INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

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OBJECTIVES:

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
MODULE-I					
1	Define Combustion chamber	The end of the cylinder between the head and the piston face where combustion occurs. The size of the combustion chamber continuously changes from a minimum volume when the piston is at TDC to a maximum when the piston is at BDC. The term cylinder is sometimes synonymous with combustion chamber	Understand	CLO 1	AMEB09.01
2	Define Connecting rod	Rod connecting the piston with the rotating crankshaft, usually made of steel or alloy forging in most engines but may be aluminum in some small engines.	Remember	CLO 2	AMEB09.02
3	Define Stroke in IC engines	Movement distance of the piston from one extreme position to the other: TDC to BDC or BDC to TDC.	Understand	CLO 3	AMEB09.03
4	Define Bore in IC engines	Diameter of the cylinder or diameter of the piston face, which is the same Minus a very small clearance.	Remember	CLO 3	AMEB09.03
5	Define Cooling fins	Metal fins on the outside surfaces of cylinders and head of an air cooled engine. These extended surfaces cool the	Understand	CLO 2	AMEB09.02

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		cylinders by conduction and convection.			
6	Define Wide-Open Throttle (WOT)	Engine operated with throttle valve fully open when maximum power and/or speed is desired	Understand	CLO 3	AMEB09.03
7	Define Crown	The cylindrical-shaped mass that reciprocates back and forth in the cylinder, transmitting the pressure forces in the combustion chamber to the rotating Crankshaft. The top of the piston is called the crown.	Remember	CLO 2	AMEB09.02
8	Define Valves	Valves are mainly used in 4 stroke reciprocating diesel/petrol engines. Valves need a cam and rocker arm mechanism for opening and closing of valves	Remember	CLO 2	AMEB09.02
9	What is meant by Ports	Port is the best and simplest one to suck the air or air-fuel mixture to cylinder and kick the exhaust out. Ports are used in two stroke reciprocating petrol engines and also in rotary engines.	Remember	CLO 2	AMEB09.02
10	What is 4 stroke IC engine?	A four-stroke cycle engine is an internal combustion engine that utilizes four distinct piston strokes (intake, compression, power, and exhaust) to complete one operating cycle. The piston makes two complete passes in the cylinder to complete one operating cycle.	Understand	CLO 2	AMEB09.02
11	What is 2-stroke IC engine?	A two-stroke (or two-cycle) engine is a type of internal combustion engine which completes a power cycle with two strokes (up and down movements) of the piston during only one crankshaft revolution.	Understand	CLO 2	AMEB09.02
12	Define In-Line in cylinders	Cylinders are positioned in a straight line, one behind the other along the length of the crankshaft. They can consist of 2 to 11 cylinders or possibly more. In-line four-cylinder engines are very common for automobile and other applications. In-line six and eight cylinders are historically common automobile engines. In-line engines are sometimes called straight	Understand	CLO 3	AMEB09.03

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
13	Define Catalytic converter	Chamber mounted in exhaust flow containing catalytic material that promotes reduction of emissions by chemical reaction.	Understand	CLO 2	AMEB09.02
14	Define Crankcase	Part of the engine block surrounding the rotating crankshaft. In many engines, the oil pan makes up part of the crankcase housing	Understand	CLO 3	AMEB09.03
15	Define Fuel pump	Electrically or mechanically driven pump to supply fuel from the fuel tank (reservoir) to the engine. Many modern automobiles have an electric fuel pump mounted submerged in the fuel tank. Some small engines and early automobiles had no fuel pump, relying on gravity feed.	Understand	CLO 2	AMEB09.02
16	Define internal combustion engine ?	The internal combustion engine (IC) is a heat engine that converts chemical energy in a fuel into mechanical energy, usually made available on a rotating output shaft. Chemical energy of the fuel is first converted to thermal energy by means of combustion or oxidation with air inside the engine	Understand	CLO 1	AMEB09.01
17	What is Spark Ignition (SI) ?	An SI engine starts the combustion process in each cycle by use of a spark plug. The spark plug gives a high-voltage electrical discharge between two electrodes which ignites the air-fuel mixture in the combustion chamber surrounding the plug.	Remember	CLO 1	AMEB09.01
18	Define Compression Ignition (CI)?	The combustion process in a CI engine starts when the air-fuel mixture self-ignites due to high temperature in the combustion chamber caused by high compression.	Understand	CLO 3	AMEB09.03
19	Define Top-Dead-Center (TDC) ?	Position of the piston when it stops at the furthest point away from the crankshaft. Top because this position is at the top of most engines (not always), and dead because the piston stops at this point. Because in some engines top-dead-centre is not at the top of the engine (e.g., horizontally opposed engines, radial engines, etc.), some Sources call this position	Remember	CLO 2	AMEB09.02
20	Define Bottom-Dead-Center (BDC) ?	Position of the piston when it stops at the point closest to the crankshaft. Some sources call this Crank-End-Dead-Center (CEDC) because it is not always	Understand	CLO 2	AMEB09.02

