off
(*e*) uniform throughout.

4.289. Missing quantity can be reduced by
(*a*) steam jacketing of cylinder walls
(*b*) superheating the inlet steam
(*c*) reducing the expansion ratio
(*d*) increasing speed of engine
(*e*) all of the above.

4.290. In a condensing steam engine, the
(*a*) exhaust steam is wasted into atmosphere
(*b*) condensed steam is supplied
(*c*) steam condenses in the cylinder
(*d*) steam condenses as soon as it leaves the cylinder
(*e*) exhaust steam is condensed in condenser.

2.291. In uniflow steam engine, steam enters at one side and steam exhausts at
(*a*) the same side
(*b*) the opposite side
(*c*) the middle of cylinder
(*d*) both the ends
(*e*) the middle and at other end.

2.292. Cut off ratio in a steam engine is the ratio of
(*a*) volume of steam at cut off to cylinder volume
(*b*) pressure at cut off to supply pressure
(*c*) pressure at cut off to m.e.p.
(*d*) fraction of piston stroke travelled by piston at cut off
(*e*) pressure at cut-off to exhaust pressure.

4.293. Angle of advance on plain D-slide valve is the
(*a*) distance that the edge of the valve closes off the port opening when it is in the centre of its travel
(*b*) amount of opening in the steam port when the piston is exactly at the end of the stroke

(c) amount of cam movement necessary to make the valve to be opened by a distance equal to lead and lap when the piston is at top of dead centre
(d) movement due to wear and tear
(e) none of the above.

4.294. It is not possible to obtain complete expansion of steam to condenser pressure in a steam engine because
(a) it is not economical to use condenser with steam engine
(b) cooling water at very low water is required
(c) engine then can't be balanced
(d) since specific volume of steam at vacuum is very high, size of LP cylinder will be very large
(e) not much work is obtainable.

4.295. The D-slide valve
(a) exhausts steam from the cylinder at proper moment
(b) adjusts stroke lenght
(c) controls point of steam admission
(d) guides motion of piston
(e) controls cut off point.

4.296. The sequence of events during the stroke of a steam engine are
(a) admission, cut-off, expansion, release
(b) admission, expansion, release, cut-off
(c) admission, expansion, cut-off, release
(d) cut-off, admission, release, expansion, cut-off
(e) none of the above.

4.297. In steam engines, the use of following type of valves follows closely in internal combustion engine practice
(a) simple slide valve
(b) meyer expansion valve
(c) piston valve (d) corliss valve
(e) drop valve.

4.298. The following valves in steam engines use independent steam and exhaust valve which reduce cylinder condensation and allow admission and exhaust events to be set independently
(a) meyer expansion valve
(b) piston valve
(c) corliss valve
(d) drop valve
(e) both corliss and drop valves.

4.299. According to William's law for a steam engine operating on throttle governing, the steam consumption with reference to I.H.P. varies
(a) linearly (b) parabolically
(c) remain constant
(d) first increases and then decreases
(e) first decreases and then increases.

4.300. The cylinder of a steam engine is usually
(a) exposed to atmosphere
(b) properly lagged
(c) steam jacketed
(d) water cooled (e) air cooled.

4.301. The condensation in multi-cylinder steam engine in comparison to single cylinder engine is
(a) more (b) less
(c) same
(d) more/less depending on engine capacity
(e) more/less depending on steam inlet pressure.

4.302. In a two cylinder compound engine the cylinder dimeneions can be calculated from the
(a) p-v digaram and RPM
(b) h.p. and actual indicator diagram
(c) h.p. and hypothetical indicator diagram
(d) h.p. and speed (e) none of the above.

4.303. Pick up the correct statement about advantages of compound steam engine
(a) ratio of expansion is reduced, thus reducing lenght of stroke
(b) temperature range is low and thus more condensation
(c) cost of engine is low
(d) high pressure steam can be used
(e) power output is more.

4.304. In a compound steam engine, the ratio of expansion, and stroke lenght, respectively are
(a) increased, increased
(b) decreased, decreased
(c) increased, decreased
(d) decreased, increased
(e) none of the above.

4.305. In a compound steam engine, the diameter of high pressure piston compared to low pressure piston is

(a) more (b) less
(c) same
(d) more or less depending on engine capacity
(e) more or less depending on steam pressure.

4.306. The following type of valve in steam engine has no sliding parts which permits use to superheated steam
(a) drop valve
(b) meyer expansion valve
(c) corliss valve (d) piston valve
(e) none of the above.

4.307. If L be the stroke in metres and N its rpm, then piston speed in m/min is given by
(a) LN (b) $\frac{LN}{2}$
(c) $2LN$ (d) $\frac{LN}{4}$
(e) $4LN$.

4.308. The size of a steam engine is specified as $250 \times 300 - 450$ rpm. In this 300 indicates
(a) h.p. (b) bore size
(c) shaft diameter (d) piston stroke
(e) cylinder volume.

4.309. In steam engines using throttle control, the relationship between steam consumption and I.H.P. is
(a) linear (b) non-linear
(c) lower rise at lower loads and higher rise at higher loads
(d) higher rise at lower loads and lower rise at higher loads
(e) none of the above.

4.310. Missing quantity in steam engines refers to
(a) steam not admitted into cylinder due to valve imperfection
(b) steam lost due to friction
(c) difference between actual weight of steam present in cylinder and the indicated weight of dry saturated steam
(d) steam not capable of expanding due to early opening of exhaust valve
(e) steam lost due to leakage past the cylinder.

4.311. The cross head in a steam engine is essential when it is
(a) directly connected to reciprocating pump
(b) directly connected to rail wheels
(c) single acting (d) double acting
(e) connected to two driven machines.

4.312. A steam engine is to be reversed. How much the eccentric should be shifted, if angle of advance is 10°
(a) 180° (b) 200°
(c) 160° (d) 190°
(e) none of the above.

4.313. Which statement is not true for steam turbine in comparsion to steam engines
(a) there is no boiler-water contamination from lubricating oil as in a steam engine
(b) turbine delivers smooth uninterrupted power at high rotating speeds
(c) turbines have less weight per horsepower and power wearing parts compared to steam engines
(d) heat energy of steam is better utilised in steam egnines than in turbines
(e) all of the above.

4.314. In the impulse turbine the steam expands
(a) in the nozzle (b) in the blades
(c) partly in nozzle and partly in blades
(d) neither in nozzle nor in blades
(e) none of the above.

4.315. Parson's turbine is
(a) simple reaction type turbine
(b) simple impulse type turbine
(c) velocity compounded type turbine
(d) pressure compounded type turbine
(e) does not exist.

4.316. A Ljungstrom turbine is
(a) impulse turbine
(b) reaction trubine
(c) inward radial flow turbine
(d) outward radial flow turbine
(e) pressure and velocity compounded turbine.

4.317. In reaction turbine the expansion of steam as it flows over blades represents
(a) throttling process
(b) free expansion process
(c) isothermal expansion
(d) adiabatic process
(e) none of the above.

4.318. In a non-condensing turbine, the steam is exhausted

(*a*) below atmospheric pressure
(*b*) at atmospheric pressure
(*c*) above atmospheric pressure
(*d*) at any pressure
(*e*) into cooling tower.

4.319. De Laval turbine is a
(*a*) simple reaction turbine
(*b*) simple impulse turbine
(*c*) velocity compounded impulse turbine
(*d*) pressure compounded impulse turbine
(*e*) multi-stage turbine.

4.320. De Laval turbine is used for applications requiring
(*a*) high power, high speed
(*b*) high power, low speed
(*c*) low power, high speed
(*d*) low power, low speed
(*e*) low speed.

4.321. The maximum efficiency of De-Laval turbine in terms of nozzle angla α is expressed as
(*a*) $\cos^2\alpha$ (*b*) $1 - \cos^2\alpha$
(*c*) $\cos 2\alpha$ (*d*) $1 - \cos 2\alpha$
(*e*) $\cos^2 2\alpha$.

4.322. In a back pressure tubine the steam is exhausted
(*a*) below atmospheric pressure
(*b*) at atmospheric pressure
(*c*) above atmospheric pressure
(*d*) at any pressure
(*e*) into cooling tower.

4.323. Reteau turbine is a
(*a*) simple reaction turbine
(*b*) simple impulse turbine
(*c*) pressure compounded turbine
(*d*) velocity compounded impulse turbine
(*e*) multi-stage turbine.

4.324. Velocity compounding involves
(*a*) expansion of steam in stages
(*b*) recovery of kinetic energy of steam leaving first set of blades in subsequent rows of blades
(*c*) velocity and pressure equalisation at different stages
(*d*) increased velocity after each stage due to expansion of steam
(*e*) none of the above.

4.325. Pick up the correct statement about change of parameter in an impulse turbine
(*a*) velocity increases
(*b*) pressure reduces
(*c*) both pressure and velocity increase
(*d*) velocity decreases
(*e*) both pressure and velocity decrease.

4.326. Pick up the correct statement about change of parameter in a reaction turbine's moving blades
(*a*) velocity increases
(*b*) pressure reduces
(*c*) both pressure and velocity increase
(*d*) velocity decreases
(*e*) both pressure and velocity decrease.

4.327. For a given horsepower an impulse turbine, compared to a reaction turbine has
(*a*) less rows of blades
(*b*) more rows of blades
(*c*) equal rows of blades
(*d*) it can be anything
(*e*) none of the above

4.328. In a reaction turbine, a stage is represented by
(*a*) each row of blades
(*b*) number of entries of steam
(*c*) number of casings
(*d*) number of exits of steam
(*e*) none of the above.

4.329. If Δh_m and Δh_f be the enthalpy drops in moving and fixed blades, then the degree of reaction is defined as
(*a*) $\frac{\Delta h_m}{\Delta h_f}$ (*b*) $\frac{\Delta h_f}{\Delta h_m}$
(*c*) $\frac{\Delta h_m}{\Delta h_m + \Delta h_f}$ (*d*) $\frac{\Delta h_f}{\Delta h_f + \Delta h_m}$
(*e*) $\frac{\Delta h_f + \Delta h_m}{\Delta h_m}$.

4.330. In impulse turbine
(*a*) the steam is expanded in nozzles and there is no fall in pressure as the steam passes over the rotor blades
(*b*) steam is directed over bucket like blades which propels the rotor
(*c*) expansion of steam takes place as it passes through the moving blades on the rotor as well as through the guide blades fixed to the casing
(*d*) steam pressure remains constant
(*e*) steam temperature remains constant.

4.331. In an impulse turbine, the energy supplied to the blades per kg of steam equals to
(*a*) work done by steam
(*b*) sum of kineetic energy and potential energy at inlet
(*c*) reaction energy of steam
(*d*) kinetic energy of jet at entrance per kg of steam
(*e*) none of the above.

4.332. Pick up the correct statement about change of parameter in a reaction turbine's fixed blades
(*a*) pressure and velocity are constant
(*b*) velocity decreases and pressure increases
(*c*) pressure decreases and velocity increases
(*d*) both pressure and velocity decrease
(*e*) both pressure and velocity increase.

4.333. The pressure velocity compounding of steam turbine results in
(*a*) shorter turbine for a given total pressure drop
(*b*) large turbine for a given pressure drop
(*c*) large number of stages
(*d*) lesser friction losses
(*e*) more output.

4.334. Combining impulse stages in series results in
(*a*) increase of speed
(*b*) decrease of speed
(*c*) speed remains unaffected
(*d*) unpredictable speed effect
(*e*) none of the above.

4.335. Pick up wrong statement about Parson's reaction turbine
(*a*) fixed and moving blades are identical
(*b*) inlet and outlet velocity triangles are identical about a vertical centre line
(*c*) degree of reaction is 0.5
(*d*) maximum blade efficiency is obtained for blade speed ratio of 0.5
(*e*) none of the above.

4.336. In reaction turbines
(*a*) the steam is expanded in nozzles and there is no fall in pressure as the steam passes over the rotor blades
(*b*) steam is directed over bucket-like-blades which propels the rotor
(*c*) expansion of steam takes place as it passes through the moving blades on the rotor as well as through the guide blades fixed to the casing
(*d*) steam pressure remains constant
(*e*) steam temperature remains constant.

4.337. In impulse reaction turbines, the pressure drops
(*a*) in fixed nozzles
(*b*) in moving blades
(*c*) in fixed blades
(*d*) in both fixed and moving blades
(*e*) none of the above.

4.338. For maximum work done for good economy of turbines the linear speed of the blades is
(*a*) equal to the velocity of steam entering the blades
(*b*) twice the velocity of steam entering the blades
(*c*) half the velocity of steam entering the blades
(*d*) one-fourth the velocity of steam entering the blades
(*e*) none ot the above.

4.339. Why a single stage turbine is not used in practice ?
(*a*) It can't generate much power
(*b*) the control is not possible
(*c*) heat energy is not utilised fully
(*d*) the rotational speed becomes very high requiring large reduction gearing
(*e*) its efficiency is very low.

4.340. If friction be neglected in impulse turbine then
(*a*) work done is maximum
(*b*) pressure increases as it flows over moving blades
(*c*) relative velocity at inlet and outlet of blade is same
(*d*) pressure decreases as steam moves over blades
(*e*) steam flow provides motive force.

4.341. Which is false statement in connection with collection of steam coming out of sealing glands
(*a*) steam having high heat value should be utilised instead of wasting into atmosphere
(*b*) if not collected, it would cool the shaft

(c) it may blow in bearings and destroy lub oil
(d) it would form condensate, causing undue moisture in plant equipment
(e) none of the above.

4.342. As a result of blade friction, the relative velocity at outlet of impulse turbine compared to inlet relative velocity is
(a) nearly same (b) 2% less
(c) 10% to 15% less
(d) 30% less (e) 50% less.

4.343. Steam rate of steam turbines is expressed as
(a) kg (b) kg/kW
(c) kg/hr (d) kg/kWhr
(e) kg/kWhr°C.

4.344. Heat rate of steam turbines is expressed as
(a) kcal (b) kcal/hr
(c) kcal/kW (d) kcal/kWhr
(e) kcal/kg.

4.345. Percentage of steam bled for regeverative heating in a regenerative cycle is of the order of
(a) 5% (b) 10-15%
(c) 20-30% (d) 40-50%
(e) 60%.

4.346. Steam escaping across the tips of blades, represents loss of work. Tip leakage is a problem in
(a) reaction turbine
(b) impulse turbine
(c) both (a) and (b)
(d) velocity compounded turbine
(e) pressure compounded turbine.

4.347. Axial shift in steam turbines occurs due to
(a) thermal expansion of casing
(b) wearing of thrust pad
(c) different expansions of casing and rotor
(d) axial thrust (e) does not occur.

4.348. Curtis turbine is a
(a) simple impulse type turbine
(b) simple reaction type turbine
(c) velocity compounded turbine
(d) pressure compounded turbine
(e) does not exist.

4.349. The condition for maximum efficiency of impulse turbine is
(a) $V_b = V_1 \cos \alpha$ (b) $V_b = V_1^2 \cos \alpha$
(c) $V_b = \frac{V_1 \cos \alpha}{2}$ (d) $V_b = 1 - V_1 \cos \alpha$
(e) $V_b = 1 + V_1 \cos \alpha$.
where V_b = blade speed
V_1 = absolute speed of steam entering the blades
and α = nozzle angle

4.350. The condition for maximum efficiency of a reaction turbine is
(a) $V_b = V_1 \cos \alpha$ (b) $V_b = V_1^2 \cos \alpha$
(c) $V_b = \frac{V_1 \cos \alpha}{2}$ (d) $V_b - 1 - V_1 \cos \alpha$
(e) $V_b = \frac{V_1^2 \cos 2\alpha}{2}$

4.351. In Parson's turbine the relative velocity at outlet as compared to inlet is
(a) greater (b) lesser
(c) same
(d) depends on speed
(e) unpredictable.

4.352. Total expansion of steam turbine represents
(a) thermal expansion of casing
(b) wearing of thrust pad
(c) different expansions of casing and rotor
(d) cooling of casing
(e) heating of casing.

4.353. In a steam thermal power plant, in order to build up the vacuum in the condenser, the turbine glands are sealed by supplying steam from
(a) boiler (b) leakage steam
(c) auxiliary steam source
(d) extraction steam
(e) exhaust steam.

4.354. The number of stages in an impulse turbine as compared to reaction turbine is
(a) same (b) more
(c) less
(d) more/less depending on capacity
(e) unpredictable.

4.355. In a steam turbine, the leak off steam and air from the last chambers of seal of each rotor is sucked into
(a) atmosphere (b) condenser
(c) gland cooler

(*d*) low pressure heaters
(*e*) deaerator.

4.356. The pressure in the gland steam header for sealing the glands of low pressure steam turbine is maintained
(*a*) at vacuum
(*b*) at atmospheric conditions
(*c*) at around 0-1 mm wcl
(*d*) at around 100-200 mm wcl
(*e*) at around 2-5 kg/cm^2.

4.357. Differential expansion takes place due to
(*a*) thermal expansion of casing
(*b*) wearing of thrust pad
(*c*) different expansions of casing and rotor
(*d*) cooling of casing due to radiation
(*e*) does not take place.

4.358. In case of tandom compound arrangement in steam turbines
(*a*) the steam from one casing flows to other, the shafts of both being coupled in straight line
(*b*) the steam in any casing enters in the middle and flows in both the directions
(*c*) the steam from one casing flows to other, the shafts of both being in different planes
(*d*) the steam flows from high pressure casing to intermediate pressure casing and then to low pressure casing, the shafts of all the three being coupled in one straight line
(*e*) none of the above.

4.359. After turbine trip, the cooling water to condenser is stopped
(*a*) immediately
(*b*) after 15-30 mts
(*c*) never stopped
(*d*) may be stopped any time
(*e*) none of the above.

4.360. The ratio of work done by the blades per kg of steam flowing through a set of fixed and moving blades, and the corresponding isentropic enthalpy drop is called
(*a*) nozzle efficiency
(*b*) blade efficiency
(*c*) stage efficiency
(*d*) relative efficiency
(*e*) reheat factor.

4.361. Stage efficiency of steam turbine is equal to
(*a*) blade efficency/nozzle efficiency
(*b*) nozzle efficiency/blade efficiency
(*c*) nozzle efficiency × blade efficiency
(*d*) 1- blade efficiency
(*e*) 1- nozzle efficiency.

4.362. For heat economy in the turbine cycle, the following parameters should be maintained at rated values at various loads
(*a*) turbine speed (*b*) steam flow
(*c*) Inlet steam pressure and temperature and condenser pressure
(*d*) turbine vibration
(*e*) bled steam.

4.363. The ratio of work done on the blades to the energy supplied to the blades is called
(*a*) diagram efficiency
(*b*) nozzle efficiency
(*c*) stage efficiency
(*d*) mechanical efficiency
(*e*) gross efficiency.

4.364. The back pressure in steam turbines in Indian conditions is of the order of
(*a*) 0.01 ata (*b*) 0.1 ata
(*c*) 0.3 ata (*d*) 0.5 ata
(*e*) 1 ata.

4.365. For a 200 MW plant, the MCR (max. continuous rating) turbine heat rate is of the order of
(*a*) 1050 kcal/kWhr
(*b*) 1350 kcal/kWhr
(*c*) 2050 kcal.kWhr
(*d*) 2550 kcal/kWhr
(*e*) 3050 kcal/kWhr.

4.366. If the back pressure of condensing steam turbine rises, then heat rate of turbine will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) first increase upto a certain limit and then decrease
(*e*) first decrease upto a certain limit and then increase.

4.367. The back pressure of condensing steam turbines can be improved by
(*a*) decreasing steam flow
(*b*) decreasing steam temperature
(*c*) injecting water in last stages

(d) using debris filter to clean circulating water and cleaning condenser tubes by rubber ball cleaning equipment
(e) reducing bled steam.

4.368. The back pressure of a condensing steam turbine, with decrease in temperature of circulating water used in condenser, will
(a) increase (b) decrease
(c) remain unaffected
(d) first increase and then decrease
(e) first decrease and then increase.

4.369. If high pressure heaters in a thermal power plant operating on a regenerative cycle are cut off, then fuel input to boiler will
(a) increase (b) decrease
(c) remain unaffected
(d) may increase/decrease depending on number of heaters cut off
(e) unpredictable.

4.370. The heat rate of a turbine operating at part loads by throttle governing as compared to full loads
(a) decreases (b) increases
(c) remains unaffected
(d) may increase/decrease depending on extent of deviation of load from full load
(e) unpredictable.

4.371. The auxiliary consumption (*i.e.*, power consumed by various equipment/devices required essentially for operation of power plant) in power plant is of the order of
(a) 2-5% (b) 8-10%
(c) 10-15% (d) 15-20 %
(e) 20-25%.

4.372. The ratio of adiabatic heat drop to the heat supplied is known as
(a) rankine efficiency
(b) reheat factor
(c) stage efficiency
(d) internal efficiency
(e) efficiency ratio.

4.373. Efficiency ratio is the ratio of
(a) useful heat drop to the total adiabatic heat drop
(b) cumulative heat drop to the adiabatic heat drop
(c) adiabatic heat drop to the heat supplied
(d) total adiabatic heat drop to useful heat drop
(e) adiabatic heat drop to cumulative heat drop.

4.374. The ratio of total useful heat drop to the total adiabatic heat drop is known as
(a) reheat factor (b) stage efficiency
(c) efficiency ratio
(d) rankine efficiency
(e) both internal efficiency and efficiency ratio.

4.375. In case of cross-compounding arrangement in steam turbines
(a) the steam from one casing flows to other, the shafts of both being coupled in straight line
(b) the steam in any casing enters in the middle and flows in both the directions
(c) the steam from one casing flows to other, the shafts of both being in different planes
(d) the steam flows from high pressure casing to intermediate pressure casing and then to low pressure casing, the shafts of all the three being coupled in one straight line
(e) none of the above.

4.376. The maximum blade efficiency of a single stage impulse turbine having nozzle angle α, under ideal conditions is
(a) $\frac{\cos \alpha}{2}$ (b) $\frac{\cos^2 \alpha}{2}$
(c) $\frac{\cos 2\alpha}{2}$ (d) $\cos 2\alpha$
(e) $\cos^2 \alpha$.

4.377. Blade or diagram efficiency of steam turbine, if V_{w1} is the velocity of whirl at entry of moving blades (tangential component of V_1 ; V_1 being equal to absolute velocity of steam entering the moving blades), and V_{w2} is the velocity of whirl at exit, and v is the linear velocity of blades, is equal to
(a) $\frac{v(V_{w1} - V_{w2})}{V_1^2}$ (b) $\frac{2v(V_{w1} - V_{w2})}{V_1^2}$
(c) $\frac{v(V_{w1} - V_{w2})}{V_1^2}$ (d) $\frac{2v(V_{w1} - V_{w2})}{V_1}$
(e) $\frac{v(V_{w1} - V_{w2})}{2V_1}$

4.378. In Parson's reaction turbine
(*a*) there are no fixed blades
(*b*) there are no moving blades
(*c*) fixed blades are bigger than moving blades
(*d*) moving blades are bigger than fixed blades
(*e*) both fixed and moving blades are identical.

4.379. For Parson's turbine if α be the nozzle angle with tangent to wheel, then maximum labde efficency is equal to
(*a*) $\frac{\cos^2 \alpha}{1+2\cos^2 \alpha}$ (*b*) $\frac{\cos^2 \alpha}{1+2\cos^2 \alpha}$
(*c*) $\frac{\cos^2 \alpha}{1+\cos 2\alpha}$ (*d*) $\frac{2\cos^2 \alpha}{1+\cos^2 \alpha}$
(*e*) $\frac{2\cos^2 \alpha}{1+\cos 2\alpha}$

4.380. The maximum blade efficiency in a single stage impulse turbine is obtained when the ratio of blade speed to the entering steam speed is
(*a*) $\frac{\cos \alpha}{2}$ (*b*) $\frac{1}{2}\cos\frac{\alpha}{2}$
(*c*) $\cos \alpha$ (*d*) 0.5
(*e*) $\frac{1}{2}\cos^2 \alpha$.

4.381. In case of double flow type arrangement in steam turbines,
(*a*) the steam from one casing flows to other, the shafts of both being coupled in straight line
(*b*) the steam in any casing enters in the middle and flows in both the directions
(*c*) the steam from one casing flows to other, the shafts of both being in different planes
(*d*) the steam flows from high pressure casing to intermediate pressure casing and then to low pressure casing, the shafts of all the three being coupled in one straight line
(*e*) none of the above.

4.382. If heat drop in the moving blade be 3.5 kcal/kg and that in fixed blade be 6.5 kcak/kg, then the degree of reaction is equal to
(*a*) 35% (*b*) 65%
(*c*) 30% (*d*) 50%
(*e*) 100%.

4.383. Reheat factor is the ratio of the
(*a*) cumulative heat drop to adiabatic heat supplied
(*b*) adiabatic heat drop to heat supplied
(*c*) useful heat drop to adiabatic heat drop
(*d*) adiabatic heat drop to cumulative heat drop
(*e*) adiabatic heat drop to useful heat drop.

4.384. The value of reheat factor is of the order of
(*a*) 0.7 to 0.8 (*b*) 0.9 to 1.0
(*c*) 1.02 to 1.06 (*d*) 1.0 to 1.1
(*e*) 1.5 to 2.0.

4.385. Theoretically, maximum work is done by a steam jet impinging on a semi-circular bucket when the ratio of bucket speed to steam speed is
(*a*) unity (*b*) half
(*c*) one-fourth (*d*) zero
(*e*) no such correlation is possible.

4.386. Fig 4.1 shows a 3-stage turbine on enthapy-entropy diagram. First stage efficiency in Fig.4.1

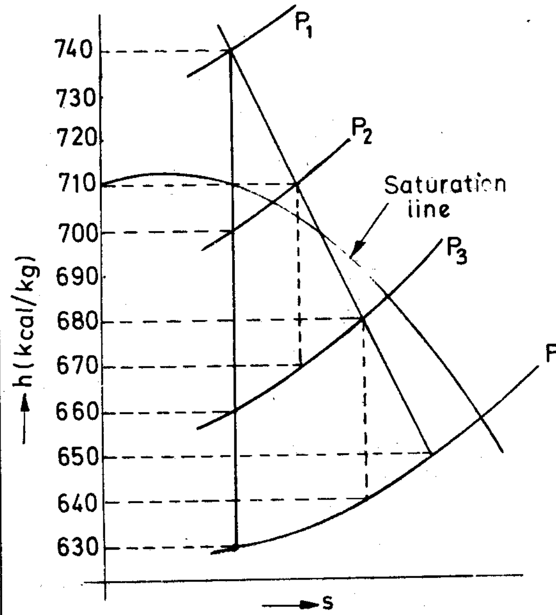

Fig. 4.1.

(*a*) 75% (*b*) 40%

(c) 60% (d) $66\frac{2}{3}\%$
(e) 80%.

4.387. Second stage efficiency in Fig. 4.1
(a) 40% (b) 56%
(c) $66\frac{2}{3}\%$ (d) 75%
(e) 72%.

4.388. Third stage efficiency in Fig. 4.1 is
(a) 50% (b) 60%
(c) 72% (d) 75%
(e) none of the above.

4.389. Reheat factor for the 3-stage turbine in Fig. 4.1 is
(a) 120/110 (b) 110/120
(c) 90/110 (d) 90/120
(e) 120/90.

4.390. Rankine cycle efficiency for turbine shown in Fig. 4.1 is
(a) 20% (b) 25%
(c) 50% (d) 80%
(e) can't be ditermined with data given in Fig. 4.1.

4.391. In case of triple-tandem compound arrangement in steam turbines
(a) the steam from one casing flows to other, the shafts of both being coupled in straight line
(b) the steam in any casing enters in the middle and flows in both the directions
(c) the steam from one casing flows to other, the shafts of both being in different planes
(d) the steam flows from high pressure casing to intermediate pressure casing and then to low pressure casing, the shafts of all the three being coupled in one straight line
(e) none of the above.

4.392. Which of the following governing method is not used for reaction turbines
(a) nozzle control governing
(b) throttle governing
(c) bypass governing
(d) throttle and bypass governing
(e) all of the above.

4.393. Turbines are usually designed for following %age of moisture content in the last stage
(a) completely saturated, *i.e.* no moisture
(b) 10-12% moisture
(c) 20% moisture
(d) 30% moisture
(e) 40% moisture.

4.394. Turbine is tripped when the
(a) pressure at inlet increases
(b) speed shoots up
(c) blades are eroded
(d) mass flow increases
(e) casing is very hot.

4.395. High moisture content (above 10-12%) in the last stage of turbine would lead to
(a) lower thermal efficiency
(b) corrosion
(c) badly erosion of blades
(d) can not occur
(e) better efficiency of condenser.

4.396. The length of blade keeps on increasing as steam flows from high pressure entrance side to condenser side because
(a) that arrangement provides good balancing
(b) for aesthetics
(c) it makes expansion easier
(d) large volumes of steam have to be handled at lower pressure
(e) none of the above.

4.397. Curtis turbine is basically a
(a) pressure compounded turbine
(b) veloctiy compounded turbine
(c) pressure velocity compounded turbine
(d) impulse-reaction turbine
(e) a hydraulic turbine.

4.398. The main advantage of the reaction turbine is that
(a) much lower blade speed can be obtained
(b) very high blade speed can be obtained
(c) huge amount of work can be obtained
(d) very high efficiency can be obtained
(e) expansion is possible in stages.

4.399. In pressure stage of steam turbines, the steam pressure
(a) remains constant while passing through moving blades
(b) varies while passing through moving blades
(c) is constant after leaving nozzles

(*d*) varies after leaving nozzles
(*e*) none of the above.

4.400. In velocity stage of steam turbines, the steam pressure
(*a*) remains constant while passing through moving blades
(*b*) veries while passing through blades
(*c*) is constant after leaving nozzles
(*d*) veries after leaving nozzles
(*e*) none of the above.

4.401. Rateau turbine is basically a
(*a*) pressure compounded turbine
(*b*) velocity compounded turbine
(*c*) pressure velocity compounded turbine
(*d*) impulse-reaction turbine
(e) a gas turbine.

4.402. In a condensing turbine, the pressure in last stage of turbine is
(*a*) equal to atmospheric
(*b*) less than atmospheric
(*c*) more than atmospheric
(*d*) may be less or more depending on size of turbine and condenser
(*e*) unpredictable.

4.403. In pressure compounded turbine
(*a*) pressure drop in each stage is equal
(*b*) pressure increases as steam flows over blades
(*c*) most of kinetic energy of steam is absorbed as it passes over moving blades
(*d*) pressure remains uniform throughout
(*e*) none of the above.

4.404. Parson's reaction turbine is basically a
(*a*) pressure compounded turbine
(*b*) velocity compounded turbine
(*c*) pressure velocity compounded turbine
(*d*) impulse-reaction turbine
(*e*) combined cycle turbine.

4.405. The purpose of a barring gear (or turning gear) with steam turbines is to
(*a*) rotate the rotor and allow uniform cooling on tripping of turbine, thus avoiding warping of rotor
(*b*) crank the turbine
(*c*) test the alignment
(*d*) stop the turbine
(*e*) reduce the vibrations.

4.406. The turbine is immediately tripped if vacuum in condenser drops because
(*a*) it lowers turbine efficiency
(*b*) temperature in last stage increases which may lead to undue expansion of blades leading to rubbing
(*c*) steam can't be dumped anywhere
(*d*) turbine balancing system is disturbed
(*e*) condenser will be damaged.

4.407. Which of the following does not represent internal loss in turbine
(*a*) nozzle losses
(*b*) gland leakage losses
(*c*) disc friction losses
(*d*) blade friction losses
(*e*) back pressure loss.

4.408. The purpose of an air ejector is to
(*a*) inject air in turbine for cooling purpose
(*b*) provide sealing
(*c*) remove noncondensable gases from condenser
(*d*) heat up the condensate
(*e*) increase turbine efficiency.

4.409. Air from condenser is removed from the coolest zone because
(*a*) the air removed form coolest zone will contain least water vapour
(*b*) air to be handled will be low
(*c*) air handling equipment can be inferior material
(*d*) air in condenser is actually removed from the hottest zone
(*e*) can be removed from anywhere.

4.410. Bleeding in turbines means
(*a*) leakage of steam
(*b*) steam doing no useful work
(*c*) extracted steam for pre-heating feed water
(*d*) removal of condensed steam
(*e*) exhausted steam in condenser.

4.411. The commonly used method of governing in steam turbines is by
(*a*) throttle governing
(*b*) nozzle control governing
(*c*) bypass governing
(*d*) hydraulic governing
(*e*) none of the above.

4.412. The actuating medium commonly used in governing system of steam turbines to control the final action is

(a) pneumatic (b) electrical
(c) hydraulic (d) power
(e) none of the above.

4.413. If main steam pressure and back pressure are maintained constant, then the rankine cycle efficiency with increase in main steam temperature will
(a) increase (b) decrease
(c) remain unaffected
(d) unpredictable
(e) depends on other factors.

4.414. Inspite of obtaining high rankine cycle efficiency with increase in temperature, the main steam temperature is fixed at 540° because
(a) it is not possible to produce higher temperature than this
(b) cycle efficiency actually drops above this temperature
(c) this is most commonly used temperature throughout the world
(d) of metallurgical limitations
(e) higher temperatures are not desirable from safety considerations.

4.415. For a given steam temperature of 850°C and vacuum of 0.1 kg/cm^2 absolute, the rankine cycle efficiency will be maximum when steam pressure is
(a) 100 kg/cm^2 (b) 200 kg/cm^2
(c) critical pressure (225.4 kg/cm^2)
(d) 250 kg/cm^2 (e) 350 kg/cm^2.

4.416. The difference between supersaturation temperature and the saturation temperature at the corresponding pressrue is known as
(a) degree of supersaturation
(b) degree of undercooling
(c) degree of supeheat
(d) degree of saturation
(e) none of the above.

4.417. Rankine cycle efficiency for fixed steam temperature of any value upto critical temperature will be maximum for steam pressure of
(a) 160 kg/cm^2 (b) critical pressure
(c) 250 kg/cm^2 (d) 400 kg/cm^2
(e) none of the above.

4.418. Generator in thermal power plants is cooled by
(a) hydrogen (b) water
(c) CO_2 (d) air
(e) any one of the above.

4.419. For modern power plant using reheating and regenerative cycles, the cycle efficiency can be equal to carnot cycle
(a) yes (b) no
(c) if super-critical pressure is used
(d) if working substance is suitably chosen
(e) if all losses can be taken care of.

4.420. Reheat cycle in steam power plant is used to
(a) prevent excess of 10-12% moisture content in last stages of turbine
(b) utilise heat of the flue gases
(c) increase plant efficiency
(d) enable two or more cylinders of turbine
(e) improve condenser performance.

4.421. The function of a condenser in thermal power plant is
(a) to act as reservior to receive steam for turbine
(b) to condense steam into condensate to be reused again
(c) to create vacuum
(d) all of the above
(e) none of the above.

4.422. The vacuum obtainable in a condenser is dependent upon
(a) capacity of ejector
(b) quantity of steam to be handled
(c) any of above two is possible
(d) temperature of coolintg water
(e) type of condenser used.

4.423. In surface condenser used in steam power plant
(a) water flows through tubes and steam is outside
(b) steam flows through tubes and water is outside
(c) any of above two is possible
(d) steam and water mix up
(e) none of the above.

4.424. The commonly used material of pipes in condensers is
(a) mild steel (b) stainless steel
(c) cast iron (d) admiralty brass
(e) aluminium.

4.425. For a convergent divergent nozzle, the mass flow rate remains constant if the ratio of exit and inlet pressures
(*a*) is less than critical pressure ratio
(*b*) is equal to the critical pressure ratio
(*c*) is more than critical pressure ratio
(*d*) is infinity (*e*) is unity.

4.426. The velocity of steam in a nozzle can be increased above sonic velocity by expanding steam below critical pressure by using
(*a*) parallel section
(*b*) tapered section
(*c*) abruptly changing cross section
(*d*) divergent portion
(*e*) ring diffusers.

4.427. The maximum velocity attainable at the throat of a steam nozzle is
(*a*) much less than sonic velocity
(*b*) slightly less than sonic velocity
(*c*) sonic velocity
(*d*) slightly more than sonic velocity
(*e*) supersonic velocity.

4.428. In convergent nozzle, velocity attained is
(*a*) velocity of sound
(*b*) supersonic velocity
(*c*) around 500 m/sec
(*d*) 1000 m/sec
(*e*) none of the above.

4.429. For a convergent divergent nozzle, critical pressure ratio occurs when
(*a*) velocity at exit becomes sonic
(*b*) shock wave occurs
(*c*) nozzle efficiency is maximum
(*d*) increase in exit and inlet pressure ratio does not increase steam flow rate
(*e*) none of the above.

4.430. If a flow is to be continuously accelerated from a subsosnic to a supersonic velocity in nozzle, it must
(*a*) be convergent (*b*) be divergent
(*c*) have throat
(*d*) have first divergent section and then convergent section
(*e*) none of the above.

4.431. Velocity of steam at any section in the nozzle (neglecting friction is)
(*a*) $91.5\sqrt{U}$ (*b*) $\sqrt{91.5U}$
(*c*) $\sqrt{91.5}\,U$ (*d*) $\frac{91.5}{\sqrt{U}}$
(*e*) $\frac{\sqrt{U}}{91.5}$
where U = heat drop during expansion.

4.432. Critical pressure ratio (ratio of upstream to down-stream pressure) for a convergent nozzle is corresponding to the condition when the
(*a*) velocity of steam reaches sonic velocity
(*b*) after which the increase in ratio of upstream to down-stream pressure does not increase the flow
(*c*) friction is minimum
(*d*) material of nozzle is in danger
(*e*) steam pressure is critical.

4.433. Critical pressure ratio for a nozzle is represented by relation
(*a*) $\left(\frac{2}{n+1}\right)^{n/n-1}$ (*b*) $\left(\frac{n}{n-1}\right)^{2/n+1}$
(*c*) $\left(\frac{1}{n+1}\right)^{2/n+1}$ (*d*) $\left(\frac{2}{n+1}\right)^{n-1/n}$
(*e*) none of the above.

4.434. The value of critical pressure ratio for superheated steam is
(*a*) 0.5 (*b*) 0.546
(*c*) 0.454 (*d*) 0.64
(*e*) 0.64.

4.435. The value of critical pressure into for initially wet steam is
(*a*) 0.546 (*b*) 0.5
(*c*) 0.554 (*d*) 0.64
(*e*) 0.582.

4.436. The critical pressure ratio for initially dry saturated steam is
(*a*) 0.546 (*b*) 0.577
(*c*) 0.582 (*d*) 0.555
(*e*) 0.64.

4.437. For critical pressure ratio, the discharge through a nozzle is
(*a*) maximum (*b*) minimum
(*c*) zero
(*d*) some value between maximum and minimum
(*e*) unpredictable.

4.438. Superheated steam at pressure of 100 kg/cm^2 is passed through a covergent-divergent nozzle. If critical pressure ratio

is 0.55, then at which exit pressure the staem mass flow rate will remain fixed
(*a*) 20 kg/cm^2 (*b*) 50 kg/cm^2
(*c*) 70 kg/cm^2 (*d*) all of the above
(*e*) none of the above.

4.439. If enthalpy drop in a steam nozzle be 100 kcal/kg, then velocity at outlet of nozzle under ideal conditions can be
(*a*) sonic velocity
(*b*) 519 m/sec (*c*) 159 m/sec
(*d*) 195 m/sec (*e*) 915 m/sec.

4.440. For a convergent nozzle the inlet steam pressure is kept constant at 100 kg/cm^2 and the exit pressure is changed and various curves (pressure profiles) are shown in Fig. 4.2. If exit pressure is same as critical pressure then following curve will hold good

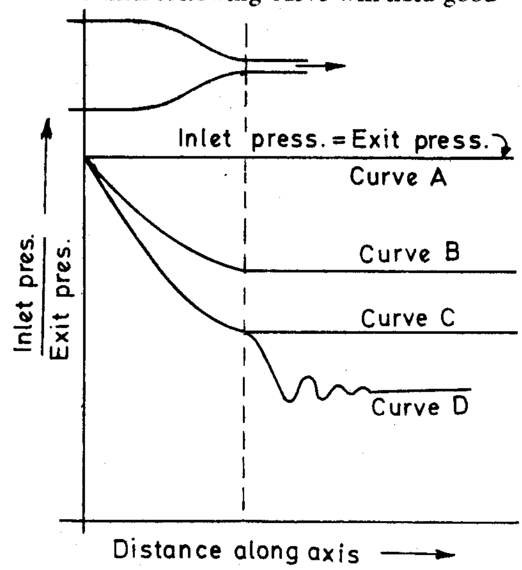

Fig. 4.2.

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.441. If in Prob. 4.440, the exit pressure is made less than critical pressure, then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.442. If in Prob. 4.440 the exit pressure is made more than critical pressure, then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.443. Which of the following devices uses Wilson's line in determining flow through it
(*a*) steam engine (*b*) steam nozzle
(*c*) reaction turbine
(*d*) impulse turbine
(*e*) gas turbine.

4.444. The effect of friction in nozzle is to
(*a*) keep dryness fraction constant
(*b*) increase dryness fraction
(*c*) decrease dryness fraction
(*d*) first increase dryness fraction upto certain limit and then decrease it
(*e*) there is no such criterion.

4.445. Mack number is more than unity in the following portion of a convergent divergent nozzle
(*a*) convergent portion
(*b*) straight portion
(*c*) throat
(*d*) divergent portion
(*e*) none of the above.

4.446. The density of supersaturated steam in comparison to ordinary saturated steam at the corresponding pressure is about
(*a*) 0.125 times (*b*) 0.5 times
(*c*) 1 times (*d*) 4 times
(*e*) 8 times.

4.447. For a convergent-divergent nozzle the inlet steam pressure is kept fixed at 100 kg/cm^2 and it is designed for exit pressure of 20 kg/cm^2. If exit pressure is varied, then various curves (pressure profiles) between $\frac{\text{inlet pressure}}{\text{exit pressure}}$ *versus* the distance along the axis of nozzle are plotted in Fig. 4.3

If exit pressure is made equal to critical pressure then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) curve *E*.

4.448. If in Prob. 4.447, the exit pressure is reduced considerably below critical pressure, say at design pressure of 20 kg/cm^2, then following curve will hold good

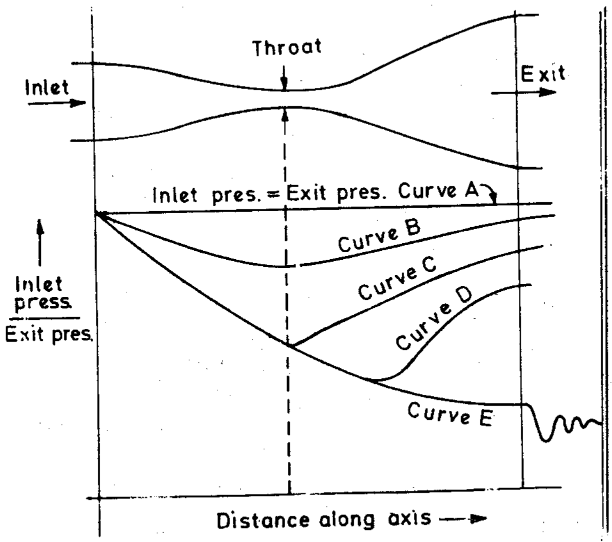

Fig. 4.3.

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) curve *E*.

4.449. If in prob. 4.447, the exit pressure is above the critical pressure, say 65 kg/cm^2, then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) curve *E*.

4.450. If in Prob. 4.447, the exit pressure is below critical pressure and above design exit pressure then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) curve *E*.

4.451. Under thermal equilibrium, flow of steam is
(*a*) isentropic (*b*) adiabatic
(*c*) hyperbolic (*d*) polytropic
(*e*) parabolic.

4.452. Nozzle efficiency is described as
(*a*) $\frac{\text{isentropic heat drop}}{\text{useful heat drop}}$
(*b*) $\frac{\text{useful heat drop}}{\text{isentropic heat drop}}$
(*c*) $\frac{\text{saturation temperature}}{\text{supersaturation temperature}}$
(*d*) $\frac{\text{supersaturation temperature}}{\text{saturation temperature}}$
(*e*) $\frac{\left(\text{pressure corresponding to saturation temperature}\right)}{\left(\text{pressure corresponding to supersaturation temperature}\right)}$

4.453. For a steam nozzle having throat area A; initial pressure *p*, and initial specific volume *v*, maximum discharge is given by
(*a*) $CA\sqrt{p/v}$ (*b*) $CA\,(p/v)^{1/3}$
(*c*) $CA\,(p/v)^2$ (*d*) $CA\,(p/v)^{3/2}$
(*e*) $CA\sqrt{v/p}$.

4.454. For a convergent-divergent nozzle designed for inlet steam pressure of 150 kg/cm^2 and exit pressure of 30 kg/cm^2, the various velocity distribution diagrams for different conditions of exit pressure are shown in Fig. 4.4.

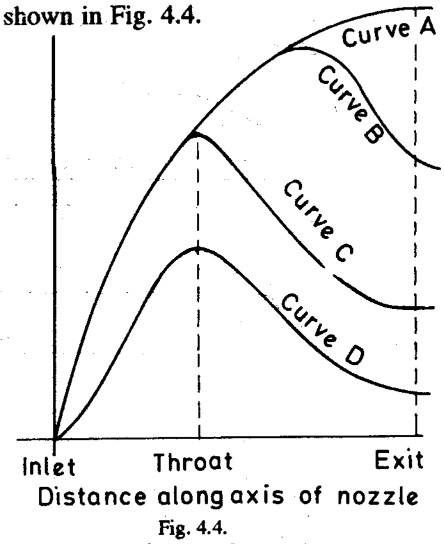

Fig. 4.4.

If exit pressure is same as design pressure of 30 kg/cm^2 then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.455. If in Prob. 4.454, the exit pressure is below critical pressure, say 50 kg/cm^2, then following curve will hold good
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.456. If in Prob, 4.454, the exit pressure is maintained above critical pressure, say 100 kg/cm^2, then following curve will hold good

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

4.457. If the cross-section of a nozzle is increasing in the direction of flow in supersonic flow, then in the downward dierction
(*a*) pressure will decrease and velocity will increase
(*b*) velocity will decrease and pressure will increase
(*c*) both pressure and velocity will increase
(*d*) both pressure and velocity will deerease
(*e*) pressure will remain constant and velocity will increase.

4.458. The flow of steam in a nozzle is subsonic at
(*a*) throat (*b*) entrance
(*c*) convergent portion
(*d*) divergent portion
(*e*) convergent divergent portion.

4.459. If the cross-section of a nozzle is decreasing in the direction of flow in sub-sonic flow, then in the downward direction
(*a*) pressure will decrease and velocity increase
(*b*) velocity will decrease and pressure increse
(*c*) both pressure and velocity increase
(*d*) both pressure and velocity decrease
(*e*) pressure will remain constant and velocity will increase.

4.460. A nozzle is said to be choked when
(*a*) flow through it is zero
(*b*) flow is attained at maximum value corresponding to critical exit pressure
(*c*) it is not possible to increase the flow by increasing inlet pressure
(*d*) it is discharging into atmosphere
(*e*) it is plugged.

4.461. The supersaturation of steam results in slight
(*a*) increase in entropy
(*b*) increase of final dryness fraction
(*c*) increase of discharge
(*d*) increase of density
(*e*) all of the above.

4.462. Shock effect in a nozzle is felt in
(*a*) divergent portion
(*b*) straight portion
(*c*) convergent portion
(*d*) throat
(*e*) none of the above.

5

Compressors, Gas Turbines and Jet Engines

5.1. Free air is the air at
(*a*) atmospheric conditions at any specific location
(*b*) 20°C and 1 kg/cm^2 and relative humidity of 36%
(*c*) 0°C and standard atmospheric conditions
(*d*) 15°C and 1 kg/cm^2
(*e*) 25°C, 1 kg/cm^2 and relative humidity of 50%.

5.2. Standard air is the air at
(*a*) atmospheric conditions at any specific location
(*b*) 20°C and 1 kg/cm^2 and relative humidity 36%
(*c*) 0°C and standard atmospheric conditions
(*d*) 15°C and 1 kg/cm^2
(*e*) 25°C, 1 kg/cm^2 and RH of 60%.

5.3. 1 m^3 of air at atmospheric condition weighs approximately
(*a*) 0.5 kg (*b*) 1.0 kg
(*c*) 1.3 kg (*d*) 2.2 kg
(*e*) 3.2 kg.

5.4. Adiabatic compression is one in which
(*a*) temperature during compression remains constant
(*b*) no heat leaves or enters the compressor cylinder during compression
(*c*) temperature rise follows a linear relationship
(*d*) work done is maximum
(*e*) entropy decreases.

5.5. The capacity of a compressor is 5 m^3/min. 5 m^3/min refers to
(*a*) standard air (*b*) free air
(*c*) compressed air
(*d*) compressed air at delivery pressure
(*e*) air sucked.

5.6. The overall isothermal eiffciency of compressor is defined as the ratio of
(*a*) isothermal h.p. to the BHP of motor
(*b*) isothermal h.p. to adiabatic h.p.
(*c*) power to drive compressor to isothermal h.p.
(*d*) work to compress air isothermally to work for actual compression
(*e*) isothermal work to ideal work.

5.7. The most efficient method of compressing air is to compress it
(*a*) isothermally (*b*) adiabatically
(*c*) isentropically (*d*) isochronically
(*e*) as per law $pV^n = C$.

5.8. Maximum work is done in compressing air when the compression is
(*a*) isothermal (*b*) adiabatic
(*c*) polytropic
(*d*) any one of the above
(*e*) none of the above.

5.9. The pressure and temperature conditions of air at the suction of compressor are
(*a*) atmospheric
(*b*) slightly more than atmospheric
(*c*) slightly less than atmospheric
(*d*) pressure slightly more than atmospheric and temperature slightly less than atmospheric
(*e*) pressure slightly less than atmospheric and temperature slightly more than atmospheric.

5.10. Isothermal compression effeicency can be attained by running the compressor
(*a*) at very high speed
(*b*) at very slow speed
(*c*) at average speed
(*d*) at zero speed (*e*) isothermally.

5.11. The compressor capacity with decrease in suction temperature
(*a*) increases (*b*) decreases
(*c*) remains unaffected
(*d*) may increase or decrease depending on compressor capacity
(*e*) increases upto certain limit and then decreases.

5.12. Isothermal compression efficiency, even when running at high speed, can be approached by using
(*a*) multi-stage compression
(*b*) cold water spray
(*c*) both (*a*) and (*b*) above
(*d*) fully insulating the cylinder
(*e*) high stroke.

5.13. Compression efficiency is compared against
(*a*) ideal compression
(*b*) adiabatic compression
(*c*) both isothermal and adiabatic compression
(*d*) isentropic compression
(*e*) isothermal compression.

5.14. Aeroplanes employ following type of compressor
(*a*) radial flow (*b*) axial flow
(*c*) centrifugal
(*d*) combination of above
(*e*) none of the above.

5.15. Inter cooling in compressors
(*a*) cools the delivered air
(*b*) results in saving of power in compressing a given volume to given pressure
(*c*) is the standard practice for big compressors
(*d*) enables compression in two stages
(*e*) prevents compressor jacket running very hot.

5.16. An ideal air compressor cycle without clearance on *p-v* diagram can be represented by following processes
(*a*) one adiabatic, two isobaric, and one constant volume
(*b*) two adiabatic and two isobaric
(*c*) two adiabatic, one isobaric and one constant volume
(*d*) one adiabatic, one isobaric and two constant volume
(*e*) two isobaric, two adiabatic and one constant volume.

5.17. An ideal air compressor cycle with clearance on *p-v* diagram can be represented by following processes
(*a*) one adiabatic, two isobaric, and one constant volume
(*b*) two adiabatic and two isobaric
(*c*) two adiabatic, one isobaric and one constant volume
(*d*) one adiabatic, one isobaric and two constant volume
(*e*) two isobaric, two adiabatic and one constant volume.

5.18. What will be the volume of air at 327°C if its volume at 27°C is 1.5 m^3/mt
(*a*) 3 m^3/mt (*b*) 1.5 m^3/mt
(*c*) 18 m^3/mt (*d*) 6 m^3/mt
(*e*) 0.75 m^3/mt.

5.19. The work done per unit mass of air in compression will be least when n is equal to
(*a*) 1 (*b*) 1.2
(*c*) 1.3 (*d*) 1.4
(*e*) 1.5.

5.20. Isothermal compression though most efficient, but is not practicable because
(*a*) it requires very big cylinder
(*b*) it does not increase pressure much
(*c*) it is impossible in practice
(*d*) compressor has to run at very slow speed to achieve it
(*e*) it requires cylinder to be placed in water.