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		at the bottom of the engine. Some sources call this point Bottom-Center (BC)			
21	What is Direct Injection (DI) ?	Fuel injection into the main combustion chamber of an engine. Engines have either one main combustion chamber (open chamber) or a divided combustion chamber made up of a main chamber and a smaller connected secondary chamber.	Understand	CLO 3	AMEB09.03
22	Define Crankshaft ?	The crankshaft is connected to the engine block with the main bearings. It is rotated by the reciprocating pistons through connecting rods connected to the crankshaft, offset from the axis of rotation. This offset is sometimes called crank throw or crank radius. Most crankshafts are made of forged steel, while some are made of cast iron	Remember	CLO 1	AMEB09.01
23	Define Fuel injector ?	A pressurized nozzle that sprays fuel into the incoming air on SI engines or into the cylinder on CI engines. On SI engines, fuel injectors are located at the intake valve ports on multipoint port injector systems and upstream at the intake manifold inlet on throttle body injector systems. In a few SI engines, injectors spray directly into the combustion chamber.	Remember	CLO 2	AMEB09.02
24	Define Head gasket?	Gasket which serves as a sealant between the engine block and headwhere they bolt together. They are usually made in sandwich construction of metal and composite materials. Some engines use liquid head gaskets.	Remember	CLO 2	AMEB09.02
25	Define Piston and Piston rings?	Piston is a cylindrical part which reciprocates inside the cylinder and is used for doing work and getting work. Piston has piston rings tightly fitted in groove around piston and provide a tight seal so as to prevent leakage across piston and cylinder wall during piston's reciprocating motion. Pistons are manufactured by casting or forging process. Pistons are made of cast iron, aluminumalloy. Piston rings are made of silicon, cast iron, steel alloy by casting process.	Understand	CLO 2	AMEB09.02
26	What is Gudgeon pin ?	It is the pin joining small end of the connecting rod and piston. This is made of steel by forging process	Understand	CLO 2	AMEB09.02

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
27	Define Carburettor?	Carburettor is device to prepare the air fuel mixture in right proportion and supplyat right time.	Understand	CLO 2	AMEB09.02
28	What is Clearance volume?	It is the volume space above the piston inside cylinder, when piston is at top dead centre. It is provided for cushioning considerations and depends, largely upon compression ratio.	Understand	CLO 2	AMEB09.02
29	Define Injection nozzle?	It is a device used to control the Air fuel ratio in the diesel engine.	Understand	CLO 2	AMEB09.02
30	What is meant by CI Engine ? Why it is called so ?	CI engine means compression ignition engine. In CI engine the fuel is injected by afuel injector in atomized form because of high compressed air it gets ignited automatically. Hence it is called as compression ignition engine.	Understand	CLO 2	AMEB09.02
31	Define Camshaft ?	Rotating shaft used to push open valves at the proper time in the engine cycle, either directly or through mechanical or hydraulic linkage (push rods, rocker arms, tappets). Most modern automobile engines have one or more camshafts mounted in the engine head (overhead cam). Most older engines had camshafts in the crankcase.	Understand	CLO 2	AMEB09.02
32	Define Crankshaft ?	Rotating shaft through which engine work output is supplied to external systems. The crankshaft is connected to the engine block with the mainbearings. It is rotated by the reciprocating pistons through connecting rods connected to the crankshaft, offset from the axis of rotation.	Understand	CLO 2	AMEB09.02
33	Define Flywheel ?	Rotating mass with a large moment of inertia connected to the crankshaft of the engine. The purpose of the flywheel is to store energy and furnish a large angular momentum that keeps the engine rotating between power strokes and smooths out engine operation.	Remember	CLO 3	AMEB09.03
34	Define Radiator ?	Liquid-to-air heat exchanger of honeycomb construction used to remove heat from the engine coolant after the engine has been cooled. The radiator is usually mounted in front of the engine in the flow of air as the automobile moves forward. An engine-driven fan is often used to increase air flow through the	Understand	CLO 2	AMEB09.02