5.21. Ratio of indicated H.P. and brake H.P. is known as
(*a*) mechanical efficiency
(*b*) volumetric efficiency
(*c*) isothermal efficiency
(*d*) adiabatic efficiency
(*e*) relative efficiency.

5.22. The ratio of work doen per cycle to the swept volume in case of compressor is called
(*a*) compression index

(b) compression ratio
(c) compressor efficiency
(d) mean effective pressure
(e) compressor effectiveness.

5.23. Cylinder clearance in a compressor should be
(a) as large as possible
(b) as small as possible
(c) about 50% of swept volume
(d) about 100% of swept volume
(e) none of the above.

5.24. Ratio of compression is the ratio of
(a) gauge discharge pressure to the gauge intake pressure
(b) absolute discharge pressure to the absolute intake pressure
(c) pressures at discharge and suction corresponding to same temperature
(d) stroke volume and clearance volume
(e) none of the above.

5.25. Clearance volume in actual reciprocating compressors is essential
(a) to accommedate valves in the cylinder head
(b) to provide cushioning effect
(c) to attain high volumetric efficiency
(d) to avoid mechanical bang of piston with cylinder head
(e) to provide cushioning effect and also to avoid mechanical bang of piston with cylinder head.

5.26. The net work input required for compressor with increase in clearance volume
(a) increases (b) decreases
(c) remains same
(d) increases/decreases depending on compressor capacity
(e) unpredictable.

5.27. Ratio of indicated h.p. to shaft h.p. in known as
(a) compressor efficiency
(b) isothermal efficiency
(c) volumetric efficiency
(d) mechanical efficiency
(e) adiabatic efficiency.

5.28. Volumetric efficiency is
(a) the ratio of stroke volume to clearance volume
(b) the ratio of the air actually delivered to the amount of piston displacement
(c) reciprocal of compression ratio
(d) index of compressor preformance
(e) proportional to compression ratio.

5.29. Volumetric efficiency of air compressors is of the order of
(a) 20–30% (b) 40–50%
(c) 60–70% (d) 70–90%
(e) 90–100%.

5.30. Volumetric efficiency of a compressor with clearance vloume
(a) increases with increase in compression ratio
(b) decreases with increase in compression ratio
(c) in not dependent upon compression ratio
(d) may increase/decrease depending on compressor capacity
(e) unpredictable.

5.31. Volumetric efficiency of a compressor without clearance volume
(a) increases with increase in compression ratio
(b) decreases with increase in compression ratio
(c) is not dependent upon compressin ratio
(d) may increase/decrease depending on compressor capacity
(e) unpredictable.

5.32. The clearance volume of the air compressor is kept minimum because
(a) it allows maximum compression to be achieved
(b) it greatly affects volumetric efficiency
(c) it results in minimum work
(d) it permits isothermal compression
(e) none of the above.

5.33. Euler's equation is applicable for
(a) centrifugal compressor
(b) axial compressor
(c) pumps
(d) all of the above
(e) none of the above.

5.34. Shaft work of compressor is given by
(a) $\frac{n}{n-1} RT_1 \left(\frac{T_2}{T_1} - 1\right)$
(b) $\frac{n}{n-1} (p_1 v_1 - p_2 v_2)$

(c) $\frac{n}{n-1} RT_1 \left[\left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}} - 1\right]$
(d) all of the above
(e) none of the above.

5.35. The expression of shaft work of compressor $\frac{n}{n-1} R(T_2 - T_1)$ is applicable for
(a) air at any pressure and temperature
(b) O_2, NH_3 etc.
(c) ideal gas (d) gas and vapour
(e) all of the above.

5.36. Separators are generally installed in compressors
(a) after the intercooler
(b) before the intercooler
(c) before the receiver
(d) after the aftercooler
(e) before first stage suction.

5.37. Compressor work for a multistage compressor with prefect intercooling will be equal to

(a) $p_1v_1 \frac{n}{n-1}\left[\left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}} + \left(\frac{p_3}{p_2}\right)^{\frac{n-1}{n}} - 2\right]$

(b) $\frac{n\,(p_1v_1 + p_2v_2)}{n-1}$

(c) $\frac{n}{n-1} RT_1 \left[\left(\frac{p_3}{p_2}\right)^{\frac{n-1}{n}} + \left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}}\right]$

(d) $\frac{n}{n-1}\left[p_1v_1\left\{\left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}} - 1\right\} + p_2v_2\left\{\left(\frac{p_3}{p_1}\right)^{\frac{n-1}{n}} - 1\right\}\right]$

(e) none of the above.

5.38. Optimum intermediate pressure in two stage compressor is
(a) average of suction and delivery
(b) 50% of defference of two
(c) geometric mean of two
(d) one fourth of sum of suction and delivery
(e) none of the above.

5.39. If k is the clearance factor for a compressor, its volumetric efficiency is equal to

(a) $1 + k - k\left(\frac{p_2}{p_1}\right)^{1/n}$

(b) $1 + k - k\left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}}$

(c) $1 + k - k\left(\frac{p_2}{p_1}\right)^{\frac{1}{n-1}}$

(d) $1 + k - k\left(\frac{v_2}{v_1}\right)^{1/n}$

(e) $1 + k$.

5.40. Out of the following, from where you will prefer to take intake for air compressor
(a) from an air conditioned room maintained at 20°C
(b) from outside atmosphere at 1°C
(c) from coal yard side
(d) from a side where cooling tower is located nearby
(e) from any one of the above locations.

5.41. Mining industry usually employs following motive power
(a) A.C. electric motor
(b) compressed air
(c) petrol engine
(d) diesel engine
(e) D.C. electric motor.

5.42. Which is false statement about air receivers
(a) These are used to dampen pulsations
(b) These act as reservoir to take care of sudden demands
(c) These increase compressor efficiency
(d) These knock out some oil and moisture
(e) These reduce frequent on/off operation of compressors.

5.43. For maximum efficiency in multi-stage compressor
(a) air should be cooled to initial temperature between the stages.
(b) pressure ratio for each stage should be same
(c) work done for each stage should be same

(*d*) all of the above
(*e*) none of the above.

5.44. An air receiver is to be placed outside. Should it be placed in
(*a*) sun (*b*) shade
(*c*) rain (*d*) enclosed room
(*e*) anywhere.

5.45. Which is false statement about multistage compression
(*a*) Power consumption per unit of air delivered is low
(*b*) Volumetric efficiency is high
(*c*) It is best suited for compression ratios around 7:1
(*d*) The moisture in air is condensed in the intercooler
(*e*) Outlet temperature is reduced.

5.46. In multistage compressor, the isothermal compression is achieved by
(*a*) employing intercooler
(*b*) by constantly cooling the cylinder
(*c*) by running compressor at very slow speed
(*d*) by insulating the cylinder
(*e*) none of the above.

5.47. Reciprocating air compressor is best suited for
(*a*) large quantity of air at high pressure
(*b*) small quantity of air at high pressure
(*c*) small quantity of air at low pressure
(*d*) large quantity of air at low pressure
(*e*) any one of the above.

5.48. Rotary compressor is best suited for
(*a*) large quantity of air at high pressure
(*b*) small quantity of air at high pressure
(*c*) small quantity of air at low pressure
(*d*) large quantity of air at low pressure
(*e*) any one of the above.

5.49. The capacity of compressor will be highest when its intake temperature is
(*a*) lowest (*b*) highest
(*c*) anything. (*d*) atmospheric
(*e*) none of the above.

5.50. After-cooler is used to
(*a*) cool the air
(*b*) decrease the delivery temperature for ease in handling
(*c*) cause moisture and oil vapour to drop out
(*d*) reduce volume
(*e*) increase pressure.

5.51. To aviod moisture troubles, the compressed air main line should
(*a*) rise gradually towards the point of use
(*b*) drop gradually towards the point of use
(*c*) be laid vertically
(*d*) be laid exactly horizontally
(*e*) none of the above

5.52. Separators in compressor installations are located
(*a*) before intercooler
(*b*) after intercooler
(*c*) after receiver
(*d*) between after-cooler and air receiver
(*e*) before suction.

5.53. The area of actual indicator diagram on an air compressor as compared to area of ideal indicator diagram is
(*a*) less (*b*) more
(*c*) same
(*d*) more/less depending on compressor capacity
(*e*) unpredictable.

5.54. An air compressor may be controlled by
(*a*) throttle control (*b*) clearance control
(*c*) blow-off control
(*d*) any one of the above
(*e*) none of the above.

5.55. The compressor efficiecny is the
(*a*) isothermal H.P/indicated H.P.
(*b*) isothermal H.P./shaft H.P.
(*c*) total output/air input
(*d*) compression work/motor input
(*e*) none of the above.

5.56. To avoid moisture troubles, the branch connections from compressed air lines should be taken from
(*a*) top side of main
(*b*) bottom side of main
(*c*) left side of main
(*d*) right side of main
(*e*) any location.

5.57. The thrust on the rotor in a centrifugal compressor is produced by
(*a*) radial component
(*b*) axial component
(*c*) tangential component
(*d*) resultant component

(*e*) all of the above.

5.58. The compressor performance at higher altitude compared to sea level will be
(*a*) same (*b*) higher
(*c*) lower
(*d*) dependent on other factors
(*e*) none of the above.

5.59. A compressor at high altitude will draw
(*a*) more power (*b*) less power
(*c*) same power
(*d*) more/less power depending on other factors
(*e*) none of the above.

5.60. During peak load periods, the best method of controlling compressors is
(*a*) start-stop motor
(*b*) constant speed unloader
(*c*) relief valve (*d*) variable speed
(*e*) none of the above.

5.61. A centrifugal compressor works on the principle of
(*a*) conversion of pressure energy into kinetic energy
(*b*) conversion of kinetic energy into pressure energy
(*c*) centripetal action
(*d*) generating pressure directly
(*e*) combination of (*a*) and (*d*).

5.62. For a compressor, least work will be done if the compression is
(*a*) isentropic
(*b*) isothermal (*c*) polytropic
(*d*) somewhere in between isentropic and isothermal
(*e*) none of the above.

5.63. Degree of reaction of the turbo compressor is defined as
(*a*) $\dfrac{\text{enthalpy increase in rotor}}{\text{enthalpy increase of the stage}}$
(*b*) $\dfrac{\text{enthalpy increase of the stage}}{\text{enthalpy increse in rotor}}$
(*c*) $\dfrac{\text{enthalpy drop of the stage}}{\text{enthalpy drop in rotor}}$
(*d*) $\dfrac{\text{enthalpy drop in rotor}}{\text{enthalpy drop of the stage}}$
(*e*) there is nothing like degree of reaction of a turbo-compressor.

5.64. Best intercooler pressure p_2 for minimum work in compressor operating between limits p_1 and p_3 is given by
(*a*) $p_2 = \dfrac{p_1 + p_3}{2}$ (*b*) $p_2 = \sqrt{p_1 p_3}$
(*c*) $\dfrac{1}{p_2} = \dfrac{1}{p_1} + \dfrac{1}{p_3}$ (*d*) $p_2 = \dfrac{p_1 - p_3}{2}$
(*e*) none of the above.

5.65. The ratio of diameters of l.p. cylinder to h.p. cylinder with complete intercooling is equal to
(*a*) $\dfrac{p_1}{p_2}$ (*b*) $\dfrac{p_2}{p_1}$
(*c*) $\sqrt{\dfrac{p_2}{p_1}}$ (*d*) $\sqrt{\dfrac{p_1}{p_2}}$
(*e*) $\left(\dfrac{p_2}{p_1}\right)^2$

5.66. High capacity reciprocating compressor is one whose output is more than
(*a*) 1 m^3/sec (*b*) 5 m^3/sec
(*c*) 10 m^3/sec (*d*) 14 m^3/sec
(*e*) 100 m^3/sec.

5.67. In a compressor, free air delivered is the actual volume delivered at the stated pressure reduced to
(*a*) N.T.P. conditions
(*b*) intake temperature and pressure conditions
(*c*) 0°C and 1 kg/cm^2
(*d*) 20°C and 1 kg/cm^2
(*e*) none of the above.

5.68. The volumetirc efficiency of a compressor is calculated on the basis of
(*a*) volume of air inhaled at working conditions
(*b*) volume of air inhaled at N.T.P. conditions
(*c*) volume at 0°C and 1 kg/cm^2
(*d*) volume at 20°C and 1 kg/cm^2
(*e*) none of the above.

5.69. The volumetric efficiency of a compressor falls roughly as follows for every 100 m increase in elevation
(*a*) 0.1% (*b*) 0.5%
(*c*) 1.0% (*d*) 5%
(*e*) 10%.

5.70. For slow-speed large capacity compressor, following type of valve will be best suited
(*a*) poppet valve
(*b*) mechanical valve of the corliss, sleeve, rotary or semirotary type
(*c*) disc or feather type(*d*) any of the above
(*e*) none of the above.

5.71. During base load operation, the best method of controlling compressor is
(*a*) start-stop motor
(*b*) constant speed unloader
(*c*) relief valve (*d*) variable speed
(*e*) none of the above.

5.72. More than one stage will be preferred for reciprocating compressor if the delivery pressure is more than
(*a*) 2 kg/cm^2 (*b*) 5.6 kg/cm^2
(*c*) 10 kg/cm^2 (*d*) 14.7 kg/cm^2
(*e*) none of the above.

5.73. The advantage of multistage compression over single stage compression is
(*a*) lower power consumption per unit of air delivered
(*b*) higher volumetric efficiency
(*c*) decreased discharge temperature
(*d*) moisture free air(*e*)all of the above.

5.74. Pick up the wrong statement about advantages of multistage compression
(*a*) better lubrication is possible advantages of multistage
(*b*) more loss of air due to leakage past the cylinder
(*c*) mechanical balance is better
(*d*) air can be cooled perfectly in between
(*e*) more uniform torque, light cylinder and saving in work.

5.75. As the value of index '*n*' is decreased, the volumetric efficiency will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) may increase/decrease depending on compressor clearance
(*e*) none of the above.

5.76. The ratio of outlet whirl velocity to blade velocity in case of centrifugal compressor is called
(*a*) slip factor (*b*) velocity factor
(*c*) velocity coefficient
(*d*) blade effectiveness
(*e*) degree of reaction.

5.77. Which curve in Fig. 5.1 represents actual curve between BHP versus intake pressure for a compressor
(*a*) curve A (*b*) curve B
(*c*) curve C (*d*) curve D
(*e*) curve E.

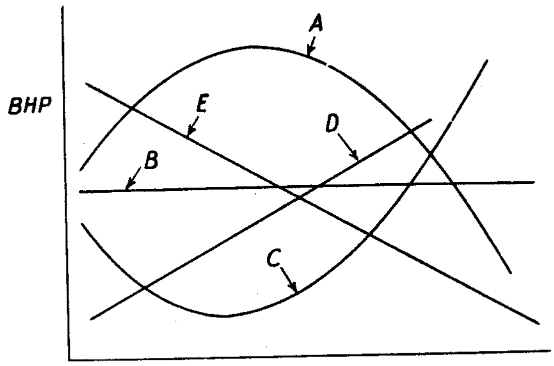

Fig. 5.1.

5.78. For high-pressure compressors, following type of valve will be best suited
(*a*) poppet valve
(*b*) mechanical valve of the corliss, sleeve, rotary or semirotary type
(*c*) disr or feather type (*d*)any of the above
(*e*) none of the above.

5.79. Losses in a centrifugal compressor are due to
(*a*) inlet losses
(*b*) impeller channel losses
(*c*) diffuser losses (*d*) all of the above
(*e*) none of the above

5.80. The volumetric efficiency of a compressor falls roughly as follows for every 5°C increase in atmospheric temperature
(*a*) 0.1% (*b*) 0.5%
(*c*) 1% (*d*) 5%
(*e*) 10%.

5.81. The indicated work per unit mass of air delivered is
(*a*) directly proportional to clearance volume
(*b*) greatly affected by clearance volume
(*c*) not affected by clearance volume
(*d*) inversely proportional to clearance volume

(e) none of the above.

5.82. An increase in speed of centrifugal compressor for a given pressure ratio would result in
(a) increase of flow and increase in efficiency (η)
(b) decrease fo flow and increase in η
(c) increase of flow and decrease in η
(d) decrease of flow and decrease in η
(e) none of the above.

5.83. The indicator diagram shown in Fig. 5.2 obtained on a compressor shows that
(a) suction valve or piston rings, or both are leaking
(b) discharge valve is leaking into cylinder during compression stroke
(c) slow opening suction valve
(d) suction valve sticking open at beginning of compression stroke
(e) suction is depressed by friction in valves.

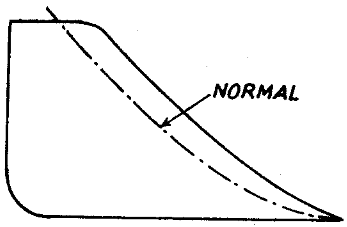

Fig., 5.2.

5.84. The indicator diagram shown in Fig. 5.3 obtained on a compressor shows that
(a) suction valve or piston rings, or both are leaking
(b) discharge valve is leaking into cylinder during compression stroke
(c) slow opening suction valve
(d) suction valve sticking open at beginning of compression stroke
(e) suction is depressed by friction in valve.

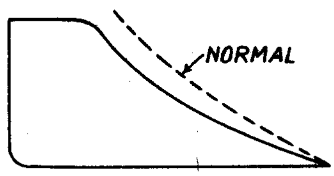

Fig., 5.3.

5.85. Optimum performance of axial flow compressor is obtained at
(a) low speed and high flow
(b) low speed and low flow
(c) high speed and low flow
(d) high speed and high flow
(e) none of the above.

5.86. The indicator diagram shown in Fig. 5.4 obtained on a compressor shows that
(a) suction valve or piston rings, or both are leaking
(b) discharge valve is leaking into cylinder during compression stroke
(c) slow opening suction valve
(d) suction valve sticking open at beginning of compression stroke
(e) suction is depressed by friction in valve.

Fig. 5.4.

5.87. The indicator diagram shown in Fig. 5.5 obtained on a compressor shows that
(a) suction valve or piston rings, or both are leaking
(b) discharge valve is leaking into cylinder during compression stroke
(c) slow opening suction valve
(d) suction valve sticking open at beginning of compression stroke
(e) suction is depressed by friction in valve.

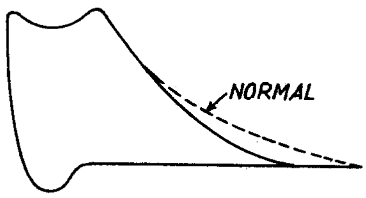

Fig. 5.5.

5.88. For high speed compressors, following type of valve will be best suited
(a) poppet valve

(*b*) mechanical valve of the corliss, sleeve, rotary or semirotary type
(*c*) disc or feather type
(*d*) any of the above
(*e*) none of the above.

5.89. For actual single stage centrifugal compressor, the maximum pressure ratio is of the order of
(*a*) 1 : 1.2 (*b*) 1 : 2
(*c*) 1 : 4 (*d*) 1 : 10
(*e*) 1 : 15.

5.90. Which is false statement about advantages of multistage compressor in comparison to single stage compressor
(*a*) less power requirement
(*b*) better mechanical balance
(*c*) less loss of air due to leakage past the cylinder
(*d*) more effective lubrication
(*e*) lower volumetric efficiency.

5.91. The ratio of isentropic work to Euler work is known as
(*a*) pressure coefficient
(*b*) work coefficient
(*c*) polytropic reaction
(*d*) slip factor
(*e*) compressor efficiency.

5.92. The criterion of the thermodynamic efficiency for rotary compressor is
(*a*) isentropic compression
(*b*) isothermal compression
(*c*) polytropic compression
(*d*) any one of the above
(*e*) none of the above.

5.93. For supplying intermittent small quantity of air at high pressure, following compressor is best suited
(*a*) centrifugal (*b*) reciprocating
(*c*) axial (*d*) screw
(*e*) turbo jet.

5.94. For minimum work in multistage compression, assuming same index of compression in all stages
(*a*) work done in first stage should be more
(*b*) work done in subsequent stages should increase
(*c*) work done in subsequent stages should decrease
(*d*) work done in all stages should be equal
(*e*) work done in any stage is no criterion for minimum work but depends on other factors.

5.95. For a two stage compressor, if index of compression for higher stage is greater than index of compression for lower stage, then the optimum pressure as compared to ideal case will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) other factors control it
(*e*) unpredictable.

5.96. Diffuser in a compressor is used to
(*a*) increase velocity
(*b*) make the flow stream-line
(*c*) convert pressure energy into kinetic energy
(*d*) convert kinetic energy into pressure energy
(*e*) increase degree of reaction.

5.97. If n_1 and n_2 are the indices of compression for first and second stage of compression then load shared in two stages (as ratio of 1st stage to 2nd stage) with perfect intercooling will be expressed as
(*a*) $\frac{n_1}{n_2}$ (*b*) $\frac{n_2}{n_1}$
(*c*) $\frac{n_2(n_1-1)}{n_1(n_2-1)}$ (*d*) $\frac{n_1(n_2-n_1)}{n_2(n_1-1)}$
(*e*) none of the above.

5.98. The ratio of isentropic work to euler's work is known as
(*a*) compressor efficiency
(*b*) isentropic efficiency
(*c*) Euler's efficiency
(*d*) pressure coefficient
(*e*) pressure ratio.

5.99. The thermodynamic efficiency of rotary compressor is based on
(*a*) isothermal compression
(*b*) adiabatic compression
(*c*) isentropic compression
(*d*) polytropic compression
(*e*) none of the above.

5.100. Phenomenon of choking in compressor means
(*a*) no flow of air

(*b*) fixed mass flow rate regardless of pressure ratio
(*c*) reducing mass flow rate with increase in pressure ratio
(*d*) increased inclination of chord with air steam
(*e*) does not occur.

5.101. The maximum compression ratio in an actual single stage axial flow comperssor is of the order of
(*a*) 1 : 1.2 (*b*) 1 : 2
(*c*) 1 : 5 (*d*) 1 : 10
(*e*) 1 : 15.

5.102. Maximum delivery pressure is a rotary air compressor is of the order of
(*a*) 6 kg/cm^2 (*b*) 10 kg/cm^2
(*c*) 16 kg/cm^2 (d) 25 kg/cm^2
(*e*) 40 kg/cm^2.

5.103. Surging is the phenomenon of
(*a*) air stream blocking the passage
(*b*) motion of air at sonic velocity
(*c*) unsteady, periodic and reversed flow
(*d*) air stream not able to follow the blade contour
(*e*) production of no air pressure.

5.104. Pick up wrong statement.

Surging phenomenon in centrifugal compressor depends on
(*a*) mass flow rate (*b*) pressure ratio
(*c*) change in load
(*d*) stagnation pressure at the outlet
(*e*) all of the above.

5.105. The ratio of the increase in pressure in rotor blades to total increase in pressure in the stage is called
(*a*) pressure ratio
(*b*) pressure coefficient
(*c*) degree of reaction
(*d*) slip factor (*e*) stage factor.

5.106. Axial flow compressor resembles
(*a*) centrifugal pump
(*b*) reciprocating pump
(*c*) turbine
(*d*) sliding vane compressor
(*e*) none of the above.

5.107. Axial flow compressor has the following advantage over centrifugal compressor
(*a*) larger air handling ability per unit frontal area
(*b*) higher pressure ratio per stage
(*c*) aerofoil blades are used
(*d*) higher average velocities
(*e*) none of the above.

5.108. Actual compression curve is
(*a*) same as isothermal
(*b*) same as adiabatic
(*c*) better than isothermal and adiabatic
(*d*) in between isothermal and adiabatic
(*e*) none of the above.

5.109. Atmospheric pressure is 1.03 kg/cm^2 and vapour pressure is 0.03 kg/cm^2. The air pressure will be
(*a*) 1.03 kg/cm^2 (*b*) 1.06 kg/cm^2
(*c*) 1.00 kg/cm^2 (*d*) 0.53 kg/cm^2
(*e*) 0.5 kg/cm^2.

5.110. The pressure ratio of an ideal vaned compressor with increase in mass flow rate
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) first decreases and then increases
(*e*) unpredictable.

5.111. Rotary compressors are suitable for
(*a*) large discharge at high pressure
(*b*) low discharge at high pressure
(*c*) large discharge at low pressure
(*d*) low discharge at low pressure
(*e*) there is no such limitation.

5.112. The vloumetric efficiency of compressor with increase in compression ratio will
(*a*) increase (*b*) decrease
(*c*) remain same
(*d*) may increase/decrease depending on clearance volume
(*e*) none of the above.

5.113. Stalling of blades in axial flow compressor is the phenomenon of
(*a*) air stream blocking the passage
(*b*) motion of air at sonic velocity
(*c*) unsteady periodic and reversed flow
(*d*) air stream not able to follow the blade contour
(*e*) production of no air pressure.

5.114. Pick up the wrong statement
(*a*) centrifugal compressors deliver practically constant pressure over a considerable range of capacities

(*b*) Axial flow compressors have a substantially constant delivery at variable pressures
(*c*) centrifugal compressors have a wider stable operating range than axial flow compressors
(*d*) axial flow compressors are bigger in diameter compared to centrifugal type
(*e*) axial flow compressors apt to be longer as compared to centrifugal type.

5.115. The work ratio of a gas turbine plant is defined as the ratio of
(*a*) net work output and heat supplied
(*b*) net work output and work done by turbine
(*c*) actual heat drop and isentropic heat drop
(*d*) net work output and isentropic heat drop
(*e*) isentropic increase/drop in temperature and actual increase/ drop in temperature.

5.116. Gas turbine works on
(*a*) Brayton or Atkinson cycle
(*b*) Carnot cycle (*c*) Rankine cycle
(*d*) Erricsson cycle
(*e*) Joule cycle.

5.117. The work ratio of simple gas turbine cycle depends on
(*a*) pressure ratio
(*b*) maximum cycle temperature
(*c*) minimum cycle temperature
(*d*) all of the above
(*e*) none of the above.

5.118. The pressure ratio for an open cycle gas turbine compared to closed cycle gas turbine of same h.p. is
(*a*) low (*b*) high
(*c*) same
(*d*) low/high depending on make and type
(*e*) unpredictable.

5.119. Open cycle gas turbine works on
(*a*) Brayton or Atkinson cycle
(*b*) Rankine cycle (*c*) Carnot cycle
(*d*) Erricsson cycle
(*e*) Joule cycle.

5.120. The fuel consumption in gas turbines is accounted for by
(*a*) lower heating value
(*b*) higher heating value
(*c*) heating value
(*d*) higher calorific value
(*e*) highest calorific value.

5.121. Gas turbines for power generaion are normally used
(*a*) to supply base load requirements
(*b*) to supply peak load requirements
(*c*) to enable start thermal power plant
(*d*) in emergency
(*e*) when other sources of power fail.

5.122. Mechanical efficiency of gas turbines as compared to I.C engines is
(*a*) higher (*b*) lower
(*c*) same
(*d*) depends on on other considerations
(*e*) unpredictable.

5.123. The ratio of specific weight/h.p. of gas turbin and I.C engines may be typically of the order of
(*a*) 1 : 1 (*b*) 2 : 1
(*c*) 4 : 1 (*d*) 1 : 2
(*e*) 1 : 6.

5.124. The thermal efficiency of a gas turbine as compared to a diesel plant is
(*a*) same (*b*) more
(*c*) less
(*d*) depends on other factors
(*e*) unpredictable.

5.125. The air-fuel ratio in gas turbines is of the order of
(*a*) 7 : 1 (*b*) 15 : 1
(*c*) 30 : 1 (*d*) 40 : 1
(*e*) 50 : 1.

5.126. The pressure ratio in gas turbines is of the order of
(*a*) 2 : 1 (*b*) 4 : 1
(*c*) 6 : 1 (*d*) 9 : 1
(*e*) 12 : 1.

5.127. Fig. 5.6 shows the three curves for gas turbines between thermal efficiency and pressure ratio using three different working fulids, *viz*. monoatomic gas, diatomic gas and triatomic gas. These three gases in order are
(*a*) A,B,C (*b*) A,C,B
(*c*) B,C,A (*d*) B,A,C
(*e*) C,A,B.

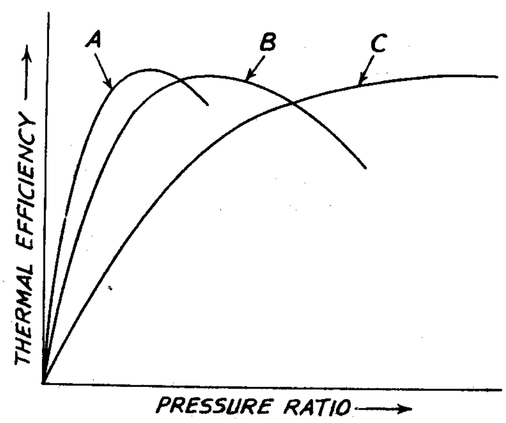

Fig. 5.6.

5.128. The hottest point in a gas turbine is
(*a*) at the base (*b*) at the tip
(*c*) in the center
(*d*) between $\frac{1}{3}$ to $\frac{1}{2}$ of the blade height
(*e*) uniformly heated.

5.129. The following is true for an open cycle gas turbine having exhaust heat exchanger. Atmospheric air before entering the compressor is
(*a*) heated
(*b*) compressed air before entering the combustion chamber is heated
(*c*) bled gas from turbine is heated and readmitted for complete expansion
(*d*) exhaust gases drive the compressor
(*e*) part of exhaust gases are heated and mixed up with atmospheric air to utilise exhaust heat.

5.130. Gas turbine blades are given a rake
(*a*) equal to zero
(*b*) in the direction of motion of blades
(*c*) opposite to the direction of motion of blades
(*d*) depending on the velocity
(*e*) none of the above.

5.131. Efficiency of gas turbine is increased by
(*a*) reheating (*b*) inter cooling
(*c*) adding a regenerator
(*d*) all of the above
(*e*) none of the above.

5.132. Temperature of gases at end of compression as compared to exhaust gases in a gas turbine is
(*a*) higher (*b*) lower
(*c*) equal (*d*) can't be compared
(*e*) unpredictable.

5.133. The ideal efficiency of simple gas turbine cycle depends on
(*a*) pressure ratio
(*b*) maximum cycle temperature
(*c*) minimum cycle temperature
(*d*) all of the above
(*e*) none of the above.

5.134. The thermal efficiency of a simple gas turbine for a given turbine inlet temperature with increase in pressure ratio
(*a*) increases (*b*) decreases
(*c*) first increases and then decreases
(*d*) first decreases and then increases
(*e*) remains same.

5.135. Gas turbines use following type of air compressor
(*a*) centrifugal type
(*b*) reciprocating type
(*c*) lobe type (*d*) axial flow type
(*e*) none of the above.

5.136. As the turbine inlet temperature increases, the thermal efficiency of gas turbine for the optimum pressure ratio
(*a*) increases (*b*) decreases
(*c*) remains same
(*d*) first increases and then decreases
(*e*) first decreases and then increases.

5.137. There is a certain pressure ratio (optimum) for a gas turbine at which its thermal efficiency is maximum. With increase in turbine temperature, the value of pressure ratio for the peak efficiency would
(*a*) remain same (*b*) decrease
(*c*) increase (*d*) unpredictable
(*e*) none of the above.

5.138. The material commonly used for air craft gas turbine is
(*a*) stainless steel (*b*) high alloy steel
(*c*) duralumin
(*d*) Timken, Haste and Inconel alloys
(*e*) titanium.

5.139. It is not possible to use closed gas turbine cycle in aeronautical engines because
(*a*) it is inefficient
(*b*) it is bulky
(*c*) it requires cooling water for its operation

(*d*) of high temperatures involved
(*e*) exhaust conditions are extreme.

5.140. The combustion efficiency of a gas turbine using perfect combustion chamber is of the order of
(*a*) 50% (*b*) 75%
(*c*) 85% (*d*) 90%
(*e*) 99%.

5.141. The maximum combustion pressure in gas turbine as compared to I.C. engine is
(*a*) more (*b*) less
(*c*) same
(*d*) depends on other factors
(*e*) unpredictable.

5.142. For an irreversible gas turbine cycle, the efficiency and work ratio both depend on
(*a*) pressure ratio alone
(*b*) maximum cycle temperature alone
(*c*) minimum cycle temperature alone
(*d*) both pressure ratio and maximum cycle temperature
(*e*) none of the above.

5.143. Producer gas is produced by
(*a*) carbonisation of coal
(*b*) passing steam over incandescent coke
(*c*) passing air and a large amount of steam over waste coal at about 65°C
(*d*) partial combustion of coal, coke, anthracite coal or charcoal in a mixed air steam blast
(*e*) same way as the natural gas.

5.144. Water gas is produced by
(*a*) carbonisation of coal
(*b*) passing steam over incandescent coke
(*c*) passing air and a large amount of steam over waste coal at about 65°C
(*d*) partial combustion of caol, cke, anthractie coal or charcoal in a mixed air steam blast
(*e*) same way as the natural gas.

5.145. Water is injected in gas turbine cycle to
(*a*) control temperature
(*b*) control output of turbine
(*c*) control fire hazards
(*d*) increase efficiency
(*e*) it is never done.

5.146. A gas turbine used in air craft should have
(*a*) high h.p. and low weight
(*b*) low weight and small frontal area
(*c*) small frontal area and high h.p.
(*d*) high speed and high h.p.
(*e*) all of the above.

5.147. If U, V and V_r represent the absolute velocity of fluid, velocity of blade, and relative velocity of fluid, and suffix i and o stand for entry and exit conditions, then following is true for axial compressor
(*a*) $V_i = V_o$ (*b*) $U_i = U_o$
(*c*) $V_{ri} = V_{ro}$ (*d*) $U_i < U_o$
(*e*) $U_i > U_o$.

5.148. The closed cycle in gas turbines
(*a*) provides greater flexibility
(*b*) provides lesser flexibility
(*c*) in never used
(*d*) is used when gas is to be burnt
(*e*) none of the above.

5.149. In the axial flow gas turbine, the work ratio is the ratio of
(*a*) compressor work and turbine work
(*b*) output and input
(*c*) actual total head tempeature drop to the isentrpic total head drop from total head inlet to static head outlet
(*d*) actual compressor work and theoretical comprssor work
(*e*) none of the above.

5.150. The degree of reaction of an axial flow turbine is the ratio of isentropic temperature drop in a blade row to the
(*a*) adiabatic temperature drop in the stage
(*b*) total temperature drop
(*c*) total temperature drop in the stage
(*d*) total adiabaitc temperature drop
(*e*) difference of maximum and minimum temperature in the cycle.

5.151. If U, V and V_r represent the absolute velocity of fluid, velocity of blade, and relative velocity of fluid, and suffix i and o stand for entry and exit conditions, then impulse effect is equal to
(*a*) $\dfrac{V_i^2 - V_o^2}{2g_c}$ (*b*) $\dfrac{U_i^2 - U_o^2}{2g_c}$
(*c*) $\dfrac{V_{ri}^2 - U_{ro}^2}{2g_c}$ (*d*) $\dfrac{V_i^2 - V_o^2}{2}$
(*e*) $\dfrac{V_i^2 - V_o^2}{g_c}$.

5.152. Number of stages in any gas turbine is equal to
(a) total heat drop in turbine ÷ heat drop in a stage
(b) total expansion ÷ expansion in a stage
(c) total temperature drop ÷ temperature drop in a stage
(d) total compression ratio ÷ compression ratio for a stage
(e) none of the above.

5.153. If infinite number of heaters be used in a gas turbine, then expansion process in turbine approaches
(a) isothermal (b) isentropic
(c) adiabatic (d) isochoric
(e) isobaric.

5.154. Pick up the correct statement
(a) gas turbine uses low air-fuel ratio to economise on fuel
(b) gas turhine uses high air-fuel ratio to reduce outgoing temperature
(c) gas turbine uses low air-fuel ratio to develop the high thrust required
(d) all of the above
(e) none of the above.

5.155. Intercooling in gas turbine results in
(a) increase in net output but decrease in thermal efficiency
(b) increase in thermal efficiency but decrease in net output
(c) increase in both thermal efficiency and net output
(d) decrease in both thermal efficiency and net output
(e) none of the above.

5.156. If V, U and V_r represent the absolute velocity of fluid, velocity of blade, and relative velocity of fluid, and suffix i and o stand for entry and exit conditions, then in a rotary machine whose degree of reaction is unity
(a) $V_i = V_o$ (b) $V_i > V_o$
(c) $U_i < V_o$ (d) $U_i = U_o$
(e) $V_{ri} = V_{ro}$.

5.157. Pick up the wrong statement
(a) large gas turbines employ axial flow compressors
(b) axial flow compressors are more stable than centrifugal type compressors but not as efficient
(c) axial flow compressors have high capacity and efficiency
(d) axial flow compressors have instability region of operation
(e) centrifugal compressors are used mainly on low flow pressure ratio gas turbines.

5.158. The power available for take off and climb in case of turbojet engine as compared to reciprocating engine is
(a) less (b) more
(c) same
(d) may be less or more depending on ambient conditons
(e) unpredictable.

5.159. Pick up the correct statement
(a) large gas turbines use radial inflow turbines
(b) gas turbines have their blades similar to steam turbine
(c) gas turbine's blade will appear as impulse section at the hub and as a reaction section at tip
(d) gas turbines use both air and liquid cooling
(e) all of the above are correct.

5.160. A closed gas turbine in which fuel is burnt directly in the air is not possible because of
(a) high pressure ratio
(b) increasing gas temperature
(c) high specific volume
(d) high friction losses
(e) paucity of O_2.

5.161. Choose the correct statement
(a) gas turbine requires lot of cooling water
(b) gas turbine is capable of rapid start up and loading
(c) gas turbines have flat efficiency at part loads
(d) gas turbines have high standby losses and require lot of maintenance
(e) gas turbines can be used to generate power only.

5.162. Ram compression in turbojet involves

(*a*) reduction of speed of incoming air and conversion of part of it into pressure energy
(*b*) compression of inlet air
(*c*) increasing speed of incoming air
(*d*) lost work (*e*) leakage losses.

5.163. In gas turbines, high thermal efficiency is obtained in
(*a*) closed cycle (*b*) open cycle
(*c*) both of the above
(*d*) closed/open depending on other considerations
(*e*) unpredictable.

5.164. In the cross compounding of the gas turbine plant
(*a*) h.p. compressor is connected to h.p. turbine and l.p. compressor ot l.p. turbine
(*b*) h.p. compressor is connected to l.p. turbine and l.p. compressor is connected to h.p. turbine
(*c*) both the arrangements can be employed
(*d*) all are connected in series
(*e*) none of the above.

5.165. A jet engine works on the principle of conservation of
(*a*) mass (*b*) energy
(*c*) flow (*d*) linear momentum
(*e*) angular momentum.

5.166. In jet engines, for the efficient production of large power, fuel is burnt in an atmosphere of
(*a*) vacuum (*b*) atmospheric air
(*c*) compressed air
(*d*) oxygen alone (*e*) liquid hydrogen.

5.167. Which of the following fuels can be used in turbojet engines
(*a*) liquid hydrogne
(*b*) high speed diesel oil
(*c*) kerosene
(*d*) demethylated spirit
(*e*) methyl alcohol

5.168. Turbo propeller has the following additional feature over the turbojet
(*a*) peopeller
(*b*) diffuser (*c*) intercooler
(*d*) turbine and combustion chamber
(*e*) starting engine.

5.169. Propulsive efficiency is defined as ratio of
(*a*) thrust power and fuel energy
(*b*) engine output and propulsive power
(*c*) propulsive power and fuel input
(*d*) thrust power and propulsive power
(*e*) none of the above.

5.170. In jet engines, paraffin is usually used as the fuel because of its
(*a*) high calorific value
(*b*) ease of atomisation
(*c*) low freezing point
(*d*) (*a*) and (*c*) above
(*e*) none of the above.

5.171. A rocket engine for the combustion of its fuel
(*a*) carries its own oxygen
(*b*) uses surrounding air
(*c*) uses compressed atmospheric air
(*d*) does not require oxygen
(*e*) depends on electrical energy supplied by solar cells.

5.172. A rocket works with maximum overall efficiency when air craft velocity is equal to the
(*a*) jet velocity
(*b*) twice the jet velocity
(*c*) half the jet velocity
(*d*) average of the jet velocity
(*e*) no such co-relationship with jet velocity exists.

5.173. Propulsion efficiency of the following order is obtained in practice
(*a*) 34% (*b*) 50%
(*c*) 60% (*d*) 72%
(*e*) 85%.

5.174. The maximum propulsion efficiency of a turbojet is attained at around following speed
(*a*) 550 km/hr (*b*) 1050km/hr
(*c*) 1700 km/hr (*d*) 2400km /hr
(*e*) 4000 km/hr.

5.175. In jet propulsion power unit, the inlet duct of diverging shape is used in order to
(*a*) collect more air
(*b*) convert kinetic energy of air into pressure energy
(*c*) provide robust structure
(*d*) beautify the shape
(*e*) none of the above.

5.176. In jet engines the products of combustion after passing through the gas turbine are discharged into
(a) atmosphere
(b) back to the compressor
(c) discharge nozzle
(d) vacuum (e) none of the above.

5.177. The air entry velocity in a rocket as compared to aircraft is
(a) same (b) more
(c) less (d) zero
(e) dependent on power and speed.

5.178. The propulsive power of the rocket is given by
(a) $\frac{(V_1 - V_2)^2}{2g}$ (b) $\frac{V_1^2 - V_2^2}{2g}$
(c) $\frac{(V_1 - V_2)^2}{g}$ (d) $\frac{(V_1^2 - V_2^2)}{g}$
(e) $\frac{V_1^2}{2g}$.
where V_1 = jet velocity
and V_2 = aircraft velocity

5.179. The overall efficiency of a rocket is maximum when aircraft velocity compared to jet velocity is
(a) same (b) half
(c) double (d) two-third
(e) one-fourth.

5.180. In order to increase thermal efficiency of aircraft jet engines, use is made of
(a) regeneration (b) reheating
(c) intercooler
(d) high temperature and pressure
(e) all of the above.

5.181. Aircraft units employ following type of gas turbine
(a) closed (b) semi-closed
(c) open
(d) any one of the above
(e) all of the above.

5.182. Choose the wrong statement
(a) open type gas turbine can be designed for operation without cooling water
(b) closed type gas turbine has constant efficiency over a wide load range
(c) open type gas turbine requires a charging compressor to provide the necessary air for combustion
(d) major disadvantage of semi-closed type gas turbine is the corrosion and fouling problems due to recirculation of the products of combustion
(e) high absolute pressure and density of working fluid in closed type gas turbines reduce the size of plant.

5.183. The weight per horse power ratio for gas turbine as compared to I.C. engine and steam turbine is
(a) same (b) higher
(c) lower (d) uncomparable
(e) unpredictable.

5.184. Fighter bombers use following type of engine
(a) turbo-jet (b) turbo-propeller
(c) rocket (d) ram-jet
(e) pulso-jet.

5.185. Pick up the wrong statement
(a) pulso-jet requires no ambient air for propulsion
(b) ram jet engine has no turbine
(c) turbine drives compressor in a burbo-jet
(d) bypass turbo-jet engine increases the thrust without adversely affecting the propulsive efficiency and fuel economy
(e) propeller is an indirect reaction device.

5.186. Thrust of a jet propulsion power unit can be increased by
(a) burning fuel after gas turbine
(b) injecting water in the compressor
(c) injecting ammonia into the combustion chamber
(d) all of the three above
(e) none of the above.

5.187. The blades of gas turbine are made of
(a) mild steel (b) stainless steel
(c) carbon steel (d) high alloy seel
(e) high nicket alloy (neimonic).

5.188. The following property is most important for material used for gas turbine blade
(a) toughness (b) fatigue
(c) creep
(d) corrosion resistance
(e) bulk modulus.

5.189. The effective power of gas turbines is increased by adding the following in compressor
(*a*) ammonia and water vapour
(*b*) carbon dioxide
(*c*) nitrogen (*d*) hydrogen
(*e*) none of the above.

5.190. High air-fuel ratio is used in gas turbines
(*a*) to increase the output
(*b*) to increase the efficiency
(*c*) to save fuel
(*d*) to reduce the exit temperature
(*e*) none of the above.

5.191. Air-fuel ratio in a jet engine will be of the order of
(*a*) 10 : 1 (*b*) 15 : 1
(*c*) 20 : 1 (*d*) 60 : 1
(*e*) 100 : 1.

5.192. In which case the air-fuel ratio is likely to be maximum
(*a*) 2-stroke engine
(*b*) 4-stroke petrol engine
(*c*) 4-stroke diesel engine
(*d*) multi-cylinder engine
(*e*) gas turbine.

5.193. In jet engines the compression ratio
(*a*) varies as square root of the speed
(*b*) varies linearly to the speed
(*c*) varies as square of the speed
(*d*) varies as cube of the speed
(*e*) is constant irrespective of variation in speed.

5.194. The specific output per kg mass flow rate of a gas turbine (having fixed efficiencies of compressor and turine and fixed higher and lower temperature) with increase in pressure ratio will
(*a*) increase first at fast rate and then slow
(*b*) increase first at slow rate and then fast
(*c*) decrease continuously
(*d*) first increase, reach maximum and then decrease
(*e*) none of the above.

5.195. The working fluid in a turbine is
(*a*) in two phases (*b*) in three phases
(*c*) in a single phase
(*d*) in the form of air and water mixture
(*e*) gas and no air.

5.196. Gas turbine cycle with regenerator
(*a*) increases thermal efficiency
(*b*) allows high compression ratio
(*c*) decreases heat loss in exhaust
(*d*) allows operation at very high altitudes
(*e*) permits high moisture content fuel to be used.

5.197. The compression ratio in a gas turbine is of the roder of
(*a*) 3.5 : 1 (*b*) 5 : 1
(*c*) 8 : 1 (*d*) 12 : 1
(*e*) 20 : 1.

5.198. Reheating in multi-stage expansion gas turbine results in
(*a*) high thermal efficiency
(*b*) reduction in compressor work
(*c*) decrease of heat loss in exhaust
(*d*) maximum work output
(*e*) none of the above.

5.199. The main purpose of reheating in gas turbine is to
(*a*) increase temperature
(*b*) reduce turbine size
(*c*) increase power output
(*d*) increase speed
(*e*) increase pressure ratio.

5.200. Reheating in gas turbine results in
(*a*) increase of work ratio
(*b*) decrease of thermal efficiency
(*c*) decrease of work ratio
(*d*) both (*a*) and (*b*) above
(*e*) both (*b*) and (*c*) above.

5.201. Work ratio of a gas turbine plant is ratio of
(*a*) net work output and work done by turbine
(*b*) net work output and heat supplied
(*c*) work done by turbine and heat supplied
(*d*) work done by turbine and net work output
(*e*) actual heat drop and isentropic heat drop.

5.202. Work ratio of a gas turbine may be improved by
(*a*) decreasing the compression work
(*b*) increasing the compression work
(*c*) increasing the turbine work
(*d*) decreasing the turbine work
(*e*) (*a*) and (*c*) above.

5.203. Maximum temprature in a gas turbine is of the order of

(*a*) 2500°C (*b*) 2000°C
(*c*) 1500°C (*d*) 1000°C
(*e*) 700°C.

5.204. For maximum work output in a two stage expansion gas turbine with perfect reheating, the intermediate pressure should be
(*a*) $\frac{P_1 + P_2}{2}$ (*b*) $\frac{P_1 - P_2}{2}$
(*c*) $\frac{\sqrt{P_1 P_2}}{2}$ (*d*) $\sqrt{P_1 P_2}$
(*e*) none of the above.
(P_1 and P_2 are the maximum and minimum pressure of cycle)

5.205. The gas turbine can be used with
(*a*) producer gas (*b*) blast furnace gas
(*c*) coal gas
(*d*) any one of the above
(*e*) none of the above.

5.206. The specific heat of products of combustion increases with increase in
(*a*) pressure (*b*) temperature
(*c*) fuel air ratio (*d*) (*a*) and (*c*) above
(*e*) (*b*) and (*c*) above.

5.207. Which of the curves in Fig. 5.7 shows the relationship between specific H.P. (HP/kg/unit time) and cycle pressure ratio

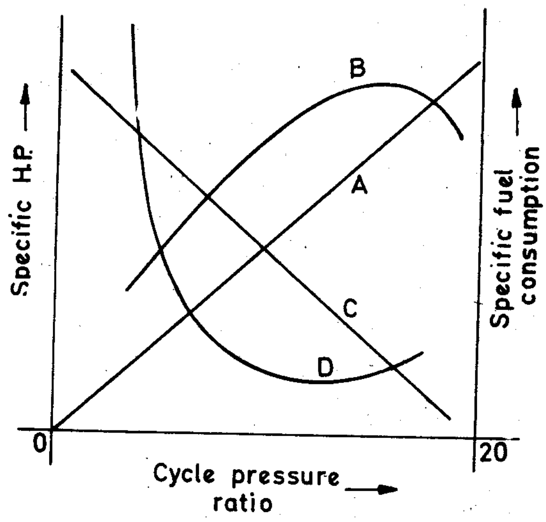

Fig. 5.7.

(*a*) curve A (*b*) curve B
(*c*) cruve C (*d*) curve D
(*e*) none of the above.

5.208. Which of the curves in Fig. 5.7 shows the relationship between specific fuel consumption (kg/h.p./unit time) and the cycle pressure ratio
(*a*) cruve A (*b*) cruve B
(*c*) curve C (*d*) cruve D
(*e*) none of the above.

5.209. The values of constant pressure specific heats during heating and expansion in gas turbine, and adiabatic index of air during expansion in a gas turbine are taken respectively as
(*a*) 0.24, 1.4 (*b*) 0.27. 1.33
(*c*) 0.24, 1.33 (*d*) 0.32, 1.33
(*e*) 0.27, 1.4.

5.210. Intercooling results in
(*a*) improved work ratio
(*b*) lower work ratio
(*c*) unaffected work ratio
(*d*) improved work ratio initially which is lowered subsequently
(*e*) lower work ratio initially which improves afterwards.

5.211. Reheating in a gas turbine results in
(*a*) improvement of work ratio
(*b*) decrease of work ratio
(*c*) increase of thermal efficiency
(*d*) decrease thermal efficiency
(*e*) increase in work ratio but decrease in thermal efficiency.

5.212. Regenerator in gas turbine results in
(*a*) improved thermal efficiency
(*b*) lower work ratio
(*c*) higher work ratio
(*d*) lowe theraml efficiency
(*e*) (*a*) and (*b*) above.

5.213. Which of the following devices is suitable for space travel
(*a*) propeller (*b*) turbo propeller
(*c*) turbo jet (*d*) rocket
(*e*) plasma.

5.214. In the aircraft propulsion
(*a*) the propulsive matter is caused to flow around the propelled body
(*b*) propulsive matter is ejected from within the propelled body
(*c*) its functioning does not depend on presence of air
(*d*) all of the above
(*e*) none of the above.

5.215. In the aircraft propellers
(*a*) the propulsive matter is caused to flow around the propelled body
(*b*) propulsive matter is ejected from within the propelled body
(*c*) its functioning does not depend on presence of air
(*d*) all of the above
(*e*) none of the above.

5.216. In air breathing jet engine, the jet is formed by expading
(*a*) gases (*b*) solids
(*c*) liquid (*d*) plasma
(*e*) highly heated atmospheric air.

5.217. Ram-jet engine
(*a*) is self-operating at zero flight speed
(*b*) is not self-operating at zero flight speed
(*c*) requires no air for its operation
(*d*) produces a jet consisting of plasma
(*e*) none of the above.

5.218. For speed above 3000 km/hour, it is more advantageous to use
(*a*) turbo-jet engine
(*b*) ram-jet engine
(*c*) propellers (*d*) rockets
(*e*) hydraulic jet propulsion.

5.219. A simple turbo-jet engine is basically
(*a*) a propeller system
(*b*) gas-turbine engine equipped with a propulsive nozzle and diffuser
(*c*) chemical rocket regine
(*d*) ram-jet enigne (*e*) none of the above.

5.220. Which of the following plants is smallest and lightest for genrating a given amount of power
(*a*) steam power plant
(*b*) petrol engine (*c*) diesel engine
(*d*) solar plant (*e*) gas turbine plant.

5.221. In turbofan engine, the jet velocity as compared to turbo-jet engine is
(*a*) less (*b*) more
(*c*) same
(*d*) may be less or more depening upon speed
(*e*) none of the above.

5.222. Turbofan engine employs
(*a*) one air stream
(*b*) two or more air streams
(*c*) no air stream (*d*) solid fuel firing
(*e*) rocket principle for its operation.