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		radiator.			
35	What is Speed control-cruise control ?	Automatic electric-mechanical control system that keeps the automobile operating at a constant speed by controlling engine speed	Understand	CLO 3	AMEB09.03
		MODULE-II			
1	Define induction stroke	The induction stroke is the stroke of the piston in an internal combustion engine in which working fluid is drawn into the cylinder. In a car engine, the combustion cycle begins with the induction stroke which pulls a gasoline/air mixture into the cylinder	Understand	CLO 3	AMEB09.03
2	What happens during power stroke	The exhaust stroke is the final stroke and occurs when the exhaust valve is open and the intake valve is closed. Piston movement evacuates exhaust gases to the atmosphere. As the piston reaches BDC during the power stroke combustion is complete and the cylinder is filled with exhaust gases	Understand	CLO 4	AMEB09.04
3	Define Throttle	Butterfly valve mounted at the upstream end of the intake system, used to control the amount of air flow into an SI engine. Some small engines and stationary constant-speed engines have no throttle	Understand	CLO 5	AMEB09.05
4	Define compression stroke	The compression stroke is when the trapped air-fuel mixture is compressed inside the cylinder. Compressing the air-fuel mixture allows more energy to be released when the charge ignited. Intake and exhaust valves must be closed to ensure that the cylinder is sealed to provide compression.	Understand	CLO 6	AMEB09.06
5	Define swirl	The main macro mass motion within the cylinder is a rotational motion called swirl. It is generated by constructing the intake system to give a tangential component to the intake flow as it enters the cylinder This is done by shaping and contouring the intake manifold, valve ports, and sometimes even the piston face. Swirl greatly enhances the mixing of air and fuel to give a homogeneous mixture in the very short time available for this in	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		modern high-speed engines.			
6	Define turbulent flows	Due to the high velocities involved, all flows into, out of, and within engine cylinders are turbulent flows. The exception to this is those flows in the corners and small crevices of the combustion chamber where the close proximity of the walls dampens out turbulence.	Understand	CLO 5	AMEB09.05
7	Define Fuel injectors	Fuel injectors are nozzles that inject a spray of fuel into the intake air. They are normally controlled electronically, but mechanically controlled injectors which are cam actuated also exist. A metered amount of fuel is trapped in the nozzle end of the injector, and a high pressure is applied to it, usually by a mechanical compression process of some kind.	Understand	CLO 6	AMEB09.06
8	Define Alcohols in fuel	Alcohols are an attractive alternate fuel because they can be obtained from a number of sources, both natural and manufactured. Methanol (methyl alcohol) and ethanol (ethyl alcohol) are two kinds of alcohol that seem most promising and have had the most development as engine fuel.	Understand	CLO 6	AMEB09.06
9	Define fuel sensitivity	Operating conditions used to measure MON are more severe than those used to measure RON. Some fuels, therefore, will have a RON greater than MON. The difference between these is called fuel sensitivity: FS = RON – MON	Understand	CLO 5	AMEB09.05
10	Define Otto cycle	Otto cycle is a is a combination of 4 thermodynamic processes used as a basis of all the spark ignition engines. It consists of a constant volume heat addition process along with suction, exhaust and heat removal processes. The name Otto comes from its inventor named Nikolaus Otto	Remember	CLO 6	AMEB09.06
11	Define Choked Flow	Choked flow is a compressible flow effect. The parameter that becomes "choked" or "limited" is the fluid velocity. Choked flow is a fluid dynamic condition associated with the Venturi effect. .Under choked conditions, valves and calibrated	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		orifice plates can be used to produce a desired mass flow rate			
12	Define Normal combustion	It is defined as spark-ignited flame moves steadily across the combustion chamber until the charge is fully consumed.	Understand	CLO 6	AMEB09.06
13	Define Abnormal combustion	It is defined as fuel composition, engine design and operating parameters, combustion chamber deposits may prevent occurring of the normal	Remember	CLO 6	AMEB09.06
14	Define knock	Knock is the auto ignition of the portion of fuel, air and residual gas mixture ahead of the advancing flame that produces a noise.	Remember	CLO 7	AMEB09.07
15	Define delay period	There is a delay of approx. constant duration until a noticeable increase in the cylinder pressure as a result of chemical reactions is recorded in pressure ~ alpha diagram called the delay period	Understand	CLO 7	AMEB09.07
16	Define Combustion ?	Combustion may be defined as a relatively rapid chemical combination of hydrogen and carbon in fuel with oxygen in air resulting in liberation of energy in the form of heat.	Understand	CLO 3	AMEB09.03
17	Define Surface Ignition ?	It is defined as ignition of the fuel-air charge by any hot surface other than the spark discharge prior to the arrival of the normal flame front.it may occur before the spark ignites the charge or after normal ignition.	Understand	CLO 5	AMEB09.05
18	What is auto-ignition ?	A mixture of fuel and air can react spontaneously and produce heat by chemical reaction in the absence of flame to initiate the combustion or self-ignition. This type of self-ignition in the absence of flame is known as Auto-Ignition	Understand	CLO 5	AMEB09.05
19	Define knocking/Detonation/pinging ?	This is one process that happens within the combustion chamber. It sounds like a small ticking or rattling noise within the engine. In long term, the piston and ring can be damaged as well as the spark plug and valve.	Understand	CLO 6	AMEB09.06
20	What is Ricardo Diagram ?	Ricardo diagram is another important term in combustion. This diagram is important because it is used to study	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		about the time ignition of one combustion.If the fuel in the chamber burned very fast ,slow or late. Within the pressure and crank angle.			
21	Define Stoichiometry ?	It is the calculation of reactants and products in chemical reactions and measures these quantitative relationships, and is used to determine the amount of products and reactants that are produced or needed in a given reaction.	Understand	CLO 5	AMEB09.05
22	What is Air–fuel ratio (AFR) ?	The air–fuel ratio is the most common reference term used for mixtures in internal combustion engines. The term is also used to define mixtures used for industrial furnace heated by combustion. The AFR in mass units is employed in fuel oil fired furnaces, while volume (or mole) units are used for natural gas fired furnaces	Understand	CLO 6	AMEB09.06
23	What is stoichiometric ratio(φ)?	It is the exact ratio between air and flammable gas or vapor at which complete combustion takes place. A stoichiometric ratio is neither too rich nor too lean.A/F ratio is 14.7:1, which means 14.7 parts of air to one part of fuel.	Understand	CLO 5	AMEB09.05
24	Define Cetane number (cetane rating) ?	It is an indicator of the combustion speed of diesel fuel and compression needed for ignition. It is an inverse of the similar octane rating for gasoline. The CN is an important factor in determining the quality of diesel fuel, but not the only one; other measurements of diesel's quality include (but are not limited to) energy content, density, lubricity, cold-flow properties and sulphur content	Understand	CLO 5	AMEB09.05
25	Define Octane number ?	An *octane rating*, or *octane number*, is a standard measure of the performance of an engine or aviation *fuel*. The higher the *octane number*, the more compression the *fuel* can withstand before detonating (igniting).Use of gasoline with lower *octane numbers* may lead to the problem of engine knocking.	Remember	CLO 6	AMEB09.06
26	What is supercharger?	A supercharger is an air compressor that increases the pressure or density of air supplied to an internal combustion engine. This gives each intake cycle of	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		theengine more oxygen, letting it burn more fuel and do more work, thus increasing power.			
27	Define anti-knocking ?	An antiknock agent is a gasoline additive used to reduce engine knocking and increase the fuel's octane rating by raising the temperature and pressure at which auto-ignition occurs	Understand	CLO 7	AMEB09.07
28	Define spark-knock ?	A continued advancement in the spark timing, lead to high pressure oscillation in the combustion chamber as a result of the detonation of the end gas which effect is detrimental to the engine components if the engine is ran in this condition for a period of time. This type of knock is called spark-knock.	Remember	CLO 6	AMEB09.06
29	What is meant by Scavenging ?	Fuel is added to the air with either a carburetor or fuel injection. This incoming mixture pushes much of the remaining exhaust gases out the open exhaust valve and fills the cylinder with a combustible air-fuel mixture, a process called scavenging.	Remember	CLO 7	AMEB09.07
30	Define ignition ?	An ignition system generates a spark or heats an electrode to a high temperature to ignite a fuel-airmixturein SI internal combustion engines, oil-fired and gas-fired boilers, rocket engines, etc.	Understand	CLO 6	AMEB09.06
31	Define combustion inefficiency?	Internal combustion engine exhaust contains combustible species: CO, Hz,unburned hydrocarbons, and particulates. When their concentrations are known, the combustion efficiency , The chemical energy carried out of the engine in these combustibles represents the combustion inefficiency. $$1-\eta_i = \frac{\sum x_i Q_{hvi}}{\left\{\frac{m_f}{m_a+m_f}\right] Q_{Hvf}}$$	Remember	CLO 7	AMEB09.07
32	What is volumetric efficiency of an I.C Engine? ?	The intake system-the air filter, carburetor, and throttle plate (in a spark ignition engine), intake manifold, intake port, intake valve--restricts the amount of air which an engine of given displacement can induct. The parameter used to measure the effectiveness of an engine's induction process is the volumetric eficiency.	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		$$\eta = \frac{2m_a}{\rho_{al} V_d N}$$			
33	Define Air/Fuel(A/F) Ratio ?	In engine testing, both the air mass flow rate m_a and the fuel mass flow rate m_f are normally measured. The ratio of these flow rates is useful in defining engine operating condition. $$A/F = \frac{m_a}{m_f}$$	Understand	CLO 8	AMEB09.08
34	Define Throttle?	Butterfly valve mounted at the upstream end of the intake system, used to control the amount of air flow into an SI engine. Some small engines and stationary constant-speed engines have no throttle.	Remember	CLO 7	AMEB09.07
35	Define Wrist pin?	Pin fastening the connecting rod to the piston (also called the piston pin).	Remember	CLO 7	AMEB09.07
MODULE-III					
1	Define maximum brake torque (MBT)	The optimum timing which gives maximum brake torque (called maximum brake torque (MBT) occurs when magnitude of these two opposing trends just offset each other.	Understand	CLO 7	AMEB09.07
2	Define Valve lift	The distance which a valve opens is called valve lift and is generally on the order of a few millimeters to more than a centimeter depending upon the engine size. Usually about 5-10mm $$l_{max} < d_v/4$$	Remember	CLO 8	AMEB09.08
3	Define coefficient of discharge (CD)	The coefficient of discharge (CD) is defined as the ratio of actual discharge to ideal discharge. The flow through engines it is equally important to have accurate values for coefficients of discharge through the combinations of valves, ports and ducts	Understand	CLO 7	AMEB09.07
4	Define Rated Speed	Rated Speed is the speed of the motor (stated in R.P.M) at which it produces its rated (maximum) power, when the specified (rated) voltage is given at its rated Load. While, maximum speed is the maximum attainable speed in a motor without damaging the bearings and other components of the motor.	Remember	CLO 7	AMEB09.07
5	Unittow Scavenged or Through-Flow Scavenged	Intake ports are in the cylinder walls and exhaust valves in the head (or intake valves are in the head and exhaust ports are in the wall, which is less common).	Understand	CLO7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		This is the most efficient system of scavenging but requires the added cost of valves.			
6	Define combustion efficiency	A combustion efficiency TJc is defined to account for the fraction of fuel which burns. TJc typically has values in the range0.95 to 0.98 when an engine is operating properly. For one engine cycle in one cylinder, the heat added is $$Q_{\text{in}} = m_f Q_{\text{HV}}\, \eta_c$$	Understand	CLO 8	AMEB09.08
7	Define Turbocharger	Turbine-compressor used to compress incoming air into the engine. The turbine is powered by the exhaust flow of the engine and thus takes very little useful work from the engine	Remember	CLO 7	AMEB09.07
8	Define Indicated Power	Indicated Power is the Theoretical Power Output of an IC Engine. The Actual Power output (Brake Power) differs from Indicated Power due to frictional losses. Theoretically, IP = 1/60 * P*L*A*N*k	Remember	CLO 8	AMEB09.08
9	What is frictional power	The sum of all those losses are known as frictional energy and when it is expressed in power unit, known as frictional power. The remaining power is known as brake power available to useful work.	Remember	CLO 8	AMEB09.08
10	What does stroker motor mean	A Stroker kit is an aftermarket assembly that increases the displacement of a reciprocating engine by increasing the travel of the piston (that is, the piston moves farther up and/or down in the cylinder).	Understand	CLO 7	AMEB09.07
11	Define Brake mean effective pressure (BMEP)	Brake mean effective pressure (BMEP) is the mean effective pressure calculated from the dynamometer power (torque). This is the actual output of the internal combustion engine, at the crankshaft. Brake mean effective pressure takes into account the engine efficiency.	Understand	CLO 8	AMEB09.08
12	Define mechanical efficiency of the engine ($\eta_{m)}$)	It is defined as brake mean effective pressure function of the indicate mean effective pressure BMEP=η_m*IMEP	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
13	What does engine speed mean	Idle speed (or idle) is the rotational speed an engine runs at when the engine is idling, that is, when the engine is uncoupled from the drivetrain and the throttle pedal is not depressed. In combustion engines, idle speed is generally measured in revolutions per minute (rpm) of the crankshaft.	Understand	CLO 8	AMEB09.08
14	Define Friction mean effective pressure (FMEP)	Friction mean effective pressure (FMEP) is an indicator of the mean effective pressure of the engine lost through friction and it's the difference between indicated mean effective pressure and brake mean effective pressure. $FMEP = IMEP - BMEP$	Understand	CLO 7	AMEB09.07
15	Define friction torque (T_f)	Friction torque is the torque caused by the frictional force that occurs when two objects in contact move. This can be find out by friction mean effective pressure. $T_f = n c V_d FMEP / 2\pi n r$	Understand	CLO 8	AMEB09.08
16	Define mean effective pressure of an I.C. engine	Mean effective pressure is defined as the constant pressure acting on the pistonduring the working stroke. It is also defined as the ratio of work done to the strokevolume or piston displacement volume.	Understand	CLO 7	AMEB09.07
17	Define the term compression ratio ?	Compression ratio is the ratio between total cylinder volume to clearance volume. It is denoted by the letter 'r'	Remember	CLO 8	AMEB09.08
18	Define clearance ratio ?	Clearance ratio is defined as the ratio of clearance volume to swept volume (or) stroke volume. $$C = \frac{V_c}{V_s}$$ Vs– swept volume VsVc– clearance volume	Understand	CLO 8	AMEB09.08
19	Define mechanical efficiency in case of an IC engine?	Mechanical efficiency of an I.C. engine is defined as the ratio of brake power and indicated power Mechanical efficiency= BP/FP	Remember	CLO 7	AMEB09.07
20	Define brake specific fuel consumption ?	Brake specific fuel consumption is defined as the ratio of the mass of fuel consumed per hour per unit power output. $$bsfc = m_f \backslash BP$$	Understand	CLO7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
21	What is meant by I.P and B.P ?	I. P – Indicated power B. P. – Brake power IP is defined as the rate of work done on the piston by burning of charge inside the cylinder. B. P. is the net power available at the engine shaft for external use.	Understand	CLO 8	AMEB09.08
22	Define Indicated specific fuel consumption ?	Indicated specific fuel consumption is defined as the ratio of the mass of fuel consumed per hour per unit power output. Isfc =m_f\IP	Remember	CLO 7	AMEB09.07
23	Define volumetric efficiency of an I.C Engine?	Volumetric efficiency of an I.C. engine is defined as the ratio between volume of actual charge inducted into the cylinder and the volume of charge corresponding to the swept volume. $_{vol}$=V_{actual}/V_s	Remember	CLO 8	AMEB09.08
24	Define calorific value of fuel?	Calorific value of fuel is defined as the amount of heat energy liberated by complete combustion of unit mass of a fuel.	Remember	CLO 8	AMEB09.08
25	Define air-standard efficiency of an I.C Engine.?	Air standard efficiency is defined as the thermal efficiency of the internal combustion engine whileworking under appropriate air-standard cycles.	Understand	CLO 7	AMEB09.07
26	Define Choked Flow ?	This choked flow condition is the maximum flow rate that can be produced in the intake system regardless of how controlling conditions are changed. The result of this is a lowering of the efficiencycurve on the high-speed end	Understand	CLO 8	AMEB09.08
27	What is air compressor?	Air compressor is a machine which compresses atmospheric air with the help of mechanical energy to a high pressure	Understand	CLO 7	AMEB09.07
28	Define volumetric efficiency of a reciprocating compressor ?	Volumetric efficiency of a reciprocating compressor is defined as the ratio of actual volume of air sucked into the compressor and the piston-displacement volume.	Understand	CLO 8	AMEB09.08
29	What is single acting compressor?	In single acting compressor, the suction, compression and delivery of air take place on one side of the piston.	Understand	CLO 7	AMEB09.07