5.223. Pressure ratio in gas turbines is the ratio of
(*a*) compressor pressure ratio
(*b*) highest pressure to exhaust pressure
(*c*) inlet pressure to exhaust pressure
(*d*) pressures across the turbine
(*e*) none of the above.

5.224. Pick up the false statement
(*a*) gas turbine is a self-starting unit
(*b*) gas turbine does not require huge quantity of water like steam plant
(*c*) exhaust losses in gas turbine are high due to large mass flow rate
(*d*) overall efficiency of gas turbine plant is lower than that of a reciprocating engine
(*e*) gas turbine can be easily started and stopped and thus is best suited for peaking demands.

5.225. The efficiency and work ratio of a gas turbine plant can be increased by
(*a*) using mulit-stage compressor with intercooler
(*b*) adding heat exchanger
(*c*) injecting water in/around combustion chamber
(*d*) reheating the air after partial expansion in the turbine
(*e*) all of the above.

5.226. Pick up the correct statement
(*a*) closed cycle gas turbine is an I.C engine
(*b*) gas turbine uses same working fluid over and over again
(*c*) air-fuel ratio in a gas turbine is 100 : 1
(*d*) ideal efficiency of closed cycle gas turbine plant is more than carnot cycle efficiency
(*e*) thrust in turbo-jet is produced by nozzle exit gases.

5.227. The compression ratio in a jet engine varies proportional to
(*a*) speed (*b*) speed^2
(*c*) altitude (*d*) $\sqrt{\text{speed}}$
(*e*) does not vary.

5.228. The efficiency of jet engine is
(*a*) higher at ground
(*b*) higher at high altitudes
(*c*) same at all altitudes
(*d*) higher at high speed
(*e*) lower at low speed.

6

Heat Transfer

6.1. Unit of thermal conductivity in M.K.S. units is
(*a*) kcal/kg m^2 °C (*b*) kcal-m/hr m^2 °C
(*c*) kcal/hr m^2 °C (*d*) kcal-m/hr °C
(*e*) kcal-m/m^2 °C.

6.2. Unit of thermal conductivity in S.I. units is
(*a*) J/m^2 sec (*b*) J/m °K sec
(*c*) W/m °K (*d*) (*a*) and (*c*) above
(*e*) (*b*) and (*c*) above.

6.3. Thermal conductivity of solid metals with rise in temperature normally
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase or decrease depending on temperature
(*e*) unpredictable.

6.4. Thermal conductivity of non-metallic amorphous solids with decrease in temperature
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase or decrease depending on temperature
(*e*) unpredictable.

6.5. Heat transfer takes place as per
(*a*) zeroth law of thermodynamics
(*b*) first law of thermodynamic
(*c*) second law of the thermodynamics
(*d*) Kirchoff's law (*e*) Stefan's law.

6.6. When heat is transferred from one particle of hot body to another by actual motion of the heated particles, it is referred to as heat transfer by
(*a*) conduction (*b*) convection
(*c*) radiation
(*d*) conduction and convection
(*e*) convection and radiation.

6.7. When heat is transferred form hot body to cold body, in a straight line, without affecting the intervening medium, it is referred to as heat transfer by
(*a*) conduction (*b*) convection
(*c*) radiation
(*d*) conduction and convection
(*e*) convection and radiation.

6.8. Sensible heat is the heat required to
(*a*) change vapour into liquid
(*b*) change liquid into vapour
(*c*) increase the temperature of a liquid or vapour
(*d*) convert water into steam and superheat it
(*e*) convert saturated steam into dry steam.

6.9. The insulation ability of an insulator with the presence of moisture would
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) may increase/decrease depending on temperature and thickness of insulation
(*e*) none of the above.

6.10. When heat is transferred by molecular collision, it is referred to as heat transfer by
(*a*) conduction (*b*) convection
(*c*) radiation (*d*) scattering
(*e*) convection and radiation.

6.11. Heat transfer in liquid and gases takes place by
(*a*) conduction (*b*) convection
(*c*) radiation

(*d*) conduction and convection
(*e*) convection and radiation.

6.12. Which of the following is the case of heat transfer by radiation
(*a*) blast furnace
(*b*) heating of building
(*c*) cooling of parts in furnace
(*d*) heat received by a person from fireplace
(*e*) all of the above.

6.13. Heat is closely related with
(*a*) liquids (*b*) energy
(*c*) temperature (*d*) entropy
(*e*) enthalpy.

6.14. Pick up the wrong case. Heat flowing from one side to other depends directly on
(*a*) face area (*b*) time
(*c*) thickness
(*d*) temperature difference
(*e*) thermal conductivity.

6.15. Metals are good conductors of heat because
(*a*) their atoms collide frequently
(*b*) thier atoms are relatively far apart
(*c*) they contain free electrons
(*d*) they have high density
(*e*) all of the above.

6.16. Which of the following is a case of steady state heat transfer
(*a*) I.C. engine (*b*) air preheaters
(*c*) heating of building in winter
(*d*) all of the above
(*e*) none of the above.

6.17. Total heat is the heat required to
(*a*) change vapour into liquid
(*b*) change liquid into vapour
(*c*) increase the temperature of a liquid or vapour
(*d*) convert water into steam and superheat it
(*e*) convert saturated steam into dry steam.

6.18. Cork is a good insulator because it has
(*a*) free electrons
(*b*) atoms colliding frequency
(*c*) low density (*d*) porous body
(*e*) all of the above.

6.19. Thermal conductivity of water in general with rise in temperature
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase or decrease depending on temperature
(*e*) none of the above.

6.20. Thermal conductivity of water at 20°C is of the order of
(*a*) 0.1 (*b*) 0.23
(*c*) 0.42 (*d*) 0.51
(*e*) 0.64.

6.21. Temperature of steam at around 540°C can be measured by
(*a*) thermometer (*b*) radiatioin pyrometer
(*c*) thermistor (*d*) thermocouple
(*e*) thermopile.

6.22. Thermal conductivity of air at room temperature in kcal/m hr °C is of the order of
(*a*) 0.002 (*b*) 0.02
(*c*) 0.01 (*d*) 0.1
(*e*) 0.5.

6.23. The time constant of a thermocouple is
(*a*) the time taken to attain the final temperature to be measured
(*b*) the time taken to attain 50% of the value of initial temperature difference
(*c*) the time taken to attain 63.2% of the value of initial temperature difference
(*d*) determined by the time taken to reach 100°C from 0°C
(*e*) none of the above.

6.24. Thermal conductivity of air with rise in temperature
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase or decrease depending on temperature
(*e*) none of the above.

6.25. Heat flows from one body to other when they have
(*a*) different heat contents
(*b*) different specific heat
(*c*) different atomic structure
(*d*) different temperatures
(*e*) none of the above.

6.26. The concept of overall coefficient of heat transfer is used in heat transfer problems of
(*a*) conduction (*b*) convection
(*c*) radiation
(*d*) all the three combined

(*e*) conduction and convection.

6.27. In heat transfer, conductance equals conductivity (kcal/hr/sqm/°C/cm) divided by
(*a*) hr (time) (*b*) sqm (area)
(*c*) °C (temperature)
(*d*) cm (thickness) (*e*) kcal (heat).

6.28. The amount of heat flow through a body by conduction is
(*a*) directly proportional to the surface area of the body
(*b*) directly proportional to the temperature difference on the two faces of the body
(*c*) dependent upon the material of the body
(*d*) inversely proportional to the thickness of the body
(*e*) all of the above.

6.29. Which of the following has least value of conductivity
(*a*) glass (*b*) water
(*c*) plastic (*d*) rubber
(*e*) air.

6.30. Which of the following is expected to have highest thermal conductivity
(*a*) steam (*b*) solid ice
(*c*) melting ice (*d*) water
(*e*) boiling water.

6.31. Thermal conductivity of glass-wool varies from sample to sample because of variation in
(*a*) composition (*b*) density
(*c*) porosity (*d*) structure
(*e*) all of the above.

6.32. Thermal conductivity of a material may be defined as the
(*a*) quantity of heat flowing in one second through one cm cube of material when opposite faces are maintained at a temperature difference of 1°C
(*b*) quantity of heat flowing in one second through a slab of the material of area one cm square, thickness 1 cm when its faces differ in temperature by 1°C
(*c*) heat conducted in unit time across unit area through unit thickness when a temperature difference of unity is maintained between opposite faces
(*d*) all of the above
(*e*) none of the above.

6.33. Which of the following has maximum value of thermal conductivity
(*a*) aluminium (*b*) steel
(*c*) brass (*d*) copper
(*e*) lead.

6.34. Moisture would find its way into insulation by vapour pressure unless it is prevented by
(*a*) high thickness of insulation
(*b*) high vapour pressure
(*c*) less thermal conductivity insulator
(*d*) a vapour seal (*e*) all of the above.

6.35. Heat is transferred by all three modes of transfer, *viz*, conduction, convection and radiation in
(*a*) electric heater (*b*) steam condenser
(*c*) melting of ice
(*d*) refrigerator condenser coils
(*e*) boiler.

6.36. According to Prevost theory of heat exchange
(*a*) it is impossible to transfer heat from low temperature source to high temperature source
(*b*) heat transfer by radiation requires no medium
(*c*) all bodies above absolute zero emit radiation
(*d*) heat transfer in most of the cases takes place by combination of conduction, convection and radiation
(*e*) rate of heat transfer depends on thermal conductivity and temperature difference.

6.37. The ratio of heat flow Q_1/Q_2 from two walls of same thickness having their thermal conductivities as $K_1 = 2K_2$ will be
(*a*) 1 (*b*) 0.5
(*c*) 2 (*d*) 0.25
(*e*) 4.

6.38. Heat transfer by radiation mainly depends upon
(*a*) its temperature
(*b*) nature of the body
(*c*) kind and extent of its surface
(*d*) all of the above
(*e*) none of the above.

6.39. Thermal diffusivity is
(*a*) a dimensionless parameter
(*b*) function of temperature

(*c*) used as mathematical model
(*d*) a physical property of the material
(*e*) useful in case of heat transfer by radiation.

6.40. Thermal diffusivity of a substance is
(*a*) proportional of thermal conductivity (k)
(*b*) inversely proportional to k
(*c*) proportional to $(k)^2$
(*d*) inversely proportional to k^2
(*e*) none of the above.

6.41. Unit of thermal diffusivity is
(*a*) m^2/hr (*b*) $m^2/hr\ °C$
(*c*) $kcal/m^2\ hr$ (*d*) kcal/m.hr°C
(*e*) $kcal/m^2\ hr\ °C$.

6.42. An electric furnace has a laminated wall composed of 0.2 m of refractory brick ($k = 2$), 0.15 m of insulation ($k = 0.15$), and 0.15 m of brick having ($k = 1.5$). Inner and outer temperatures of wall are 1027°C and 27°C respectively. Units of k are kcal-m/hr m^2 °C. If surface area of the wall is 1.2 m^2, heat transfer rate will be
(*a*) 10 kcal/hr (*b*) 100 kcal/hr
(*c*) 1000 kcal/hr (*d*) 10,000 kcal/hr
(*e*) none of the above.

6.43. Thermal conductivity of wood depends on
(*a*) moisture (*b*) density
(*c*) temperature (*d*) all of the above
(*e*) none of the above.

6.44. In convection heat transfer from hot flue gases to water tube, even though flow may be turbulent, a laminar flow region (boundary layer of film) exists close to the tube. The heat transfer through this film takes place by
(*a*) convection (*b*) radiation
(*c*) conduction
(*d*) both convection and conduction
(*e*) none of the above.

6.45. Film coefficient is defined as
(*a*) $\frac{\text{Inside diameter of tube}}{\text{Equivalent thickness of film}}$
(*b*) $\frac{\text{Thermal conductivity}}{\text{Equivalent thickness of film}}$
(*c*) $\frac{\text{Specific heat} \times \text{Viscocity}}{\text{Thermal conductivity}}$ or $\frac{\text{Molecular diffusivity of momentum}}{\text{Thermal diffusivity}}$
(*d*) $\frac{\text{Film coefficient} \times \text{Inside diameter}}{\text{Thermal conductivity}}$
(*e*) none of the above.

6.46. Heat conducted through unit area and unit thick face per unit time when temperature difference between opposite faces is unity, is called
(*a*) thermal resistance
(*b*) thermal coefficient
(*c*) temperature gradient
(*d*) thermal conductivity
(*e*) heat-transfer.

6.47. In the heat flow equation $Q = \frac{kA(t_1 - t_2)}{x}$, the term $\frac{x}{kA}$ is known as
(*a*) thermal resistance
(*b*) thermal coefficient
(*c*) temperature gradient
(*d*) thermal conductivity
(*e*) heat-transfer.

6.48. In the heat flow equation $Q = \frac{kA(t_1 - t_2)}{x}$, the term $\frac{t_1 - t_2}{x}$ is known as
(*a*) thermal resistance
(*b*) thermal coefficient
(*c*) temperature gradient
(*d*) thermal conductivity
(*e*) heat-transfer.

6 49. The rate of energy emission from unit surface area through unit solid angle, along a normal to the surface, is known as
(*a*) emissivity (*b*) transmissivity
(*c*) reflectivity
(*d*) intensity of radiation
(*e*) absorptivity.

6.50. Emissivity of a white polished body in comparison to a black body is
(*a*) higher (*b*) lower
(*c*) same
(*d*) depends upon the shape of body
(*e*) none of the above.

6.51. A grey body is one whose absorptivity
(*a*) varies with temperature
(*b*) varies with wavelength of the incident ray
(*c*) is equal to its emissivity

(*d*) does not vary with temperature and wavelength of the incident ray
(*e*) none of the above.

6.52. Eckert number is expressed by

(*a*) $\frac{\text{(Velocity of fluid)}^2}{\text{(Specific heat at constant pressure} \times \text{temperature)}}$

(*b*) $\frac{\text{(Specific heat at constant pressure} \times \text{Coefficient of viscosity)}}{\text{Thermal condictivity}}$

(*c*) $\frac{\text{(Coefficient of heat transfer} \times \text{Linear dimension)}}{\text{Thermal conductivity}}$

(*d*) $\frac{\text{Density} \times \text{Velocity} \times \text{Linear dimension}}{\text{Coefficient of absolute viscosity}}$

(*e*) none of the above.

6.53. Two balls of same material and finish have their diameters in the ratio of 2 : 1 and both are heated to same temperature and allowed to cool by radiation. Rate of cooling by big ball as compared to smaller one will be in the ratio of

(*a*) 1 :1 (*b*) 2 : 1
(*c*) 1 : 2 (*d*) 4 : 1
(*e*) 1 : 4.

6.54. Grashoff number is expressed by

(*a*) $\frac{\text{Inside diameter of tube}}{\text{Equivalent thickness of film}}$

(*b*) $\frac{\text{Thermal conductivity}}{\text{Equivalent thickness of film}}$

(*c*) $\frac{\text{Specific heat} \times \text{viscosity}}{\text{Thermal conductivity}}$ or $\frac{\text{Molecular diffusivity of momentum}}{\text{Thermal conductivity}}$

(*d*) $\frac{\text{Film coefficient} \times \text{Inside diameter}}{\text{Thermal conductivity}}$

(*e*) $\frac{\text{Inertia force} \times \text{Buoyant force}}{\text{Viscous force}}$

6.55. A non-dimensional number generally associated with natural convection heat transfer is

(*a*) Grashoff number
(*b*) Nusselt number
(*c*) Weber number
(*d*) Prandtl number
(*e*) Reynold number.

6.56. LMTD in case of counter flow heat exchanger as compared to parallel flow heat exchanger is

(*a*) higher (*b*) lower
(*c*) same
(*d*) depends on the area of heat exchanger
(*e*) depends on temperature conditions.

6.57. In heat exchangers, degree of approach is defined as the difference between temperatures of

(*a*) cold water inlet and outlet
(*b*) hot medium inlet and outlet
(*c*) hot medium outlet and cold water inlet
(*d*) hot medium outlet and cold water outlet
(*e*) none of the above.

6.58. In counter flow heat exchangers

(*a*) both the fluids at inlet (of heat exchanger where hot fluid enters) are in their coldest state
(*b*) both the fluids at inlet are in their hottest state
(*c*) both the fluids at exit are in their hottest state
(*d*) one fluid is in hottest state and other in coldest state at inlet
(*e*) any combination is possible depending on design of heat exchanger.

6.59. A steam pipe is to be insulated by two insulating materials put over each other. For best results

(*a*) better insulation should be put over pipe and better one over it
(*b*) inferior insulation should be put over pipe and better one over it
(*c*) both may be put in any order
(*d*) whether to put inferior on over pipe or the better one would depend on steam temperature
(*e*) unpredictable.

6.60. Nusselt number is expressed by

(a) $\frac{\text{Inside diameter of tube}}{\text{Equivalent thickness of film}}$

(b) $\frac{\text{Thermal conductivity}}{\text{Equivalent thickness of film}}$

(*c*) $\frac{\text{Specific heat} \times \text{Viscosity}}{\text{Thermal conductivity}}$ or $\frac{\text{Molecular diffusivity of momentum}}{\text{Thermal diffusivity}}$

(*d*) $\frac{\text{(Coefficient of heat transfer} \times \text{Inside diameter)}}{\text{Thermal conductivity}}$

(*e*) none of the above.

6.61. Fourier's law of heat conduction is valid for
(*a*) one dimensional cases only
(*b*) two dimensional cases only
(*c*) three dimensional cases only
(*d*) regular surfaces having non-uniform temperature gradients
(*e*) irregular surfaces.

6.62. According of Kirchhoff's law,
(*a*) radiant heat is proportional to fourth power of absolute temperature
(*b*) emissive power depends on temperature
(*c*) emissive power and absorptivity are constant for all bodies
(*d*) ratio of emissive power to absorptive power is maximum for perfectly black body
(*e*) ratio of emissive power to absorptive power for all bodies is same and is equal to the emissive power of a perfectly black body.

6.63. All radiations in a black body are
(*a*) reflected (*b*) refracted
(*c*) transmitted (*d*) absorbed
(*e*) partly reflected and partly absorbed.

6.64. According to Kirchoff's law, the ratio of emissive power to absorptivity for all bodies is equal to the emissive power of a
(*a*) grey body
(*b*) brilliant white polished body
(*c*) red hot body (*d*) black body
(*e*) none of the above.

6.65. The concept of overall coefficient of heat transfer is used in case of heat transfer by
(*a*) conduction (*b*) convection
(*c*) radiation
(*d*) conduction and convection
(*e*) convection and radiation.

6.66. The unit of overall coefficient of heat transfer is
(*a*) kcal/m^2 (*b*) kcal/hr °C
(*c*) kcal/m^2 hr °C
(*d*) kacl/m hr °C (*e*) kcal/m^3 hr °C.

6.67. The heat transfer equation $Q = \sigma A T^4$ is known as
(*a*) Fourier equation
(*b*) Lapalce's equation
(*c*) Poisson equation
(*d*) general heat transfer equation
(*e*) Stefan-Boltzmann equation.

6.68. Joule sec is the unit of
(*a*) universal gas constant
(*b*) kinematic viscosity
(*c*) thermal conductivity
(*d*) Planck's constant
(*e*) none of the above.

6.69. The value of Prandtl number for air is about
(*a*) 0.1 (*b*) 0.3
(*c*) 0.7 (*d*) 1.7
(*e*) 10.5.

6.70. The value of the wavelength for maximum emissive power is given by
(*a*) Wien's law (*b*) Planck's law
(*c*) Stefan's law (*d*) Fourier's law
(*e*) Kirchhoff's law.

6.71. Prandtl number is expressed by
(*a*) $\frac{\text{Inside diameter of tube}}{\text{Equivalent thickness of film}}$
(*b*) $\frac{\text{Thermal conductivity}}{\text{Equivalent thickness of film}}$
(*c*) $\frac{\text{Specific heat} \times \text{Viscosity}}{\text{Thermal conductivity}}$ or $\frac{\text{Molecular diffusivity of momentum}}{\text{Thermal diffusivity}}$
(*d*) $\frac{\text{Film coefficient} \times \text{Inside diameter}}{\text{Thermal conductivity}}$
(*e*) none of the above.

6.72. Log mean temperature difference in case of counter flow compared to parallel flow will be
(*a*) same (*b*) more
(*c*) less
(*d*) depends on other factors
(*e*) none of the above.

6.73. The energy distribution of an ideal reflector at higher temperatures is largely in the range of
(*a*) shorter wavelength
(*b*) longer wavelength
(*c*) remains same at all wavelengths
(*d*) wavelength has nothing to do with it
(*e*) none of the above.

6.74. Total emissivity of polished silver compared to black body is
(*a*) same (*b*) higher
(*c*) more or less same
(*d*) very much lower

(*e*) very much higher.

6.75. According to Stefan-Boltzmann law, ideal radiators emit radiant energy at a rate proportional to
(*a*) absolute temperature
(*b*) square of temperature
(*c*) fourth power of absolute temperature
(*d*) fourth power of temperature
(*e*) cube of absolute temperature.

6.76. Which of the following property of air does not increase with rise in temperature
(*a*) thermal conductivity
(*b*) thermal diffusivity
(*c*) density
(*d*) dynamic viscosity
(*e*) kinematic viscosity.

6.77. The unit of Stefan Boltzmann constant is
(*a*) watt/cm^2 °K (*b*) watt/cm^4 °K
(*c*) watt^2/cm °K^4 (*d*) watt/cm^2 °K^4
(*e*) watt/cm^2 °K^2.

6.78. In free convection heat transfer, Nusselt number is function of
(*a*) Grashoff no. and Reynold no.
(*b*) Grashoff no. and Prandtl no.
(*c*) Prandtl no. and Reynold no.
(*d*) Grashoff no., Prandtl no. and Reynold no.
(*e*) none of the above.

6.79. Stefan Boltzmann law is applicable for heat transfer by
(*a*) conduction (*b*) convection
(*c*) radiation
(*d*) conduction and radiation combined
(*e*) convection and radiation combined.

6.80. The thermal diffusivities for gases are generally
(*a*) more than those for liquids
(*b*) less than those for liquids
(*c*) more than those for solids
(*d*) dependent on the viscosity
(*e*) same as for the liquids.

6.81. The thermal diffusivities for solids are generally
(*a*) less than those for gases
(*b*) less than those for liquids
(*c*) more than those for liquids and gases
(*d*) more or less same as for liquids and gases
(*e*) zero.

6.82. Thermal diffusivity is expressed by the relation
(*a*) $\frac{k}{\rho C_p}$ (*b*) $\frac{C_p \rho}{k}$
(*c*) $\frac{\rho k}{C_p}$ (*d*) $\frac{\mu C_p}{k}$
(*e*) $\frac{k}{\mu C_p}$
where k = thermal conductivity
ρ = density, μ = dynamic viscosity
and C_p = Specific heat at constant pressure

6.83. Thermal diffusivity of a substance is
(*a*) directly proportional to thermal conductivity
(*b*) inversely proportional to density of substance
(*c*) inversely proportional to specific heat
(*d*) all of the above
(*e*) none of the above.

6.84. If two surfaces of area A distance L apart, of a material having thermal conductivity k are at temperatures t_1 and t_2, then heat flow rate through it will be
(*a*) $\frac{kA}{L}(t_1 - t_2)$ (*b*) $\frac{kL}{A}(t_1 - t_2)$
(*c*) $\frac{k}{AL}(t_1 - t_2)$ (*d*) $\frac{L}{kA}(t_1 - t_2)$
(*e*) $\frac{A}{LK}(t_1 - t_2)$.

6.85. The ratio of the emissive power and absorptive power of all bodies is the same and is equal to the emissive power of a perfectly black body. This statement is known as
(*a*) Krichoff's law (*b*) Stefan's law
(*c*) Wien' law (*d*) Planck's law
(*e*) Black body law.

6.86. According to Stefan's law, the total radiation from a black body per second per unit area is proportional to
(*a*) absolute temperature (T)
(*b*) T^2 (*c*) T^3
(*d*) T^4 (*e*) $1/T$.

6.87. According to Planck's law, the wavelength corresponding to the maximum energy is proportional to
(*a*) absolute temperature (T)
(*b*) T^2 (*c*) T^3
(*d*) T^4 (*e*) $1/T$.

6.88. According to Wien's law, the wavelength corresponding to maximum energy is proportion to
(*a*) absolute temperature (*T*)
(*b*) T^2 (*c*) T^3
(*d*) T^4 (e) $1/T$.

6.89. Depending on the radiating properties, a body will be white when
(*a*) $\rho = 0, \tau = 0$ and $\alpha = 1$
(*b*) $\rho = 1, \tau = 0$ and $\alpha = 0$
(*c*) $\rho = 0, \tau = 1$ and $\alpha = 0$
(*d*) $\tau = 0, \alpha + \rho = 1$
(*e*) $\alpha = 0, \tau + \rho = 1$.
where α = absorptivity, ρ = reflectivity, τ = transmissivity

6.90. Depending on the radiating properties, a body will be black when
(*a*) $\rho = 0, \tau = 0$ and $\alpha = 1$
(*b*) $\rho = 1, \tau = 0$ and $\alpha = 0$
(*c*) $\rho = 0, \tau = 1$ and $\alpha = 0$
(*d*) $\tau = 0, \alpha + \rho = 0$
(*e*) $\alpha = 0, \tau + \rho = 1$.
where α = absorptivity, ρ = reflectivity, τ = transmissivity.

6.91. Depending on the radiating properties, a body will be opaque when
(*a*) $\rho = 0, \tau = 0$ and $\alpha = 1$
(*b*) $\rho = 1, \tau = 0$ and $\alpha = 0$
(*c*) $\rho = 0, \tau = 1$ and $\alpha = 0$
(*d*) $\tau = 0, \alpha + \rho = 1$
(*e*) $\alpha = 0, \tau + \rho = 1$.
where α = absorptivity, ρ = reflectivity, τ = transmissivity.

6.92. The heat transfer equation $\frac{\partial^2 t}{\partial x^2} + \frac{\partial^2 t}{\partial y^2} + \frac{\partial^2 t}{\partial z^2} = 0$ is known as
(*a*) Laplace's equation
(*b*) Stefan-Boltzmann equation
(*c*) Fourier equation
(*d*) Poisson's equation
(*e*) General equation of heat transfer.

6.93. If the inner and outer surfaces of a hollow cylinder (having radii r_1 and r_2 and length L) are at temperatures t_1 and t_2 then rate of radial heat flow will be
(*a*) $\frac{k}{2\pi L}\frac{t_1 - t_2}{\log \frac{r_2}{r_2}}$ (*b*) $\frac{1}{2\pi Lk}\frac{t_1 - t_2}{\log \frac{r_2}{r_1}}$
(*c*) $\frac{2\pi L}{k} \cdot \frac{t_1 - t_2}{\log \frac{r_2}{r_1}}$ (*d*) $\frac{2\pi K}{L}\frac{t_1 - t_2}{\log \frac{r_2}{r_1}}$
(*e*) $2\pi LK \frac{t_1 - t_2}{\log \frac{r_2}{r_1}}$

6.94. Two plane slabs of equal areas and conductivities in the ratio 1 : 2 are held together and temperature in between surface ends are t_1 and t_2. If junction temperature in between two surfaces is desired to be $\frac{t_1 + t_2}{2}$, then their thicknesses should be in the ratio of
(*a*) 1 : 2 (*b*) 2 : 1
(*c*) 1 : 1 (*d*) 3 : 1
(*e*) 1 : 3.

6.95. The heat flow rate through parallel walls of thickness L_1, L_2 and L_3 and having surface areas A_1, A_2 and A_3, thermal conductivities k_1, k_2, and k_3, respectively and first and last walls maintained at temperatures t_1 and t_2 will be
(*a*) $\frac{t_1 - t_2}{\frac{L_1}{A_1 k_1} + \frac{L_2}{A_2 k_2} + \frac{L_3}{A_3 k_3}}$
(*b*) $\frac{t_1 - t_2}{\frac{k_1}{A_1 L_1} + \frac{k_2}{A_2 L_2} + \frac{k_3}{A_3 L_3}}$
(*c*) $\frac{t_1 - t_2}{\frac{k_1 A_1}{L_1} + \frac{k_2 A_2}{L_2} + \frac{k_3 A_3}{L_3}}$
(*d*) $\frac{t_1 - t_2}{\frac{L_1 A_1}{k_1} + \frac{L_2 A_2}{k_3} + \frac{L_3 A_3}{k_3}}$
(*e*) $\frac{t_1 - t_2}{\frac{A_1}{L_1 k_1} + \frac{A_2}{L_2 k_2} + \frac{A_3}{L_3 k_3}}$

6.96. If the inner and outer walls of a hollow sphere having surface areas of A_1 and A_2, and inner and outer radii r_1 and r_2, are maintained at temperatures t_1 and t_2, then rate of heat flow will be
(*a*) $k\sqrt{A_1 A_2}\frac{t_1 - t_2}{r_2 - r_1}$ (*b*) $\frac{k}{\sqrt{A_1 A_2}}\frac{t_1 - t_2}{r_1 - r_2}$

(c) $4\pi k \frac{t_1 - t_2}{\sqrt{A_1 A_2}}$ (d) $4\pi k r_1 r_2 \frac{t_1 - t_2}{\sqrt{A_1 A_2}}$
(e) none of the above.

6.97. At thermal equilibrium
(a) absorptivity is greater than emissivity
(b) absorptivity is lesser than emissivity
(c) absorptivity is equal to emissivity
(d) sum of absorptivity and emissivity is unity
(e) none of the above.

6.98. The ratio of emissive power of a body to the emissive power of a perfectly black body is called
(a) absorptivity (b) emissivity
(c) diffusivity (d) conductivity
(e) absorptive power.

6.99. The wave length of the radiation emitted
(a) depends on temperature only
(b) depends on $(\text{temperature})^2$
(c) does not depend on material of body
(d) depends on material of body
(e) (a) and (c) above.

6.100. Fig. 6.1 shows the variation of temperature across the thickness of materials with different thermal conductivities under steady states. Curve C will be applicable when thermal conductivity of the material
(a) increases with increase in temperature
(b) decreases with increase in temperature
(c) is very large
(d) is constant at all the temperatures
(e) none of the above.

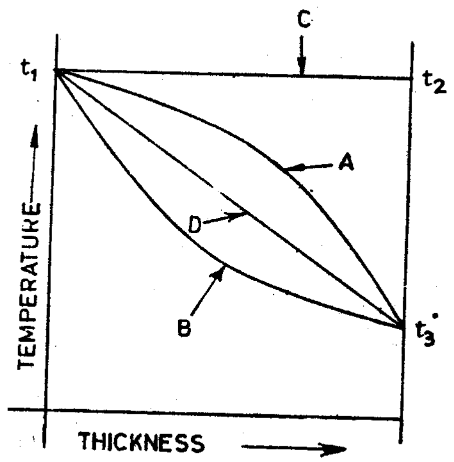

Fig. 6.1.

6.101. In Fig. 6.1, curve A will be applicable when thermal conductivity of the material
(a) increases with increase in temperature
(b) decreases with increase in temperature
(c) is very large
(d) is constant at all the temperatures
(e) none of the above.

6.102. In Fig. 6.1, curve B will be applicable when thermal conductivity of the material
(a) increases with increase in temperature
(b) decreases with increase in temperature
(c) is very large
(d) is constant at all the temperatures
(e) none of the above.

6.103. In Fig. 6.1, curve B will be applicable when thermal conductivity of the material
(a) increases with increase in temperature
(b) decreases with increase in temperature
(c) is very large
(d) is constant at all the temperatures
(e) none of the above.

6.104. The critical radius of insulation for a cylindrical pipe is

(a) $\frac{(\text{Thermal conductivity of insulating material})}{2 \times (\text{heat transfer coefficient at outer surface})}$

(b) $\frac{2 \times (\text{Thermal conductivity of insulating material})}{(\text{heat transfer coefficient at outer surface})}$

(c) inverse of (a)

(d) $\frac{(\text{thermal conductivity of insulating material})}{(\text{heat transfer coefficient at outer surface})}$

(e) inverse of (b).

6.105. The total emissivity power is defined as the total amount of radiation emitted by a black body per unit
(a) temperature (b) thickness
(c) area (d) time
(e) area and time.

6.106. The critical radius of insulation for a spherical shell is

(a) $\frac{\left(\text{thermal conductivity of insulating material}\right)}{\left(\text{heat transfer coefficient at outer surface}\right)}$

(*b*) $\dfrac{2 \times \text{(thermal conductivity of insulating material)}}{\text{(heat transfer coefficient at outer surface)}}$

(*c*) inverse of (*a*) (*d*) inverse of (*b*)
(*e*) none of the above.

6.107. The ratio of the energy absorbed by the body to total energy falling on it is called
(*a*) absorptive power
(*b*) emissive power
(*c*) absorptivity (*d*) emissivity
(*e*) none of the above.

6.108. 40% of incident radiant energy on the surface of a thermally transparent body is reflected back. If the transmissivity of the body be 0.15, then the emissivity of surface is
(*a*) 0.45 (*b*) 0.55
(*c*) 0.40 (*d*) 0.75
(*e*) 0.60.

6.109. LMTD for a heat exchanger is given by

(*a*) $\dfrac{\Delta t_2 - \Delta t_1}{\log\left(\dfrac{\Delta t_2}{\Delta t_1}\right)}$ (*b*) $\dfrac{\Delta t_2 - \Delta t_1}{\log\left(\dfrac{\Delta t_1}{\Delta t_2}\right)}$

(*c*) $\dfrac{\Delta t_2 - \Delta t_1}{\dfrac{\Delta t_2}{\Delta t_1}}$ (*d*) $\log \dfrac{(\Delta t_2 - \Delta t_1)}{\dfrac{\Delta t_2}{\Delta t_1}}$

(*e*) $\log \dfrac{(\Delta t_2 - \Delta t_1)}{\dfrac{\Delta t_1}{\Delta t_2}}$

where Δt_1 and Δt_2 are temperature differences between the hot and cold fluids at entrance and exit.

6.110. The amount of radiation mainly depends on
(*a*) nature of body
(*b*) temperature of body
(*c*) type of surface of body
(*d*) all of the above
(*e*) none of the above.

6.111. The emissive power of a body depends upon its
(*a*) temperature
(*b*) wave length
(*c*) physical nature
(*d*) all of the above
(*e*) none of the above.

6.112. Two plates spaced 150 mm apart are maintained at 1000°C and 70°C. The heat transfer will take place mainly by
(*a*) convection (*b*) free convection
(*c*) forced convection
(*d*) radiation
(*e*) radiation and convection.

6.113. Absorptivity of a body will be equal to its emissivity
(*a*) at all temperatures
(*b*) at one particular temperature
(*c*) when system is under thermal equilibrium
(*d*) at critical temperature
(*e*) for a polished body.

6.114. In regenerator type heat exchanger, heat transfer takes place by
(*a*) direct mixing of hot and cold fluids
(*b*) a complete separation between hot and cold fluids
(*c*) flow of hot and cold fluids alternately over a surface
(*d*) generation of heat again and again
(*e*) indirect transfer.

6.115. A perfect black body is one which
(*a*) is black in colour
(*b*) reflects all heat
(*c*) transmits all heat radiations
(*d*) absorbs heat radiations of all wave lengths falling on it
(*e*) fully opaque.

6.116. Planck's law holds good for
(*a*) black bodies
(*b*) polished bodies
(*c*) all coloured bodies
(*d*) all of the above
(*e*) none of the above.

6.117. If the temperature of a solid surface changes form 27°C to 627°C, then its emissive power changes in the ratio of
(*a*) 3 (*b*) 6
(*c*) 9 (*d*) 27
(*e*) 81.

6.118. Depending on the radiating properties, body will be transparent when
(*a*) $\rho = 0, \tau = 0$ and $\alpha = 1$
(*b*) $\rho = 1, \tau = 0,$ and $\alpha = 0$
(*c*) $\rho = 0, \tau = 1,$ and $\alpha = 0$
(*d*) $\tau = 0, \alpha + \rho = 1$

(e) $\alpha = 0, \tau + \rho = 1$.
(α = absorptivity, ρ = reflectivity,
τ = transmissibility)

6.119. Thermal radiation extends over the range of
(a) 0.01 to 0.1 μ (b) 0.1 to 100 μ
(c) 100 to 250 μ (d) 250 to 1000 μ
(e) 1000 to 2500 μ.

6.120. A grey body is one whose absorptivity
(a) varies with temperature
(b) varies with the wave length of incident ray
(c) varies with both
(d) does not vary with temperature and wave length of the incident ray
(e) there is no such criterion.

6.121. Effectiveness of heat exchanger is defined as

(a) $\frac{t_{hi} - t_{he}}{t_{hi} - t_{ci}}$ (b) $\frac{t_{ce} - t_{ci}}{t_{hi} - t_{ci}}$

(c) greater of (a) and (b)

(d) $\frac{t_{hi} - t_{ce}}{t_{ho} - t_{hi}}$ (e) $\frac{t_{hi} - t_{ce}}{t_{hi} - t_{ci}}$.

where

t_{hi} = temperature of hot fluid at inlet
t_{he} = temperature of hot fluid at exit
t_{ci} = temperature of cold fluid at inlet.
t_{ce} = temperature of cold fluid at exit.

7

Refrigeration and Air Conditioning

7.1. Pick up the wrong statement. A refrigerant should have
(*a*) low specific heat of liquid
(*b*) high boiling point
(*c*) high latent heat of vaporisation
(*d*) higher critical temperature
(*e*) low specific volume of vapour.

7.2. A standard ice point temperature corresponds to the temperature of
(*a*) water at 0°C (*b*) ice at – 4°C
(*c*) solid and dry ice
(*d*) mixture of ice, water and vapour under equilibrium conditions under NTP conditions
(*e*) mixture of ice and water under equilibrium conditions.

7.3. Vapour compression refrigeration is somewhat like
(*a*) Carnot cycle (*b*) Rankine cycle
(*c*) reversed Carnot cycle
(*d*) reversed Rankine cycle
(*e*) none of the above.

7.4. Which of the following cycles uses air as the refrigerant
(*a*) Ericsson (*b*) Stirling
(*c*) Carnot (*d*) Bell-coleman
(*e*) none of the above.

7.5. Ammonia-absorption refrigeration cycle requires
(*a*) very little work input
(*b*) maximum work input
(*c*) nearly same work input as for vapour compression cycle
(*d*) zero work input
(*e*) none of the above.

7.6. An important characteristic of absorption system of refrigeration is
(*a*) noisy operation
(*b*) quiet operation
(*c*) cooling below 0°C
(*d*) very little power consumption
(*e*) its input only in the form of heating.

7.7. The relative coefficient of performance is
(*a*) actual COP/theoretical COP
(*b*) theoretical COP/actual COP
(*c*) actual COP × theoretical COP
(*d*) 1–actual COP × theoretical COP
(*e*) 1-actual COP/theoretical COP.

7.8. Clapeyron equation is a relation between
(*a*) temperature, pressure and enthalpy
(*b*) specific volume and enthalpy
(*c*) temperature and enthalpy
(*d*) temperature, pressure, and specific volume
(*e*) temperature, pressure, specific volume and enthalpy.

7.9. Clapeyron equation is applicable for region at
(*a*) saturation point of vapour
(*b*) saturation point of liquid
(*c*) sublimation temperature
(*d*) triple point (*e*) critical point.

7.10. In vapour compression cycle, the condition of refrigerant is saturated liquid
(*a*) after passing through the condenser
(*b*) before passing through the condenser
(*c*) after passing through the expansion or throttle valve
(*d*) before entering the expansion valve
(*e*) before entering the compressor.

7.11. In vapour compression cycle, the condition of refrigerant is very wet vapour
(*a*) after passing through the condenser
(*b*) before passing through the condenser
(*c*) after passing through the expansion or throttle valve
(*d*) before entering the expansion valve
(*e*) before entering the compressor.

7.12. In vapour compression cycle, the condition of refrigerant is high pressure saturated liquid
(*a*) after passing through the condenser
(*b*) before passing through the condenser
(*c*) after passing through the expansion or throttle valve
(*d*) before entering the expansion valve
(*e*) before entering the compressor.

7.13. In vapour compression cycle the condition of refrigerant is superheated vapour
(*a*) after passing through the condenser
(*b*) before passing through the condenser
(*c*) after passing through the expansion or throttle valve
(*d*) before entering the expansion valve
(*e*) before entering the compressor.

7.14. In vapour compression cycle the condition of refrigerant is dry saturated vapour
(*a*) after passing through the condenser
(*b*) before passing through the condenser
(*c*) after passing through the expansion or throttle valve
(*d*) before entering the expansion valve
(*e*) before entering the compressor.

7.15. The boiling point of ammonia is
(*a*) – 100°C (*b*) – 50°C
(*c*) – 33.3°C (*d*) 0°C
(*e*) 33.3°C.

7.16. One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice
(*a*) in 1 hour (*b*) in 1 minute
(*c*) in 24 hours (*d*) in 12 hours
(*e*) in 10 hours.

7.17. One ton refrigeration corresponds to
(*a*) 50 kcal/min (*b*) 50 kcal/kr
(*c*) 80 kcal/min (*d*) 80 kcal/hr
(*e*) 1000 kcal/day.

7.18. In S.I. unit, one ton of refrigeration is equal to
(*a*) 210 kJ/min (*b*) 21 kJ/min
(*c*) 420 kJ/min (*d*) 840 kJ/min
(*e*) 105 kJ/min.

7.19. The vapour compression refrigerator employs the following cycle
(*a*) Rankine (*b*) Carnot
(*c*) Reversed Rankine
(*d*) Brayton (*e*) Reversed Carnot.

7.20. Allowable pressure on high-pressure side or ammonia absorption system is of the order of
(*a*) atmospheric pressure
(*b*) slightly above atmospheric pressure
(*c*) 2-4 bars (*d*) 5-6 bars
(*e*) 7-10 bars.

7.21. The moisture in a refrigerant is removed by
(*a*) evaporator (*b*) safety relief valve
(*c*) dehumidifier (*d*) driers
(*e*) expansion valve

7.22. The condensing pressure due to the presence of non-condensable gases, as compared to that actually required for condensing temperatures without non-condensable gases,
(*a*) will be higher
(*b*) will be lower
(*c*) will remain unaffected
(*d*) may be higher or lower depending upon the nature of non-condensable gases
(*e*) unpredictable.

7.23. Critical pressure of a liquid is the pressure
(*a*) above which liquid will remain liquid
(*b*) above which liquid becomes gas
(*c*) above which liquid becomes vapour
(*d*) above which liquid becomes solid
(*e*) at which all the three phases exist together.

7.24. Critical temperature is the temperature above which
(*a*) a gas will never liquefy
(*b*) a gas will immediately liquefy
(*c*) water will evaporate
(*d*) water will never evaporate
(*c*) none of the above.

7.25. The refrigerant for a refrigerator should have
(*a*) high sensible heat
(*b*) high total heat (*c*) high latent heat
(*d*) low latent heat (*e*) low sensible heat.

7.26. Rating of a domestic refrigerator is of the order of
(*a*) 0.1 ton (*b*) 5 tons
(*c*) 10 tons (*d*) 40 tons
(*e*) 100 tons.

7.27. The COP of a domestic refrigerator
(*a*) is less than 1
(*b*) is more than 1
(*c*) is equal to 1
(*d*) depends upon the make
(*e*) depends upon the weather conditions.

7.28. The domestic refrigerator uses following type of compressor
(*a*) centrifugal (*b*) axial
(*c*) miniature sealed unit
(*d*) piston type reciprocating
(*e*) none of the above.

7.29. Horse power per ton of refrigeration is expressed as
(*a*) $\frac{4.75}{\text{COP}}$ (*b*) $\frac{\text{COP}}{4.75}$
(*c*) $4.75 \times \text{COP}$ (*d*) $\frac{47.5}{\text{COP}}$
(*e*) none of the above.

7.30. Refrigeration in aeroplanes usually employs the following refrigerant
(*a*) CO_2 (*b*) Freon-11
(*c*) Freon-22 (*d*) Air
(*e*) none of the above.

7.31. Domestic refrigerator working on vapour compression cycle uses the following type of expansion device
(*a*) electrically operated throttling valve
(*b*) manually operated valve
(*c*) thermostatic valve
(*d*) capillary tube (*e*) expansion valve.

7.32. Air refrigeration operates on
(*a*) Carnot cycle
(*b*) Reversed Carnot cycle
(*c*) Rankine cycle
(*d*) Erricson cycle
(*e*) Brayton cycle.

7.33. Air refrigeration cycle is used in
(*a*) domestic refrigerators
(*b*) commercial refrigerators
(*c*) air conditioning
(*d*) gas liquefaction
(*e*) such a cycle does not exist.

7.34. In a vapour compression cycle, the refrigerant immediately after expansion valve is
(*a*) liquid (*b*) sub-cooled liquid
(*c*) saturated liquid
(*d*) wet vapour (*e*) dry vapour.

7.35. The vapour pressure of refrigerant should be
(*a*) lower than atmospheric pressure
(*b*) higher than atmospheric pressure
(*c*) equal to atmospheric pressure
(*d*) could be anything
(*e*) none of the above.

7.36. For better COP of refrigerator, the pressure range corresponding to temperature in evaporator and condenser must be
(*a*) small (*b*) high
(*c*) euqal (*d*) anything
(*e*) under some conditions small and under some conditions high.

7.37. The bank of tubes at the back of domestic refrigerator are
(*a*) condenser tubes
(*b*) evaporator tubes
(*c*) refrigerant cooling tubes
(*d*) capillary tubes
(*e*) throttling device.

7.38. The higher temperature in vapour compression cycle occurs at
(*a*) receiver (*b*) expansion valve
(*c*) evaporator (*d*) condenser discharge
(*e*) compressor discharge.

7.39. Highest temperature encountered in refrigeration cycle should be
(*a*) near critical temperature of refrigerant
(*b*) above critical temperature
(*c*) at critical temperature
(*d*) much below critical temperature
(*e*) could be anywhere.

7.40. In refrigerator, liquid receiver is required between condenser and flow controlling device, if quantity of refrigerant for system is
(*a*) less than 2 kg
(*b*) more than or equal to 3.65 kg
(*c*) more than 10 kg
(*d*) there is no such consideration
(*e*) none of the above.

7.41. Absorption system normally uses the following refrigerant

(a) Freon-11 (b) Freon-22
(c) CO_2 (d) SO_2
(e) ammonia.

7.42. If T_1 and T_2 be the highest and lowest absolute temperatures encountered in a refrigeration cycle working on a reversed Carnot cycle, then COP is equal to
(a) $\frac{T_1}{T_1 - T_2}$ (b) $\frac{T_2}{T_1 - T_2}$
(c) $\frac{T_1 - T_2}{T_2}$ (d) $\frac{T_1 - T_2}{T_2}$
(e) none of the above.

7.43. The value of COP in vapour compression cycle is usually
(a) always less than unity
(b) always more than unity
(c) equal to unity
(d) any one of the above
(e) none of the above.

7.44. In a refrigeration system, heat absorbed in comparison to heat rejected is
(a) more (b) less
(c) same
(d) more for small capacity and less for high capacity
(e) less for small capacity and more for high capacity.

7.45. Condensing temperature in a refrigerator is the temperature
(a) of cooling medium
(b) of freezing zone
(c) of evaporator
(d) at which refrigerant gas becomes liquid
(e) condensing temperature of ice.

7.46. Formation of frost on evaporator in refrigerator
(a) results in loss of heat due to poor heat transfer
(b) increases heat transfer rate
(c) is immaterial
(d) can be avoided by proper design
(e) decreases compressor power.

7.47. In refrigerators, the temperature difference between the evaporating refrigerant and the medium being cooled should be
(a) high, of the order of 25°
(b) as low as possible (3 to 11°C)
(c) zero (d) any value
(e) none of the above.

7.48. In a flooded evaporator refrigerator, an accumulator at suction of compressor is used to
(a) collect liquid refrigerant and prevent it from going to compressor
(b) detect liquid in vapour
(c) superheat the vapour
(d) collect vapours
(e) increase refrigeration effect.

7.49. Accumulators should have adequate volume to store refrigerant charge at least
(a) 10% (b) 25%
(c) 50% (d) 75%
(e) 100%.

7.50. At lower temperatures and pressures, the latent heat of vaporisation of a refrigerant
(a) decreases (b) increases
(c) remains same
(d) depends on other factors
(e) none of the above.

7.51. A refrigeration cycle operates between condenser temperature of + 27°C and evaporator temperature of – 23°C. The Carnot coefficient of performance of cycle will be
(a) 0.2 (b) 1.2
(c) 5 (d) 6
(e) 10.

7.52. If T_1 and T_2 be the highest and lowest absolute temperatures encountered in a heat pump operating on a reversed Carnot cycle, then its COP is equal to
(a) $\frac{T_1 - T_2}{T_1}$ (b) $\frac{T_1 - T_2}{T_2}$
(c) $\frac{T_2}{T_1 - T_2}$ (d) $\frac{T_1}{T_1 - T_2}$
(e) none of the above.

7.53. In vapour compression refrigeration system, refrigerant occurs as liquid between
(a) condenser and expansion valve
(b) compressor and evaporator
(c) expansion valve and evaporator
(d) compressor and condenser
(e) none of the above.

7.54. Pick up the correct statement about giving up of heat from one medium to other in ammonia absorption system

(*a*) strong solution to weak solution
(*b*) weak solution to strong solution
(*c*) strong solution to ammonia vapour
(*d*) ammonia vapour to weak solution
(*e*) ammonia vapour to strong solution.

7.55. Efficiency of a Cornot engine is given as 80%. If the cycle direction be reversed, what will be the value of COP of reversed Carnot cycle
(*a*) 1.25 (*b*) 0.8
(*c*) 0.5 (*d*) 0.25
(*e*) none of the above.

7.56. Highest pressure encountered in a refrigeration system should be
(*a*) critical pressure of refrigerant
(*b*) much below critical pressure
(*c*) much above critical pressure
(*d*) near critical pressure
(*e*) there is no such restriction.

7.57. If a heat pump cycle operates between the condenser temperature of +27°C and evaporator temperature of – 23°C, then the Carnot COP will be
(*a*) 0.2 (*b*) 1.2
(*c*) 5 (*d*) 6
(*e*) 10.

7.58. A certain refrigerating system has a normal operating suction pressure of 10 kg/cm^2 gauge and condensing pressure of about 67 kg/cm^2. The refrigerant used is
(*a*) Ammonia (*b*) Carbon dioxide
(*c*) Freon (*d*) Brine
(*e*) Hydrocarbon refrigerant.

7.59. Aqua ammonia is used as refrigerant in the following type of refrigeration system
(*a*) compression (*b*) direct
(*c*) indirect (*d*) absorption
(*e*) none of the above.

7.60. If the evaporator temperature of a plant is lowered, keeping the condenser temperature constant, the h.p. of compressor required will be
(*a*) same (*b*) more
(*c*) less
(*d*) more/less depending on rating
(*e*) unpredictable.

7.61. In a refrigeration cycle, the flow of refrigerant is controlled by
(*a*) compressor (*b*) condenser
(*c*) evaporator (*d*) expansion valve
(*e*) all of the above.

7.62. Where does the lowest temperature occur in a vapour compression cycle ?
(*a*) condenser (*b*) evaporator
(*c*) compressor (*d*) expansion valve
(*e*) receiver.

7.63. The leaks in a refrigeration system using Freon are detected by
(*a*) halide torch which on detection produces greenish flame lighting
(*b*) sulphur sticks which on detection gives white smoke
(*c*) using reagents (*d*) smelling
(*e*) sensing reduction in pressure.

7.64. Pick up the incorrect statement
(*a*) lithium bromide used in vapour absorption cycle is nonvolatile
(*b*) lithium bromide plant can't operate below 0°C
(*c*) a separator is used in lithium bromide plant to remove the unwanted water vapour by condensing
(*d*) concentration of solution coming out of lithium bromide generator is more in comparison to that entering the generator
(*e*) weak solution in liquid heat exchanger gives up heat to the strong solution.

7.65. The lower horizontal line of the refrigeration cycle plotted on pressure-enthalpy diagram represents
(*a*) condensation of the refrigerant vapour
(*b*) evaporation of the refrigerant liquid
(*c*) compression of the refrigerant vapour
(*d*) metering of the refrigerant liquid
(*e*) none of the above.

7.66. Mass flow ratio of NH_3 in comparison to Freon-12 for same refrigeration load and same temperature limits is of the order of
(*a*) 1 : 1 (*b*) 1 : 9
(*c*) 9 : 1 (*d*) 1 : 3
(*e*) 3 : 1.

7.67. Freon group of refrigerants are
(*a*) inflammable
(*b*) toxic
(*c*) non-inflammable and toxic
(*d*) non-toxic and inflammable
(*e*) non-toxic and non-inflammable.

7.68. Ammonia is
(*a*) non-toxic (*b*) non-inflammable
(*c*) toxic and non-inflammable
(*d*) highly toxic and inflammable
(*e*) none of the above.