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
30	Define double acting compressor?	In double acting reciprocating compressor, the suction compression and delivery of air take place on both side of the piston	Understand	CLO 8	AMEB09.08
31	What is crank angle?	It is a unit equal to one ordinary degree used to measure the piston travel position eg to adjust ignition. when the piston is at its highest point known as the top dead center TDC. the crank shaft angle crank angle is atzero crank angle degrees. $\frac{V}{V_t} = 1 + \frac{1}{2}(r_e - 1)[R + 1 - \cos\theta - (R^2 - \sin^2\theta)^{1/2}]$	Understand	CLO 8	AMEB09.08
32	Define friction power?	The gross indicated work per cycle or power is used to expel exhaust gases and induct fresh charge. An additional portion is used to overcome the friction of the bearings, pistons, and other mechanical components of the engine, and to drive the engine accessories. All of these power requirements are grouped together and called friction power P_f. $P_{ig}=P_{b}+P_f$	Understand	CLO 7	AMEB09.07
33	Define Road-Load Power (*Pr*)?	It is the power required to drive a vehicle on a level road at a steady speed. Called road-load power.Rolling resistanceand drag coefficients, C, and C,, respectively, are determined empirically. An approximate formula for road-load power Pr $P_r=(C_R M_V g+\frac{1}{2}\rho_a C_D A_v S^2_v)S_v$	Understand	CLO 8	AMEB09.08
34	Define Mean Effective Pressure ?	A more useful relative engine performance measure is obtained by dividing the work per cycle by the cylinder volume displaced per cycle. The parameter so obtained has units of force per unit area and is called the mean effective pressure (mep) $mep = \frac{Pn_R}{V_e N}$	Understand	CLO 7	AMEB09.07
35	What is volumetric efficiency of an I.C Engine? ?	The intake system-the air filter, carburetor, and throttle plate (in a spark ignition engine), intake manifold, intake port, intake valve--restricts the amount of air which an engine of given displacement can induct. The parameter used to measure the effectiveness of an engine's induction process is the volumetric efficiency.	Understand	CLO 8	AMEB09.08

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
16		$$\eta_{V} = \frac{2m_a}{\rho_{al} V_d N}$$			
MODULE-IV					
1	Define compressor	A compressor is a device creating pressurized air from potential energy derived from power creation. There are multiple methods of doing this, including forcing air into a storage tank to reduce volume and create pressure. The result is compressed air that can be used for one of many applications. One simple example of an air compressor's use is to fill a tire with air.	Understand	CLO 9	AMEB09.09
2	Define Rotary screw compressor	Air sucked in at one end and gets trapped between the rotors and get pushed to other side of the rotors .The air is pushed by the rotors that are rotating in opposite direction and compression is done when it gets trapped in clearance between the two rotors. Then it pushed towards pressure side.	Remember	CLO 10	AMEB09.10
3	What is hermetic compressor	A hermetic or sealed compressor is one in which both compressor and motor are confined in a single outer welded steel shell. The motor and compressor are directly coupled on the same shaft, with the motor inside the refrigeration circuit	Understand	CLO 10	AMEB09.10
4	Define Positive displacement c ompressor	Positive displacement compressors are usually of the reciprocating piston type, in which the gas is drawn in during the suction stroke of the piston, compressed by decreasing the volume of the gas by moving the piston in the opposite direction, and, lastly, discharged.	Remember	CLO 10	AMEB09.10
5	Define Rotary scroll compressor	The air is compressed using two spiral elements. One element is stationary and the other one moves in small eccentric circles inside the spiral. Air gets trapped inside the spiral way of that element and gets transported in small air-pockets to the center of the spiral.	Understand	CLO 11	AMEB09.11
6	What is Vane Type Rotary Compressor	In this rotor rotates the disc also rotates thus allowing the sliding plates to slide as the inner surface of casing is eccentric. Whenever the plates moves	Understand	CLO 10	AMEB09.10