7.69. In vapour compression cycle using NH_3 as refrigerant, initial charge is filled at
(*a*) suction of compressor
(*b*) delivery of compressor
(*c*) high pressure side colse to receiver
(*d*) low pressure side near receiver
(*e*) anywhere in the cycle.

7.70. Short horizontal lines on pressure-enthalpy chart show
(*a*) constant pressure lines
(*b*) constant temperature lines
(*c*) constant total heat lines
(*d*) constant entropy lines
(*e*) constant volume lines.

7.71. On the pressure-enthalpy diagram, condensation and desuperheating is represented by a horizontal line because the process
(*a*) involves no change in volume
(*b*) takes place at constant temperature
(*c*) takes place at constant entropy
(*d*) takes place at constant enthalpy
(*e*) takes place at constant pressure.

7.72. One ton of the refrigeration is
(*a*) the standard unit used in refrigeration problems
(*b*) the cooling effect produced by melting 1 ton of ice
(*c*) the refrigeration effect to freeze 1 ton of water at 0°C into ice at 0°C in 24 hours
(*d*) the refrigeration effect to produce 1 ton of ice at NTP conditions
(*e*) the refrigeration effect to produce 1 ton of ice in 1 hour time.

7.73. Superheating in a refrigeration cycle
(*a*) increases COP (*b*) decreases COP
(*c*) COP remains unaltered
(*d*) other factors decide COP
(*e*) unpredictable.

7.74. For proper refrigeration in a cabinet, if the temperature and vapour pressure difference between cabinet and atmosphere is high, then
(*a*) bigger cabinet should be used
(*b*) smaller cabinet should be used
(*c*) perfectly tight vapour seal should be used
(*d*) refrigerant with lower evaporation temperature should be used
(*e*) refrigerant with high boiling point must be used.

7.75. Choose the correct statement
(*a*) A refrigerant should have low latent heat
(*b*) If operating temperature of system is low, then refrigerant with low boiling point should be used
(c) Precooling and subcooling of refrigerant are same
(*d*) Superheat and sensible heat of a refrigerant are same
(*e*) Refrigerant is inside the tubes in case of a direct-expansion chiller.

7.76. The suction pipe diameter of refrigerating unit compressor in comparison to delivery side is
(*a*) bigger (*b*) smaller
(*c*) equal
(*d*) smaller/bigger depending on capacity
(*e*) unpredictable.

7.77. Moisture in freon refrigeration system causes
(*a*) ineffective refrigeration
(*b*) high power consumption
(*c*) freezing automatic regulating valve
(*d*) corrosion of whole system
(*e*) breakdown of refrigerant.

7.78. The advantage of dry compression is that
(*a*) it permits higher speeds to be used
(*b*) it permits complete evaporation in the evaporator
(*c*) it results in high volumetirc and mechanical efficiency
(*d*) all of the above
(*e*) none of the above.

7.79. Choose the wrong statement
(*a*) Temperature of medium being cooled must be below that of the evaporator
(*b*) Refrigerant leaves the condenser as liquid
(*c*) All solar thermally operated absorption systems are capable only of intermittent operation

(*d*) frost on evaporator reduces heat transfer
(*e*) refrigerant is circulated in a refrigeration system to transfer heat.

7.80. Under-cooling in a refrigeration cycle
(*a*) increases COP (*b*) decreases COF
(*c*) COP remains unaltered
(*d*) other factors decide COP
(*e*) unperdictable.

7.81. For obtaining high COP, the pressure range of compressor should be
(*a*) high (*b*) low
(*c*) optimum (*d*) any value
(*e*) there is no such criterion.

7.82. The coefficient of performance is the ratio of the refrigerant effect to the
(*a*) heat of compression
(*b*) work done by compressor
(*c*) enthalpy increase in compressor
(*d*) all of the above
(*e*) none of the above.

7.83. The C.O.P. of a refrigeration cycle with increase in evaporator temperature, keeping condenser temperature constant, will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) may increase or decrease depending on the type of refrigerant used
(*e*) unpredictable.

7.84. Vertical lines on pressure-enthalpy chart show constant
(*a*) pressure lines (*b*) temperature lines
(*c*) total heat lines
(*d*) entropy lines (*e*) volume lines.

7.85. Most of the domestic refrigerators work on the following refrigeration system
(*a*) vapour compression
(*b*) vapour absorption
(*c*) carnot cycle
(*d*) electrolux refrigerator
(*e*) dual cycle.

7.86. The general rule for rating refrigeration systems (excepting for CO_2 system) is to approximate following h.p. per ton of refrigeration
(*a*) 0.1 to 0.5 h.p. per ton of refrigeration
(*b*) 0.5 to 0.8 h.p. per ton of refrigeration
(*c*) 1 to 2 h.p. per ton of refrigeration
(*d*) 2 to 5 h.p. per ton of refrigeration
(*e*) 5 to 10 h.p. per ton refrigeration.

7.87. Reducing suction pressure in refrigeration cycle
(*a*) lowers evaporation temperature
(*b*) increases power required per ton of refrigeration
(*c*) lowers compressor capacity because vapour is lighter
(*d*) reduces weight displaced by piston
(*e*) all of the above.

7.88. The COP of electrolux refrigerator is equal to
(*a*) $\frac{\text{Heat absorbed by evaporator}}{\text{Heat supplied by gas burner}}$
(*b*) $\frac{\text{Heat supplied by gas burner}}{\text{Heat absorbed by evaporator}}$
(*c*) $\frac{(\text{Heat supplied by gas burner} - \text{Heat absorbed by evaporator})}{\text{Heat supplied by gas burner}}$
(*d*) reverse of (*c*)
(*e*) none of the above.

7.89. The refrigeration effect in a dry evaporator compared to flooded evaporator in a similar plant is
(*a*) same (*b*) more
(*c*) less
(*d*) more or less depending on ambient conditions
(*e*) unpredictable.

7.90. The C.O.P. of a refrigeration cycle with lowering of condenser temperature, keeping the evaporator temperature constant, will
(*a*) increase (*b*) decrease
(*c*) may increase or decrease depending on the type of refrigerant used
(*d*) remain unaffected
(*e*) unpredictable.

7.91. Which of the following refrigerants has lowest freezing point
(*a*) Freon-12 (*b*) NH_3
(*c*) CO_2 (*d*) Freon-22
(*e*) SO_2.

7.92. The COP of a vapour compression plant in comparison to vapour absorption plant is
(*a*) more
(*b*) less
(*c*) same
(*d*) more/less depending on size of plant
(*e*) unpredictable.

7.93. The C.O.P. of a domestic refrigerator in comparison to domestic air conditioner will be
(*a*) same (*b*) more
(*c*) less
(*d*) dependent on weather conditions
(*e*) unpredictable.

7.94. The evolution of heat of solution takes place in ammonia absorption plant when
(*a*) ammonia vapour goes into solution
(*b*) ammonia vapour is driven out of solution
(*c*) lithium bromide mixes with ammonia
(*d*) weak solution mixes with strong solution
(*e*) lithium bromide is driven out of solution.

7.95. The change in evaporator temperature in a refrigeration cycle, as compared to change in condenser temperature, influences the value of C.O.P.
(*a*) more (*b*) less
(*c*) equally (*d*) unpredictable
(*e*) none of the above.

7.96. Presence of moisture in a refrigerant affects the working of
(*a*) compressor (*b*) condenser
(*c*) evaparator (*d*) expansion valve
(*e*) heat transfer.

7.97. The leaks in a refrigeration system using ammonia are detected by
(*a*) halide torch which on detection produces greenish flame lighting
(*b*) sulphur sticks which on detection give white smoke
(*c*) using regents (*d*) smelling
(*e*) sensing reduction in pressure.

7.98. One of the purposes of sub-cooling the liquid refrigerant is to
(*a*) reduce compressor overheating
(*b*) reduce compressor discharge temperature
(*c*) increase cooling effect
(*d*) ensure that only liquid and not the vapour enters the expansion (throttling) valve
(*e*) none of the above.

7.99. Which of the following is not a desirable property of a refrigerant
(*a*) high miscibility with oil
(*b*) low boiling point
(*c*) good electrical conductor
(*d*) large latent heat
(*e*) non-inflammable.

7.100. Cooling water is required for following equipment in ammonia absorption plant
(*a*) condenser (*b*) evaporator
(*c*) absorber
(*d*) condenser and absorber
(*e*) condenser, absorber and separator (rectifier).

7.101. When two refrigerants are mixed in the proper proportions, the mixture forms a third refrigerant called
(*a*) synthetic refrigerant
(*b*) refrigerant mixture
(*c*) high pressure refrigerant
(*d*) auxiliary refrigerant
(*e*) an azeotrope.

7.102. The condenser and evaporator tubes in a Freon refrigeration plant are made of
(*a*) steel (*b*) copper
(*c*) brass (*d*) aluminium
(*e*) none of the above.

7.103. The electrolux refrigerator works on
(*a*) electro magnetic principle
(*b*) thermo-electric principle
(*c*) vapour compression system
(*d*) vortex tube system
(*e*) absorption refrigeration system.

7.104. The denser air system (air above atmospheric pressure throughout the cycle) as compared to open air system, for same range of temperature in Bell-Colemann cycle results in
(*a*) lower C.O.P. (*b*) higher C.O.P.
(*c*) same C.O.P. (*d*) unpredictable
(*e*) none of the above.

7.105. Lithium bromide in vapour absorption refrigeration system is used as
(*a*) refrigerant
(*b*) cooling substance
(*c*) auxiliary refrigerant
(*d*) absorbent (*e*) lubricant.

7.106. In electrolux refrigerator
(*a*) ammonia is absorbed in hydrogen
(*b*) ammonia evaporates in hydrogen
(*c*) ammonia is absorbed in water

(*d*) hydrogen evaporates in ammonia
(*e*) hydrogen is absorbed in water.

7.107. What pressure is allowed on ammonia system's high pressure side in absorption refrigeration system
(*a*) atmospheric (*b*) 5-10 kg/cm^2
(*c*) 17-20 kg/cm^2 (*d*) 25-30 kg/cm^2
(*e*) none of the above.

7.108. Fittings in ammonia absorption refrigeration system are made of
(*a*) cast steel or forgings
(*b*) copper (*c*) brass
(*d*) aluminium (*e*) none of the above.

7.109. Reciprocating refrigeration compressor uses following type of valve
(*a*) rotary valve (*b*) gate valve
(*c*) globe valve (*d*) poppet valve
(*e*) ring plate valve.

7.110. The denser air system as compared to open air system, for same range of temperatures in Bell-Colemann cycle results in
(*a*) lower H.P./ton of refrigeration
(*b*) higher H.P./ton of refrigeration
(*c*) same H.P./ton of refrigeration
(*d*) unpredictable (*e*) none of the above.

7.111. The most suitable refrigerant for a commercial ice plant is
(*a*) brine (*b*) NH_3
(*c*) freon (*d*) air
(*e*) CO_2.

7.112. Leaks in brine system can be detected by
(*a*) halide torch which on detection produces greenish flame lighting
(*b*) sulphur sticks which on detection give white smoke
(*c*) using reagents (*d*) smelling
(*e*) sensing reduction in pressure.

7.113. Big refrigeration plants (of capacity of the order of 1000 tons) usually employ following type of refrigeration plant
(*a*) vapour absorption
(*b*) vapour compression
(*c*) air cycle
(*d*) electrolux refrigerator
(*e*) vortex tube.

7.114. For ammonia system, the pipe should be of following material
(*a*) brass (*b*) copper
(*c*) cast steel or wrought iron
(*d*) aluminium (*e*) rubberised.

7.115. In an atmospheric cooling tower, the temperature of the circulating water can be reduced to
(*a*) 10-15° above surrounding atmosphere
(*b*) equal to surrounding atmosphere
(*c*) 10-15° below surrounding atmosphere
(*d*) 50-60° below surrounding atmosphere
(*e*) freezing point.

7.116. If ice in a plant is made at – 6°C and if temperature difference between ice and refrigerant is 5°C, then refrigerant temperature is
(*a*) – 1°C (*b*) 0°C
(*c*) – 11°C (*d*) – 6°C
(*e*) – 16°C.

7.117. The refrigerant is never filled to more than 80% of the rated capacity while refilling the refrigerant cylinder because
(*a*) to avoid refrigerant decomposition
(*b*) the cylinder would be too heavy for easy handling
(*c*) the 20% vapour space provides a safety margin for liquid expansion when the surrounding temperature rises
(*d*) the cylinders would become top heavy if filled 100% and tend to fall from the upright position
(*e*) it is the standard practice.

7.118. Which of the following is not a function of refrigerant oil ?
(*a*) to remove heat
(*b*) to lubricate the moving parts of the compressor
(*c*) to help insulate the refrigerant lines
(*d*) to form a seal for the compressor valves
(*e*) to dampen the noise generated by moving parts within the compressor.

7.119. Oil separator in a refrigeration cycle is installed between the
(*a*) compressor and condenser
(*b*) condenser and metering device
(*c*) metering device and evaporator
(*d*) evaporator and compressor
(*e*) none of the above.

7.120. A receiver is fitted in refrigeration unit in order to

(a) allow for variation of load
(b) remove heat (c) conserve heat
(d) form seal for compressor valves
(e) reduce the compressor work.

7.121. The following leak detector can be used on a positive halocarbon refrigerant system
(a) ammonia soaked swab
(b) sulphur candle
(c) electronic leak detector
(d) any one of the above
(e) none of the above.

7.122. Moisture in a refrigerant system is removed by
(a) driers (b) filter-driers
(c) dessicants (d) all of the above
(e) none of the above.

7.123. Cooling water at the inlet of condenser of a refrigeration plant enters at 20°C and leaves at 25°C. The refrigerant would be condensing at about
(a) 20°C (b) 25°C
(c) 30°C (d) 15°C
(e) 55°C.

7.124. The ideal location for a filter-drier in a refrigeration cycle is the point where it will remove moisture before the moisture enters the
(a) condenser (b) compressor
(c) cold side of system
(d) warm side of system
(e) all of the above.

7.125. The purpose of installing a flash chamber in the refrigeration circuit is to
(a) improve overall heat transfer coefficient
(b) reduce pressure losses through the evaporator
(c) reduce the size of evaporator by avoiding vapours going to evaporator
(d) all of the above
(e) none of the above.

7.126. Which of the following refrigerants has the highest critical point temperature
(a) Freon-11 (b) Freon-12
(c) Freon-22 (d) Ammonia
(e) none of the above.

7.127. The work input requirement for ammonia-absorption refrigeration cycle is low, because
(a) ammonia has high thermal conductivity
(b) ammonia has high latent heat
(c) ammonia is compressed in gaseous form
(d) pumping process involves vapour
(e) pumping process involves liquid.

7.128. The following type of expansion device is utilised in flooded evaporator
(a) motor operated valve
(b) self-actuated expansion valve
(c) capillary tube
(d) thermostatic device
(e) float valve.

7.129. Subcooling occurs when the vapour
(a) removes latent heat from the refrigerant
(b) removes sensible heat from the refrigerant
(c) has high latent heat
(d) has low latent heat
(e) has high thermal conductivity.

7.130. Choose the correct statement
(a) The absorption system is well known for its silent operation
(b) Automatic expansion valve is used to automatically control superheat
(c) Capillary tube can't be used for metering
(d) Condenser is usually located inside the refrigerated space
(e) Refrigerant absorbs heat in the condenser.

7.131. Which of the following refrigerant characteristics change constantly during the cooling cycle
(a) pressure and phase
(b) phase and flow
(c) flow and temperature
(d) temperature and pressure
(e) flow and pressure.

7.132. What is the usual form of liquid oil particles in a refrigerant
(a) fine fog (b) mist
(c) individual droplets
(d) all of the above
(e) none of the above.

7.133.. Which of the following refrigerants has highest refrigeration efficiency

(a) Freon-11 (b) Freon-22
(c) R-12 (d) R-113
(e) SO_2.

7.134. Chilled water with the application of principle of flash cooling is obtained by the following system
(a) absorption refrigeration system
(b) vapour compression system
(c) vortex system
(d) electro-mechanical system
(e) steam jet refrigeration system.

7.135. Presence of flash gas in the liquid feed to the expansion valve can cause the problem of
(a) feeding the evaporator unevenly
(b) loss of cooling capacity
(c) damage to the valve
(d) all of the above
(e) none of the above.

7.136. An evaporator pressure regulator performs the following function
(a) monitors evaporator temperature
(b) maintains compressor inlet pressure
(c) keeps pressure up for system needs
(d) all of the above
(e) none of the above.

7.137. The refrigeration plants are charged by introducing refrigerants from the cylinder at the
(a) suction of compressor
(b) crank case of compressor
(c) evaporator (d) receiver
(e) expansion valve.

7.138. Which of the following refrigerants has the highest critical point pressure
(a) Freon-11 (b) Freon-12
(c) Freon-22 (d) Ammonia
(e) none of the above.

7.139. The refrigerator which does not require compressor is known as
(a) vapour absorption refrigerator
(b) vapour compression refrigerator
(c) electrolux refrigerator
(d) carnot refrigerator
(e) turbo-refrigerator.

7.140. A hermetically sealed unit implies
(a) compressor is sealed
(b) compressor motor is sealed
(c) refrigerant cycle is sealed
(d) complete refrigeration unit is sealed
(e) compressor and motor are sealed.

7.141. Which of the following is not a desirable property of the refrigerant in a vapour compression refrigerator
(a) high h.p. per ton of refrigeration
(b) high critical temperature and pressure
(c) low vapour and liquid densities
(d) high latent heat of vaporisation and low specific heat
(e) high COP and thermal conductivity.

7.142. Which of the following is not a desirable property of good insulating material
(a) light weight
(b) high heat conductivity
(c) odourless
(d) low initial cost
(e) conformability.

7.143. The function of brine agitator in ice plant is to
(a) increase refrigeration effect
(b) increase COP
(c) reduce compressor power
(d) obtain uniform temperature of brine
(e) all of the above.

7.144. One of the reasons for an evaporator to not cool may be
(a) frozen oil
(b) faulty thermostat
(c) leaking refrigerant
(d) insufficient lubricant in refrigerant
(e) lot of frozen ice on it.

7.145. Choose the wrong statement
(a) Liquid refrigerant is charged into the compressor suction or discharge valve ports
(b) System is discharged easily with refrigerant in vapour form than in liquid form
(c) An absorption system is quiet in operation
(d) Non-condensable gases raise the condensing pressure above that required for the condensing temperature
(e) Refrigerant leaves the condenser as liquid.

7.146. For same compressor work, COP of refrigerator as compared to COP of heat pump is

(a) low (b) high
(c) same
(d) may be high or low
(e) unpredictable.

7.147. Choose the correct statement
(a) Automatic expansion valve can be used to control superheat and subcooling
(b) Amount of heat rejected by condenser is equal to amount of heat absorbed by evaporator
(c) Evaporator rejects heat from the refrigerating system
(d) Condensation is the process of changing vapour into liquid at constant temperature
(e) Freezing of a refrigerant in the evaporator is desirable.

7.148. Which of the following refrigerating plants requires no electricity
(a) vapour absorption
(b) vapour compression
(c) air-refrigeration
(d) vortex tube
(e) steam jet refrigeration.

7.149. Which of the following refrigerants has the lowest freezing point temperature
(a) Freon-11 (b) Freon-12
(c) Freon-22 (d) Ammonia
(e) none of the above.

7.150. Cryogenics refers to
(a) refrigeration at low temperature
(b) thermodynamic analysis at low temperature
(c) refrigeration and air conditioning in aeroplane
(d) engineering field concerned with equipment in the range of – 180°C to absolute zero
(e) refrigeration under vacuum conditions.

7.151. Which are the correct statements in respect of pressure ratio of compressor (Q.751 and 7.152) and mass of regrigerant circulated per ton of refrigerant circulated per ton of refrigeration (Q.7.153 and 7.154) for various refrigerants given below for a vapour compression system operating between temperature limits of – 15°C and + 30°C

Refrigerant	*Pressure ratio of compressor*	*Mass of refrigerant/ ton of refrigeration*
Freon-11 as compared to Freon-12, Freon-22 and NH3	(a) highest	—
	(b) lowest	—
	(c) same	—
	(d) depends on other factors	—
	(e) Unpreditable	—

7.152.

Feron-22	(a) highest	—
as compared to	(b) lowest	—
Freon-11	(c) same	—
Freon-12 and NH3	(d) depends on other factors	—
	(e) unpredictable	—

7.153.

Amonia	(a)	—	maximum
as compared to	(b)	—	minimum
Freon-11,	(c)	—	same
Freon-12 and	(d)	—	depends on other factors
Freon-22	(e)	—	unpredictable

7.154. Freon-12 as compared to

Freon-11,	(a)	—	maximum
Freon-12	(b)	—	minimum
and	(c)	+	same
NH3	(d)	—	depends on other factors
	(e)	—	unpredictable

7.155. Chemical formula of Freon-12 is
(a) $C\,Cl_2\,F_2$ (b) $C\,Cl_2\,F_3$
(c) $C\,Cl_3\,F_2$ (d) $C\,Cl_3\,F_3$
(e) $C\,Cl\,F_2$.

7.156. Air conditioning is concerned with maintaining
(a) temperature (b) humidity
(c) cleanliness (d) all the three above
(e) none of the above.

7.157. Saturation temperature
(a) is not a comfortable temperature
(b) can be attained by lowering pressure

(*c*) for any given pressure, is one and only one at which steam starts to vaporise or condense
(*d*) is very important parameter in air conditioning
(*e*) none of the above.

7.158. Relative humidity is equal to
(*a*) p_v/p_s (*b*) p_s/p_v
(*c*) $1-\frac{p_v}{p_s}$ (*d*) $1-\frac{p_s}{p_v}$
(*e*) $p_s - p_v$

where p_v = partial presure of water vapour in the air
and p_s = saturation pressure of water vapour at same temperature."

7.159. Relative humidity is
(*a*) something concerned with air conditioning
(*b*) the ratio of moisture present in air to the capability of air to hold maximum moisture
(*c*) the ratio of actual humidity to absolute humidity
(*d*) representative of amount of moisture held in air
(*e*) none of the above.

7.160. The air temperature at which water vapour in the air starts condensing is known as
(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) saturation temperature
(*d*) dew point temperature
(*e*) relative humidity.

7.161. Dew point is
(*a*) the temperature at which condensation of steam in saturated air will start
(*b*) the lowest attainable temperature for a mixture of air and steam
(*c*) dependent on pressure of air
(*d*) used in connection with air conditioning
(*e*) none of the above.

7.162. As warm air cools, its relative humidity
(*a*) increases
(*b*) decreases
(*c*) remains unaffected
(*d*) increases upto a limit and then decreases
(*e*) decreases upto a limit and then increases.

7.163. The process of addition of moisture to air at the constant dry bulb temperature is known as
(*a*) humidification
(*b*) dehumidification
(*c*) sensible cooling
(*d*) air conditioning
(*e*) dehydration.

7.164. Indication of amount of moisture in air is given by
(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) dew point temperature
(*d*) saturation temperature
(*e*) none of the above.

7.165. Wet bulb temperature is
(*a*) indication of amount of moisture in air
(*b*) measured by wetting the bulb of the thermometer
(*c*) less than dry-bulb temperature
(*d*) dependent on the dryness and temperature of air
(*e*) none of the above.

7.166. Humidity ratio or specific humidity is the
(*a*) mass in kg of water vapour contained in the air-vapour mixture per kg of dry air
(*b*) mass of the water vapour in kg contained in m^3 of air vapour mixture at its total pressure
(*c*) ratio of kg of moisture actually contained per kg of dry air and kg of moisture required to saturate one kg of dry air at same dry bulb temperature
(*d*) ratio of the mass of water vapour in air in a given volume at a given temperature to the mass of water vapour contained in the same volume at same temperature when air is saturated
(*e*) mass of vapour in a unit volume of dry air in an air vapour mixture.

7.167. The ratio of the actual partial pressure of the water vapour of the air-vapour mixture, to the pressure of the saturated water vapour at the same dry bulb temperature of the air, is known as
(*a*) relative humidity
(*b*) absolute humidity
(*c*) specific humidity
(*d*) humidity ratio
(*e*) degree of saturation.

7.168. Dew point temperature is constant as long as there is
(a) no change in moisture content of the air
(b) no change in the volume of air
(c) no change in wet bulb and dry bulb temperature
(d) no change in relative and specific humidity of air
(e) continuous increase in moisture content of air.

7.169. Heating of air without changing its moisture content takes place on psychrometric chart along
(a) a horizontal line of the constant dew point
(b) rising line (c) falling line
(d) curved line (e) none of the above.

7.170. Spray humidifying is the process of adding moisture to the air by passing it through
(a) chiller
(b) air conditioning plant
(c) washers
(d) any one of the above
(e) none of the above.

7.171. Dehumidification is the process of removing moisture from air with dry bulb temperature
(a) increasing (b) decreasing
(c) remaining constant
(d) changing in any direction
(e) corresponding to saturation condition.

7.172. The saturation temperature of the water at the partial pressure of the water vapour in the air-vapour mixture is known as
(a) dry bulb temperature
(b) wet bulb temperature
(c) dew point temperature
(d) saturation temperature
(e) vapour density.

7.173. Which of the following relationship is wrong
(a) total heat of moist air varies with wet bulb temperature
(b) sensible heat depends on dry bulb temperature
(c) latent heat depends on dew point
(d) dew point is fixed by the amount of moisture present
(e) none of the above is wrong statement.

7.174. Relative humidity is the
(a) mass in kg of water vapour contained in the air vapour mixture per kg of dry air
(b) mass of the water vapour in kg contained in m^3 of air vapour mixture at its total pressure
(c) ratio of kg moisture actually contained per kg of dry air and kg of moisture required to saturate one kg of dry air at same dry bulb temperature
(d) ratio of the mass of water vapour in air in a given volume at a given temperature to the mass of water vapour contained in the same volume at same temperature when air is saturated
(e) none of the above.

7.175. For unsaturated air, wet bulb temperature is
(a) less than dry bulb temperature
(b) less than dew point
(c) more than dry bulb temperature
(d) more than dew point
(e) unpredictable.

7.176. Absolute humidity or vapour density is the
(a) mass in kg of water vapour contained in the air-vapour mixture per kg of dry air
(b) mass of the water vapour in kg contained in m^3 of air vapour mixture at its total pressure
(c) ratio of kg of moisture actually contained per kg of dry air and kg of moisture required to saturate one kg of dry air at same dry bulb temperature
(d) ratio of the mass of water vapour in air in a given volume at a given temperature to the mass of water vapour contained in the same volume at same temperature when air is saturated
(e) none of the above.