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		away from the center a huge amount of air get trapped inside it and with the rotation the sliding plates converge due to its shape and the trapped air get compressed. This results in compression of air.			
7	Define Lobe Type Air Compressor	This is one of the simpler compressor in which there is no complicated moving part. There are two lobes attached to the driving shaft by the prime mover. These lobes are displaced with 90 degrees to one another. Thus if one of the lobe is in horizontal direction the other lobes will be exactly positioned at 90 degree therefore in vertical direction.	Remember	CLO13	AMEB09.13
8	Define Freon	It is an aerosol propellant, refrigerant, or organic solvent consisting of one or more of a group of chlorofluorocarbons and related compounds	Understand	CLO13	AMEB09.13
9	Define reciprocating compressor	Reciprocating Air Compressor is a positive displacement air compressor in which air is sucked in a chamber and compressed with the help of a reciprocating piston. It is called as positive displacement compressor because air is first sucked in a chamber and then compression is achieved by decreasing area of the chamber. The area is decreased by a piston which does reciprocating motion.	Remember	CLO13	AMEB09.13
10	Define scroll compressor	A scroll compressor (also called spiral compressor, scroll pump and scroll vacuum pump) is a device for compressing air or refrigerant. It is used in air conditioning equipment, as an automobile supercharger (where it is known as a scroll-type supercharger) and as a vacuum pump.	Understand	CLO13	AMEB09.13
11	Define velocity triangle	A velocity triangle or a velocity diagram is a triangle representing the various components of velocities of the working fluid in a turbomachine. Velocity triangles may be drawn for both the inlet and outlet sections of any turbomachine	Understand	CLO13	AMEB09.13
12	Define Metering Device / Expansion	The Metering Device converts the High Pressure and High Temperature Liquid from Condenser to Low Pressure and Low Temperature Liquid-Vapor	Remember	CLO13	AMEB09.13

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
	Valve	mixture, which will be fed to the Evaporator.			
13	Define whirl velocity	The whirl velocity is the tangential component of absolute velocity at the blade inlet and outlet. This component of velocity is responsible for the whirling or rotating of the turbine rotor	Understand	CLO13	AMEB09.13
14	Define axial thrust	Axial thrust refers to the unbalanced force acting on the rotor of a pump that tends to displace it in an axial direction or along the axis of its rotation. Axial thrust is one of the hydraulic force.	Remember	CLO13	AMEB09.13
15	Define degree of reaction	Degree of reaction is a ratio of change of pressure energy inside turbine to the change of total energy inside turbine.Here, change of pressure energy by means of static pressure. R = 1 - {(V1×V1. - V2×V2)/(2gH)}. Where,V1 = absolute velocity of jet at inlet.V2 = absolute velocity of jet at outlet.H = equivalent pressure head	Understand	CLO13	AMEB09.13
16	What is centrifugal compressor?	Centrifugal compressors, sometimes called radial compressors, are a sub-class of dynamic axis symmetric work-absorbing turbomachinery. They achieve a pressure rise by adding kinetic energy/velocity to a continuous flow of fluid through the rotor or impeller.	Understand	CLO 9	AMEB09.09
17	Explain roots blower?	The Roots type blower is a positive displacement lobe pump which operates by pumping a fluid with a pair of meshing lobes not unlike a set of stretched gears. Fluid is trapped in pockets surrounding the lobes and carried from the intake side to the exhaust. **Application** of the Roots type blower has been as the induction device on two-stroke Diesel engines, such as those produced by Detroit Diesel and Electro-Motive Diesel	Remember	CLO 10	AMEB09.10
18	What is an impeller?	An impeller is a rotating component of a centrifugalpump whichtransfers energy from the motor that drives the pump to the fluid being pumped by accelerating	Understand	CLO 10	AMEB09.10

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		the fluid outwards from the center of rotation.			
19	Explain isentropic efficiency?	In thermodynamics, an isentropic process is an idealized thermodynamic process that is both adiabatic and reversible. The work transfers of the system are frictionless, and there is no transfer of heat or matter. Such an idealized process is useful in engineering as a model of and basis of comparison for real processes	Remember	CLO 10	AMEB09.10
20	Explain polytropic efficiency?	Polytropic efficiency is a value used to describe the efficiency of a compressor. A polytropic process is more difficult to analyze than a system under the isentropic or adiabatic assumptions. For a polytropic process, each new calculation requires a new value for this ratio.	Understand	CLO 11	AMEB09.11
21	What is slip factor?	In turbo machinery, the slip factor is a measure of the fluid slip in the impeller of a compressor or a turbine, mostly a centrifugal machine. Fluid slip is the deviation in the angle at which the fluid leaves the impeller from the impeller's blade/vane angle. Being quite small in axial impellers(inlet and outlet flow in same direction), slip is a very important phenomenon in radial impellers and is useful in determining the accurate estimation of work input or the energy transfer between the impeller and the fluid, rise in pressure and the velocity triangles at the impeller exit.	Understand	CLO 10	AMEB09.10
22	What are shapes loses?	The losses in a centrifugal compressor are almost of the same types as those in a centrifugal pump. However, the following features are to be noted. Frictional losses: A major portion of the losses is due to fluid friction in stationary and rotating blade passages.	Remember	CLO13	AMEB09.13
23	What are the importance of velocity diagrams?	In turbo machinery, a velocity triangle or a velocity diagrams a triangle representing the various components of velocities of the working fluid in a turbo machine. Velocity triangles may be drawn for both the inlet and outlet sections of any turbo machine.	Understand	CLO13	AMEB09.13

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
24	What is axial compressor?	An axial compressor is a gas compressor that can continuously pressurize gases. It is a rotating, airfoil-based compressor in which the gas or working fluid principally flows parallel to the axis of rotation, or axially.	Remember	CLO13	AMEB09.13
25	What is adiabatic coefficient?	In thermal physics and thermodynamics, the heat capacity ratio or adiabatic index or ratio of specific heats or Poisson constant, is the ratio of the heat capacity at constant pressure (C_P) to heat capacity at constant volume (C_V). It is sometimes also known as the isentropic expansion factor and is denoted by γ(gamma) for an ideal gas or κ (kappa), the isentropic exponent for a real gas.	Understand	CLO13	AMEB09.13
26	What is vane compressor?	Vane Compressors, also known as Rotary Vane Air Compressors, are one of a variety of types of compressors described here at about-air-compressors.com	Understand	CLO13	AMEB09.13
27	What Prime mover?	The mechanical energy produced by the prime mover is transmitted to another machine or mechanism, such as a pump or air compressor, to do some form of useful work. Electric motors and internal combustion engines are commonly used as prime movers.	Remember	CLO13	AMEB09.13
28	Define Polytropic efficiency?	It is a value used to describe the efficiency of a compressor. A polytropic process is more difficult to analyze than a system under the isentropic or adiabatic assumptions. It determines the value for the ratio of specific heats for the gas you are using in your compressor.	Understand	CLO13	AMEB09.13
29	Define work done factor?	In an axial compressor, the flow rate tends to be high and pressure rise per stage is low. It also maintains fairly high efficiency. The basic principle of acceleration of the working fluid, followed by diffusion to convert acquired kinetic energy into a pressure rise, is applied in the axial compressor.	Remember	CLO13	AMEB09.13
30	What is power input factor?	The power input factor takes into account of the effect of disk friction, windage, etc. for which a little more power has to be supplied than required by the theoretical expression. Considering all these losses, the actual work done (or energy input) on the air	Understand	CLO13	AMEB09.13

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		per unit mass becomes $$w = \Psi\, \sigma\, U_2^2$$			
31	Define Throttling (Isenthalpic) process?	A throttling process occurs when a fluid flowing through a passage suddenly encounters a restriction in the passage. The restriction could be due to the presence of an almost completely closed valve. $$Q = W = 0$$ $$h_1 + \frac{V_1^2}{2} = h_2 + \frac{V_2^2}{2}$$	Understand	CLO 10	AMEB09.10
32	Define 4 industrial usage of compressed air ?	1. Air refrigeration 2. Driving pneumatic tools 3. Cleaning purposes. 4. Starting of heavy-duty diesel engines.	Remember	CLO 10	AMEB09.10
33	Define eccentric and strap in compressor ?	It is used most often in steam engines, and used to convert rotary into linear reciprocating motion to drive a sliding valve or pump ram. To do so, an eccentricusually has a groove at its circumference closely fitted a circular collar (eccentric strap)	Understand	CLO 11	AMEB09.11
34	Define intercoller?	An intercooler is any mechanical device used to cool a fluid, including liquids or gases, between stages of a multi-stage compression process, typically a heat exchanger that removes waste heat in a gas compressor.	Remember	CLO 10	AMEB09.10
35	Define semi fixed compressor?	A semi-variable cost, also known as a semi-fixed cost or a mixed cost, is a cost composed of a mixture of both fixed and variable components. Costs are fixed for a set level of production or consumption, and become variable after this production level is exceeded	Understand	CLO 11	AMEB09.11
		MODULE-V			
1	Define Evaporator	Evaporator is an important component together with other major components in a refrigeration system such as compressor, condenser and expansion device. The reason for refrigeration is to remove heat from air, water or other substance. It is here that the liquid refrigerant is expanded and evaporated.	Understand	CLO 13	AMEB09.13

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
2	What is Saturation pressure	A liquid is in thermal equilibrium with its own vapor at a pressure called the saturation pressure. Which depends on the temperature alone If the pressure is increased for example in a pressure cooker, the water boils at higher temperature.	Remember	CLO 13	AMEB09.13
3	Define function of a compressor in vapor compression system	There are a) To maintain the required low-side pressure in the evaporator b) To maintain the required high-side pressure in the condenser c) To circulate required amount of refrigerant through the system	Understand	CLO 14	AMEB09.14
4	Define Thermostatic e xpansion valve (TEV)	TEV is one of the most commonly used throttling devices in the refrigerator and air conditioning systems. The thermostatic expansion valve is the automatic valve that maintains proper flow of the refrigerant in the evaporator as per the load inside the evaporator	Remember	CLO 14	AMEB09.14
5	Define condenser	In systems involving heat transfer, a condenser is a device or unit used to condense a substance from its gaseous to its liquid state, by cooling it. For example, a refrigerator uses a condenser to get rid of heat extracted from the interior of the unit to the outside air.	Understand	CLO 14	AMEB09.14
6	What is Dehumidificati on	The process in which the moisture or water vapor or the humidity is removed from the air keeping its dry bulb (DB) temperature constant is called as the dehumidification process	Understand	CLO13	AMEB09.13
7	Define subcooling	The term subcooling also called undercooling refers to a liquid existing at a temperature below its normal boiling point. A subcooled liquid is the convenient state in which, say, refrigerants may undergo the remaining stages of a refrigeration cycle.	Remember	CLO 13	AMEB09.13
8	Define Saturation in refrigeration	Saturation is usually talked about in reference to a temperature. The saturation temperature is the temperature that a fluid will phase change from liquid to vapor or vapor to liquid.	Remember	CLO 15	AMEB09.15