7.177. Wet bulb temperature is
(a) less than dry bulb temperature
(b) same as saturation temperature
(c) indication of moisture content in air
(d) most important parameter used in psychrometric problems
(e) indication of performance of air conditioning system.

7.178. The psychrometric chart in air conditioning determines the
(*a*) wet bulb and dry bulb temperature
(*b*) psychrometric temperature requirements
(*c*) saturation temperature and relative humidity
(*d*) moist air conditions
(*e*) all of the above.

7.179. The weight of the water vapour in kg contained in 1 m^3 of air-vapour mixture at its total pressure is known is
(*a*) degree of saturation
(*b*) per cent humidity
(*c*) humidity ratio
(*d*) relative humidity
(*e*) vapour density.

7.180. The comfort conditions in air conditioning system are defined by
(*a*) 22°C dry bulb temperature (DBT) and 60% relative humidity (RH)
(*b*) 25°C DBT and 100% RH
(*c*) 20°C DBT and 75% RH
(*d*) 15°C DBT and 80% RH
(*e*) 25°C DBT and 40% RH.

7.181. Percentage humidity or degree of saturation is the
(*a*) mass in kg of water vapour contained in the air-vapour mixture per kg of dry air
(*b*) mass of the water vapour in kg contained in m^3 of air vapour mixture at its total pressure
(*c*) ratio of kg of moisture actually contained per kg of dry air and kg of moisture required to saturate one kg of dry air at same dry bulb temperature
(*d*) ratio of the mass of water vapour in air in a given volume at a given temperature to the mass of water vapour contained in the same volume at same temperature when air is saturated
(*e*) none of the above.

7.182. Vapour density is defined as the
(*a*) mass in kg of water vapour contained in the air-vapour mixture per kg of dry air
(*b*) mass of the water vapour in kg contained in m^3 of air vapour mixture at its total pressure
(*c*) ratio of kg of moisture actually contained per kg of dry air and kg of moisture required to saturate one kg of dry air at same dry bulb temperature
(*d*) ratio of the mass of water vapour in air in a given volume at a given temperature to the mass of water vapour contained in the same volume at same temperature when air is saturated
(*e*) none of the above.

7.183. At 100% relative humidity, wet bulb temperature is
(*a*) more than dew point
(*b*) less than dew point
(*c*) same as dew point
(*d*) has no relation with dew point
(*e*) unpredictable.

7.184. As relative humidity decreases, the dew point will be
(*a*) lower than wet bulb temperature
(*b*) higher than wet bulb temperature
(*c*) equal to wet bulb temperature
(*d*) no such correlation exists
(*e*) unpredictable.

7.185. For a given dry bulb temperature, as the relative humidity decreases, the wet bulb temperature will
(*a*) increase
(*b*) decrease
(*c*) be same
(*d*) increase/decrease depending on other factors
(*e*) none of the above.

7.186. The difference between dry bulb and wet bulb temperature increases as
(*a*) air becomes wetter
(*b*) air becomes drier
(*c*) atmospheric temperature rises
(*d*) atmospheric temperature decreases
(*e*) air humidity remains constant.

7.187. The ratio of kg of moisture actually contained per kg of dry air to the kg of moisture required to saturate 1 kg of air at the same dry bulb temperature is known as
(*a*) humidity ratio
(*b*) relative humidity
(*c*) degree of saturation
(*d*) specific humidity
(*e*) vapour density.

7.188. At 100% relative humidity, the temperatures—dry bulb, wet bulb, dew point and saturation are
(*a*) equal (*b*) different
(*c*) two equal, two different
(*d*) three equal, one different
(*e*) none of the above.

7.189. Sensible heat is the heat needed to
(*a*) vaporise water into steam and *vice versa*
(*b*) change the temperature of a liquid or vapour
(*c*) convert water into steam and superheat it
(*d*) measure dew point temperature
(*e*) none of the above.

7.190. Adiabatic saturation is the process of
(*a*) increasing humidity ratio without change in heat content
(*b*) keeping humidity ratio constant with change in dry bulb temperature
(*c*) heating air without changing humidity ratio
(*d*) adding moisture at same wet bulb temperature
(*e*) none of the above.

7.191. Air is dehumidified by
(*a*) heating (*b*) cooling
(*c*) chemical absorption
(*d*) (*a*) and (*c*) above
(*e*) (*b*) and (*c*) above.

7.192. When air is adiabatically saturated, the temperature attained is known as
(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) dew point temperature
(*d*) critical temperature
(*e*) adiabatically saturated temperature.

7.193. Dehydration is a form of dehumidifying process
(*a*) without the removal of heat at the same time
(*b*) with removal of heat at the same time
(*c*) converting latent heat of entering air into sensible heat in the leaving air
(*d*) (*a*) and (*c*) above
(*e*) (*b*) and (*c*) above.

7.194. Latent heat is the heat needed to
(*a*) vaporise water into steam and *vice versa*
(*b*) change the temperature of liquid or vapour
(*c*) convert water into steam and superheat it
(*d*) convert ice into steam
(*e*) convert water to supercooled ice.

7.195. When a mixture of air and water vapour is cooled at constant pressure upto saturation temperature of water vapour, the temperature attained is known as
(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) dew point temperaurc
(*d*) critical temperature
(*e*) adiabatically saturated temperature.

7.196. Total heat is the heat needed to
(*a*) vaporise water into steam and *vice versa*
(*b*) change the temperature of a liquid or vapour
(*c*) convert water into steam and superheat it
(*d*) convert ice into steam
(*e*) convert water to supercooled ice.

7.197. For completely dry air, total heat is
(*a*) sum of latent heat and sensible heat
(*b*) same as sensible heat
(*c*) same as latent heat
(*d*) more than sensible heat
(*e*) less than sensible heat.

7.198. Psychrometric chart
(*a*) is seldom used for air conditioning design
(*b*) provides plots for moist air conditions
(*c*) enables to determine wet bulb, and dew point temperature
(*d*) is a chart for conversion of British system into metric system
(*e*) is used to determine properties of refrigerants.

7.199. On psychrometric chart, dry bulb temperature lines are
(*a*) horizontal
(*b*) vertical
(*c*) straight inclined sloping downward to the right
(*d*) curved
(*e*) none of the above.

7.200. Central air conditioning system is normally employed where refrigeration and air conditioned air requirements respectively are more than
(*a*) 1 ton and 500 m^3/min.
(*b*) 10 tons and 1000 m^3/min.
(*c*) 25 tons and 2500 m^3/min.
(*d*) 50 tons and 5000 m^3/min.
(*e*) 100 tons and 7000 m^3/min.

7.201. Usually central air conditioning system as compared to individual system has
(*a*) higher overall efficiency
(*b*) lower overall efficiency
(*c*) same overall efficiency
(*d*) depends on other factors
(*e*) unpredictable.

7.202. Enthalpy of air-vapour mixture consists of
(*a*) sensible heat of dry air between 0°C and dry bulb temperature
(*b*) total enthalpy of the contained water vapour at saturation temperature
(*c*) heat of superheat of the contained water vapour
(*d*) all of the above
(*e*) none of the above.

7.203. Usually the quantity of free air per person in air conditioning system is taken as
(*a*) 1.2 m^3/sec (*b*) 1.2 m^3/min
(*c*) 1.2 m^3/hr (*d*) 6 m^3/min
(*e*) 0.2 m^3/min.

7.204. On psychrometric chart, relative humidity lines are
(*a*) horizontal (*b*) vertical
(*c*) straight inclined sloping downward to the right
(*d*) curved (*e*) none of the above.

7.205. Humidification process involves
(*a*) an increase in relative humidity
(*b*) a decrease in relative humidity
(*c*) an increase in specific humidity
(*d*) a decrease in specific humidity
(*e*) none of the above.

7.206. Air is normally dehumidified by
(*a*) injecting water (*b*) passing steam
(*c*) heating (*d*) cooling
(*e*) superheating.

7.207. The process of mixing two or more streams of moist air is
(*a*) adiabatic (*b*) isothermal
(*c*) constant volume
(*d*) constant pressure
(*e*) polytropic.

7.208. At 100% relative humidity
(*a*) dew point equals wet bulb temperature
(*b*) dry bulb temperature equals wet bulb temperature
(*c*) saturation and dew point temperatures become equal
(*d*) all of the above
(*e*) none of the above.

7.209. On psychrometric chart, dew point temperature lines are
(*a*) horizontal (*b*) vertical
(*c*) straight inclined sloping downward to the right
(*d*) curved (*e*) none of the above.

7.210. With decrease in relative humidity, the dew point becomes
(*a*) more than wet bulb temperature
(*b*) less than wet bulb temperature
(*c*) equal to wet bulb temperature
(*d*) more than dry bulb temperature
(*e*) unpredictable.

7.211. Which process does curve *AB* in Fig. 7.1 depict
(*a*) heating without moisture change
(*b*) cooling, humidifying by sprays
(*c*) heating, humidifying by sprays
(*d*) cooling, dehumidifying by sprays
(*e*) cooling without moisture change.

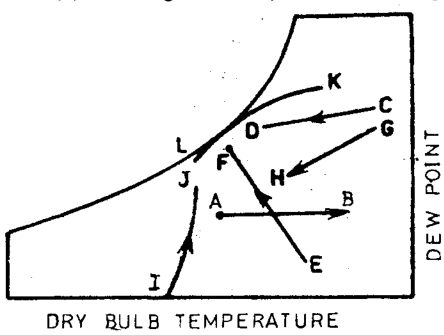

Fig. 7.1.

7.212. Which process does curve *CD* in Fig. 7.1 depict
(*a*) heating without moisture change
(*b*) cooling, humidifying by sprays
(*c*) heating, humidifying by sprays
(*d*) cooling, dehumidifying by sprays

(*e*) cooling without moisture change.

7.213. Which process does curve *EF* in Fig. 7.1 depict
(*a*) heating without moisture change
(*b*) cooling, humidifying by sprays
(*c*) heating, humidifying by sprays
(*d*) cooling, dehumidifying by sprays
(*e*) cooling without moisture change.

7.214. Which process does curve *GH* in Fig. 7.1 depict
(*a*) heating without moisture change
(*b*) cooling, humidifying by sprays
(*c*) heating, humidifying by sprays
(*d*) cooling, dehumidifying by sprays
(*e*) cooling without moisture change.

7.215. Which process does curve *IJ* in Fig 7.1 depict
(*a*) heating without moisture change
(*b*) cooling, humidifying by sprays
(*c*) heating, humidifying by sprays
(*d*) cooling, dehumidifying by sprays
(*e*) cooling without moisture change.

7.216. Which process does curve *KL* in Fig. 7.1 depict
(*a*) cooling, dehumidifying by sprays
(*b*) chemical drying, coil cooling
(*c*) coil heating, spray humidifying
(*d*) cooling, dehumidifying by sprays
(*e*) cooling, humidifying by sprays.

7.217. The saturation temperature for a given pressure is
(*a*) the temperature at which steam starts vaporising or condensing
(*b*) same as wet bulb temperature
(*c*) same as dry bulb temperature
(*d*) same as dew point temperature
(*e*) the minimum/maximum temperature attainable.

7.218. On psychrometric chart, wet bulb temperature lines are
(*a*) horizontal (*b*) vertical
(*c*) straight inclined sloping downward to the right
(*d*) curved (*e*) none of the above.

7.219. If air is heated without changing its moisture content, the dew point will
(*a*) increase (*b*) decrease
(*c*) remain same
(*d*) unpredictable (*e*) none of the above.

7.220. In spray humidification process, the dry bulb temperature is
(*a*) lowered (*b*) raised
(*c*) remains same (*d*) unpredictable
(*e*) none of the above.

7.221. Which of the following parameters remains constant during adiabatic saturation process on unsaturated air
(*a*) wet bulb temperature
(*b*) dry bulb temperature
(*c*) dew point temperature
(*d*) absolute humidity
(*e*) relative humidity.

7.222. Dust and other impurities in air are removed by
(*a*) air washing (*c*) centrifugal device
(*c*) electrostatic precipitation
(*d*) adhesive impregnated filters
(*e*) any one of the above.

7.223. In spray humidification process, the total heat
(*a*) is increased (*b*) is decreased
(*c*) remains same (*b*) unpredictable
(*e*) none of the above.

7.224. Air refrigeration cycle is used in aeroplanes because of
(*a*) high heat transfer rate of air
(*b*) higher COP
(*c*) lower temperature attainable
(*d*) lower weight of machine per ton of refrigeration
(*e*) ease of availability of cold air at high altitudes.

7.225. Air is dehumidified by
(*a*) heating (*b*) cooling
(*c*) injecting water
(*d*) injecting steam
(*e*) none of the above.

7.226. The relative humidity during sensible cooling process
(*a*) increases (*b*) decreases
(*c*) remains same (*d*) unpredictable
(*e*) none of the above.

7.227. Dehydration is the process
(*a*) of removing water vapour from surrounding air
(*b*) similar to dehumidification without removal of heat

(*c*) in which latent heat of incoming air is converted into sensible heat leaving the air
(*d*) all the three above
(*e*) none of the above.

7.228. During the sensible cooling process
(*a*) specific humidity remains constant
(*b*) specific humidity increases
(*c*) specific humidity decreases
(*d*) specific humidity is unpredictable
(*e*) none of the above.

7.229. Which of the following parameter decreases during sensible cooling of air
(*a*) specific humidity
(*b*) relative humidity
(*c*) dry bulb temperature
(*d*) wet bulb temperature
(*e*) all of the above.

7.230. Air craft refrigeration cycle employs centrifugal compressor in place of reciprocating compressor, and gas turbine in place of reciprocating expander for the following reason
(*a*) high compression/expansion ratio
(*b*) less maintenance problem
(*c*) capability of handling larger volume of air
(*d*) less power consumption
(*e*) no need of intercooling.

7.231. In humidification process
(*a*) relative humidity increases
(*b*) relative humidity decreases
(*c*) specific humidity increases
(*d*) specific humidity decreases
(*e*) specific humidity and relative humidity remain same.

7.232. Sensible heating or cooling of air is the process of heating or cooling
(*a*) at same humidity ratio
(*b*) while changing the humidity ratio
(*c*) at constant dry bulb temperature
(*d*) at same wet bulb temperature
(*e*) none of the above.

7.233. During evaporative cooling process the wet bulb temperature
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase/decrease
(*e*) unpredictable.

7.234. Sensible heating or cooling process on psychrometric chart is represented by
(*a*) vertical line (*b*) horizontal line
(*c*) inclined line (increasing)
(*d*) inclined line (decreasing)
(*e*) none of the above.

7.235. If S is the sensible heat and L the latent heat, then sensible heat factor is given by
(*a*) $\frac{S}{S+L}$ (*b*) $\frac{L}{S+L}$
(*c*) $\frac{S+L}{S}$ (*d*) $\frac{S+L}{L}$
(*e*) $\frac{S}{S-L}$.

7.236. If H_1 and H_2 be total heat of air entering and leaving the heating coil, and H_3 is total heat of air at the end of heating and humidification, then sensible heat factor during the heating and humidification process is given by
(*a*) $\frac{H_2-H_1}{H_3-H_1}$ (*b*) $\frac{H_2-H_1}{H_3}$
(*c*) $\frac{S+L}{S}$ (*d*) $\frac{S+L}{L}$
(*e*) $\frac{S}{S-L}$.

7.237. If t_1 and t_2 be dry bulb temperatures of air entering and leaving the cooling coil and t_3 the dry temperature of cooling coils then by-pass factor in case of sensible cooling of air is given by
(*a*) $\frac{t_2-t_3}{t_1-t_3}$ (*b*) $\frac{t_1-t_3}{t_2-t_3}$
(*c*) $\frac{t_3-t_1}{t_2-t_3}$ (*d*) $\frac{t_3-t_2}{t_1-t_3}$
(*e*) $\frac{t_1-t_2}{t_2-t_3}$.

7.238. If bypass factor is B during sensible cooling of air, then coil efficiency is given as
(*a*) $1-B$ (*b*) $B-1$
(*c*) $\frac{1}{B}$ (*d*) $\frac{1}{1-B}$
(*e*) $\frac{B}{1-B}$.

7.239. It is permissible to determine the resulting temperature of a mixture of air by the percentage method in the following cases

(*a*) wet bulb temperature
(*b*) dry bulb temperature
(*c*) dew point
(*d*) saturation temperature
(*e*) none of the above.

7.240. Which of the following parameter increases during heating and humidification process
(*a*) humidity ratio
(*b*) dry bulb temperature
(*c*) wet bulb temperature
(*d*) saturation temperature
(*e*) all of the above.

7.241. Sensible heat is the heat
(*a*) that can be added or removed form a substance without a change of state
(*b*) that is required to change the state of a substance
(*c*) corresponding to latent heat
(*d*) none of the above.

7.242. During sensible cooling process, wet bulb temperature
(*a*) remains same (*b*) increases
(*c*) decreases (*d*) unpredictable
(*e*) none of the above.

7.243. Dew point temperature is always an indication of
(*a*) dryness of air (*b*) latent heat
(*c*) moisture content of the air
(*d*) coolness of air
(*e*) none of the above.

7.244. Both dehumidification and cooling can be achieved by passing air over a cooling coil whose effective surface temperature is
(*a*) higher than the dew point temperature of the entering air
(*b*) lower than the dew point temperature of the entering air
(*c*) equal to the dew point temperature of the entering air
(*d*) lower than the dry bulb temperature of the entering air
(*e*) none of the above.

7.245. Sensible heat ratio, *i.e*, ratio of sensible heat removed divided by the total heat removed, in most comfort air conditioning is above
(*a*) 10% (*b*) 25%
(*c*) 50% (*d*) 90%
(*e*) none of the above.

7.246. Centigrade and Fahrenheit scale have same reading at
(*a*) – 40° (*b*) – 100°
(*c*) – 25° (*d*) – 273°
(*e*) none of the above.

7.247. Commonly used liquid absorbent is
(*a*) silica gel (*b*) activated alumina
(*c*) ethylene glycol
(*d*) any one of the above
(*e*) none of the above.

7.248. Boiling temperature of ammonia is
(*a*) – 33.33°C (*b*) – 78.5°C
(*c*) – 29.8°C (*d*) – 40.7°C
(*e*) none of the above.

7.249. During heating and humidification process, the relative humidity
(*a*) increases (*b*) decreases
(*c*) may increase or decrease
(*d*) remains constant
(*e*) unpredictable.

7.250. In sensible heating/cooling, following parameter remains constant
(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) relative humidity
(*d*) enthalpy (*e*) humidity ratio.

7.251. Which of the parameter remains constant during evaporative cooling process through an air washer with the same water recirculated again and again
(*a*) wet bulb temperature
(*b*) dry bulb temperature
(*c*) dew point (*d*) absolute humidity
(*e*) relative humidity.

7.252. Boiling temperature of CO_2 is
(*a*) – 33.33°C (*b*) – 78.5°C
(*c*) – 29.8°C (*d*) – 40.7°C
(*e*) none of the above.

7.253. Heating and dehumidification can be achieved simultaneously if air is passed through
(*a*) sprays of water maintained at a temperature higher than the dew point temperature of the entering air
(*b*) a solid absorbent surface
(*c*) a liquid absorbent spray
(*d*) any one of the (*b*) and (*c*)

(*e*) none of the above.

7.254. The specific humidity during evaporative cooling process with recirculated water spray
(*a*) increases (*d*) decreases
(*c*) remains same (*d*) unpredictable
(*e*) none of the above.

7.255. Boiling temperature of Fr-12 is
(*a*) – 33.33°C (*b*) – 78.5°C
(*c*) – 29.8°C (*d*) – 40.7°C
(*e*) none of the above.

7.265. Cooling and humidification can be achieved by washing air through sprays of water maintained at a temperature
(*a*) lower than the dew point temperature of the entering air
(*b*) higher than the dry bulb temperature of the entering air
(*c*) higher than the dew point temperature of the entering air
(*d*) more than the wet bulb temperature of the entering air
(*e*) none of the above.

7.257. Boiling temperature of Fr-22 is
(*a*) – 33.33°C (*b*) – 78.5°C
(*c*) – 29.8°C (*d*) – 40.7°C
(*e*) none of the above.

7.258. Pure humidification can be achieved by passing air through the spray water maintained at
(*a*) wet bulb temperature
(*b*) dry bulb temperature
(*c*) dew point temperature
(*d*) degree of saturation
(*e*) none of the above.

7.259. The following gas is preferred in refrigeration system
(*a*) Fr-12 (*b*) Fr-22
(*c*) NH_3 (*d*) CO_2
(*e*) Fr-11.

7.260. The BHP/ton refrigeration requirement with increase in condenser temperature, in a vapour compression system using reciprocating compressor receiving refrigerant gas at constant suction temperature, will follow
(*a*) linearly decreasing characteristic
(*b*) linear increasing characteristic
(*c*) first increase and then decrease
(*d*) first increase slowly and then rapidly
(*e*) none of the above.

COOLING TOWERS

7.261. A cooling tower is to be installed in a place where dry bulb temperature and wet bulb temperature are almost constant throughout ? Such a proposition is
(*a*) excellent (*b*) not desirable
(*c*) can be considered
(*d*) other data are required to determine the same
(*e*) none of the above.

7.262. Cooling effect in a cooling tower can be speeded by
(*a*) increasing air velocity over the wet surfaces
(*b*) lowering the barometric pressure
(*c*) reducing humidity of air
(*d*) all of the above
(*e*) none of the above.

7.263. Cooling range in cooling tower is the
(*a*) difference in temperature of hot water entering and cold water leaving
(*b*) difference in temperature of the cold water leaving the cooling tower and the wet bulb temperature of sorrounding air
(*c*) difference in temperature of the cold water and atmospheric temperature
(*d*) amount of heat thrown away by the cooling tower in kcal/hr
(*e*) none of the above.

7.264. Cooling towers are installed where
(*a*) water is available in plenty
(*b*) water is scarce
(*c*) for very big plants
(*d*) for very small plants
(*e*) finances are easily available.

7.265. Heat load of cooling tower is
(*a*) difference in temperature of hot water entering and cold water leaving
(*b*) difference in temperature of the cold water leaving the cooling tower and the wet bulb temperature of sorrounding air
(*c*) difference in temperature of the cold water and atmospheric temperature
(*d*) amount of heat thrown away by the cooling tower in kcal/hr

(*e*) none of the above.

7.266. Approach of cooling tower means
(*a*) difference in temperature of hot water entering and cold water leaving
(*b*) difference in temperature of the cold water leaving the cooling tower and the wet bulb temperature of sorrounding air
(*c*) difference in temperature of the cold water and atmospheric temperature
(*d*) amount of heat thrown away by the cooling tower in kcal/hr
(*e*) none of the above.

7.267. Drift in cooling tower refers to
(*a*) difference in temperature of hot water entering and cold water leaving
(*b*) difference in temperature of the cold water leaving the cooling tower and the wet bulb temperature of sorrounding air
(*c*) difference in temperature of the cold water and atmospheric temperature
(*d*) amount of heat thrown away by the cooling tower in kcal/hr
(*e*) none of the above.

7.268. Drift loss in cooling tower is of the order of
(*a*) 1 to 5% (*b*) 5 to 10%
(*c*) 10 to 20% (*d*) 25 to 50%
(*e*) none of the above.

7.269. Water, by evaporative cooling, can theoretically be cooled down to
(*a*) atmospheric temperature
(*b*) air's dry bulb temperature
(*c*) air's wet bulb temperature
(*d*) air's dew point temperature
(*e*) air's saturation temperature.

7.270. Cooling range in case of cooling ponds and towers is the temperature difference between
(*a*) hot and cold water
(*b*) actual cold water and air's wet bulb
(*c*) actual cold water and air's dry bulb
(*d*) actual hot water and air's dry bulb
(*e*) actual hot water and air's wet bulb.

7.271. 'Approach' in case of cooling ponds and towers is the temperature difference between
(*a*) hot and cold water
(*b*) actual cold water and air's wet bulb
(*c*) actual cold water and air's dry bulb
(*d*) actual hot water and air's dry bulb
(*e*) actual hot water and air's wet bulb.

7.272. The amount of blowdown water wasted in cooling towers depends on
(*a*) overflow to the towers
(*b*) weather conditions
(*c*) load on the tower
(*d*) hardness of the circulating water
(*e*) none of the above.

7.273. Scale is prevented in cooling towers by
(*a*) controlling blowdown to keep the concentration of soluble and scale forming solids below a limit
(*b*) softening the make up water with lime and soda ash, zeolite or some of the several phosphates
(*c*) adjusting pH between 7 to 7.5
(*d*) adding chlorine, copper sulphate, potassium permanganate etc. to the circulating water
(*e*) (*a*) and (*b*) above.

7.274. Delignification (eating up of wood) in cooling tower is controlled by
(*a*) controlling blowdown to keep the concentration of soluble and scale forming solids below a limit
(*b*) softening the make up water with lime and soda ash, zeolite or some of the several phosphates
(*c*) adjusting pH between 7 to 7.5
(*d*) adding chlorine, copper sulphate, potassium permanganate etc. to the circulating water
(*e*) (*a*) and (*b*) above.

7.275. In cooling tower, water is cooled by the process of
(*a*) condensation (*b*) fusion
(*c*) evaporation (*d*) sublimation
(*e*) all of the above.

7.276. Filling or decking in a cooling tower increases the rate of heat transfer by providing
(*a*) increased flow of water
(*b*) increased flow or air
(*c*) increased flow of water and air
(*d*) a large amount of wetted surface
(*e*) none of the above.

7.277. In an evaporative condenser, the rate at which the water evaporates depends upon the

(*a*) dry bulb temperature
(*b*) wet bulb temperature
(*c*) sensible heat (*d*) all of the above
(*e*) none of the above.

7.278. Algae formation in cooling tower is controlled by

(*a*) controlling blowdown to keep the concentration of soluble and scale forming solids below a limit
(*b*) softening the make up water with lime and soda ash, zeolite or some of the several phosphates
(*c*) adjusting pH between 7 to 7.5
(*d*) adding chlorine, copper sulphate, potassium permanganate etc. to the circulating water
(*e*) (*a*) and (*b*) above.

7.279. Cooling towers generally employ

(*a*) single speed fan drive
(*b*) two speed fan drives
(*c*) mulit-speed fan drives in steps
(*d*) infinitely variable multi-speed fan drives
(*e*) none of the above.