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
9	Define superheat	It is defined as to the heat of a temperature above its saturation point for a given pressure. to heat (a liquid) to a temperature above its boiling point without boiling occurring. to heat excessively	Remember	CLO 15	AMEB09.15
10	Define vortex Tube/ Ranque-Hilsch Tube	The vortex tube, also known as the Ranque-Hilsch vortex tube, is a mechanical device that separates a compressed gas into hot and cold streams. The gas emerging from the "hot" end can reach temperatures of 200 °C (392 °F), and the gas emerging from the "cold end" can reach −50 °C (−58 °F). It has no moving parts.	Understand	CLO 15	AMEB09.15
11	Define Degree of Superheat	The Degree of Superheat can be defined as the amount by which the temperature of a superheated vapor/steam exceeds the temperature of the saturated vapor/steam at the same pressure.	Understand	CLO 14	AMEB09.14
12	What is first refrigerant to be used commercially?	Ethyl ether was the first refrigerant to be used commercially, because it exists as liquid at ambient conditions. Ether in which the oxygen atom is linked to two ethyl groups. Ethers are liquid at room temperature and are typically colorless, with a sweet smell.	Remember	CLO 14	AMEB09.14
13	Define Evaporative Cooling	Evaporative cooling is the process of reducing the temperature of a system by evaporation of water. Human beings perspire and dissipate their metabolic heat by evaporative cooling if the ambient temperature is more than skin temperature.	Understand	CLO 14	AMEB09.14
14	What is Unit of refrigeration	Capacity of refrigeration unit is generally defined in ton of refrigeration. A ton of refrigeration is defined as the quantity of heat to be removed in order to form one ton(1000 kg) of ice at 0 ^{0}C in 24 hrs, from liquid water at 00C. This is equivalent to 3.5 kJ/s(3.5 kW) or 210 kJ/min.	Understand	CLO 14	AMEB09.14
15	Define Seasonal Energy Efficiency Ratio (Seer)	SEER is the ratio of the cooling output divided by the power consumption. It is the Btu of cooling output during its normal annual usage divided by the total electric energy input in watt hours during the same period. This is a	Understand	CLO 14	AMEB09.14

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
		measure of the cooling performance for rating of central air conditioners and central heat pumps. Higher the SEER, the system will be the more energy efficient. SEER = BTU ÷ W·h			
16	Define the term COP?	Co-efficient of performance is defined as the ratio of heat extracted or rejected to work input. Heat extracted or rejected COP = -------------------------------- Work input	Understand	CLO 13	AMEB09.13
17	Define refrigerant ?	Refrigerant is a heat carrying medium which transfers heat from a low temperature system to a high temperature surrounding.	Remember	CLO 13	AMEB09.13
18	Define tone of refrigeration?	It is defined as the amount of heat required for uniform melting of 1 ton of ice from and at 0ºC in 24 hours.	Understand	CLO 14	AMEB09.14
19	What do you mean by refrigeration ?	Refrigeration is the process of continuous removal of heat from a system to keep its temperature below that of the surrounding	Remember	CLO 14	AMEB09.14
20	Define psychrometry ?	Psychrometry is defined as the study of properties & behavior of moist air.	Understand	CLO 14	AMEB09.14
21	Define relative humidity ?	It is the ratio between actual mass of water vapour present in air and the mass of water vapour present in saturated air at same temperature and pressure.	Understand	CLO13	AMEB09.13
22	Define specific humidity or humidity ratio?	It is the ratio between mass of water vapour to the mass of dry air in a given mass of moist air. humidity ratio= mass of water vapour/ mass of dry air	Remember	CLO 13	AMEB09.13
23	Define dew Pt. temperature ?	It is defined as the temperature at which atmospheric water vapour starts to condense.	Remember	CLO 15	AMEB09.15
24	Define sensible heat ?	Sensible heat is defined as the heat which causes rise or fall in temperature of a body .	Remember	CLO 15	AMEB09.15
25	What is by-Pass factor?	It is defined as the fraction of air which doesn't come in contact with heating or cooling coil.	Understand	CLO 15	AMEB09.15

S.No	QUESTION	ANSWER	Blooms Level	CLO	CLOCode
26	What is humid specific heat?	It is the specific heat of the mixture of dry air & water vapour.	Understand	CLO 14	AMEB09.14
27	What is optimum effective temperature?	It is the effective temperature at which majority of the people feel comportable	Remember	CLO 14	AMEB09.14
28	Name the refrigerant commonly used in domestic refrigerator?	Refrigerant commonly used in domestic refrigerator are R-12, R-134a i) It is non-toxic, non-corrosive, non-irritating non-flammable. ii) It has relatively low latent heat valve	Understand	CLO 14	AMEB09.14
29	What is comfort chart?	It is a graphical representation showing the effective temperatures &number of people feelingcomfortable at various effective temperature.	Understand	CLO 14	AMEB09.14
30	What is humid specific heat?	It is the specific heat of the mixture of dry air & water vapour.	Understand	CLO 14	AMEB09.14
31	What is the basic difference between air conditioning and refrigeration ?	Refrigeration solely deals with cooling . One of the major applications of the air conditioning is cooling but it also involves the artificial tampering of the natural conditions. In air conditioning the cooling is coupled with heating. It also takes care of circulation of the air, purity of the cooled air and also humidity of the controlled space. Refrigeration and air conditioning are interrelated.	Understand	CLO 13	AMEB09.13
32	What Is Air Conditioners?	Air Conditioner continuously draws the air from the space to be cooled & cools it by the principle of refrigeration and discharge it back to the same indoor space that need to be cooled.	Remember	CLO 13	AMEB09.13
33	What Is Wet Bulb Depression?	Wet bulb depression is the difference between dry bulb temperature and wet bulb temperature.	Understand	CLO 14	AMEB09.14
34	What Is Sensible Heat Ratio (SHR)?	The Sensible Heat Ratio (SHR) express the ratio between the sensible heat load and the total heat load.	Remember	CLO 14	AMEB09.14
35	What Is Relative COP ?	It is the ratio of Actual COP and Theoretical COP Relative Cop=Actual COP/ Theoretical COP	Understand	CLO 14	AMEB09.14

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