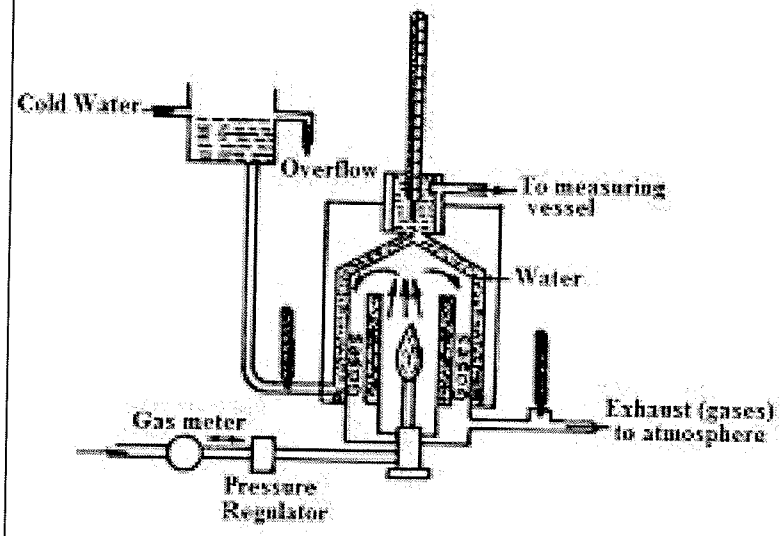
Scoring Indicators

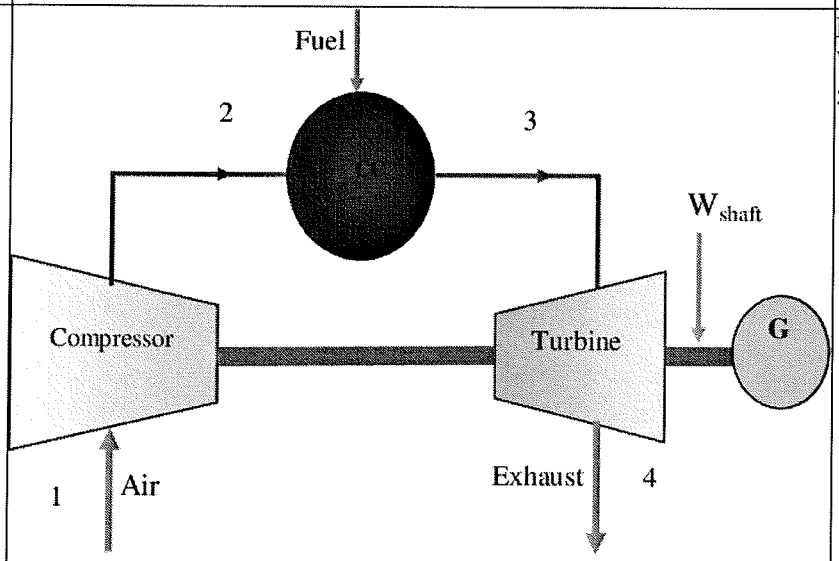
COURSE NAME : POWER PLANT ENGINEERING.

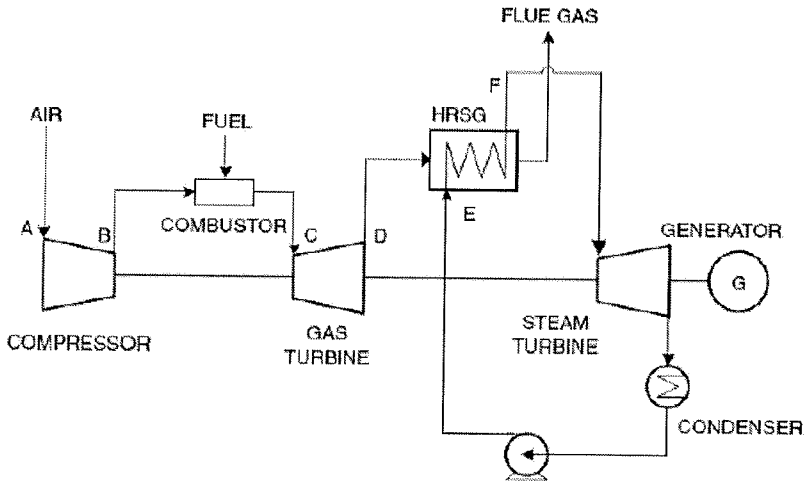
COURSE CODE : 5023C **QID :**

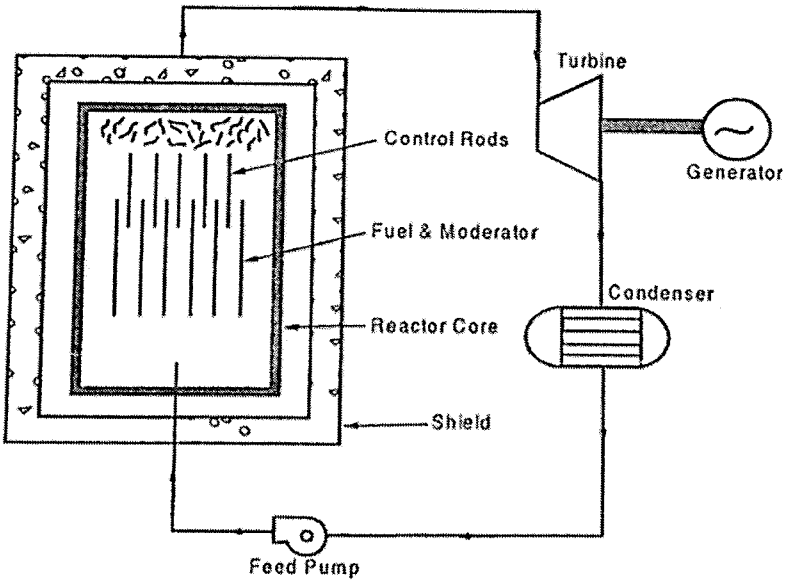
Q No	Scoring Indicators	Split score	Sub Tota l	Total score
	PART A			**9**
I. 1	Amount of heat liberated by the complete combustion of unit mass of fuel.		1	
I. 2	It is the temperature at which oil just ceases to flow. Or the pour point of the liquid is the lowest temperature at which it becomes semi-solid and loses its flow characteristics.		1	
I. 3	Pelton Wheel / Pelton Turbine		1	
I. 4	To discharge excess water from a dam to safe guard.		1	
I. 5	$^{236}_{92}U = {}^{144}_{56}Ba + {}^{89}_{36}Kr + 3n + 177MeV$		1	
I. 6	U235,U233,Plutonium 235, Plutonium 238, Plutonium 239, Plutonium 241 (Any Two)		1	
I. 7	Water/ Heavy water (D2O) /Graphite. Any one		1	
I. 8	SO2 / Oxides of Nitrogen (Any one)		1	
I. 9	Indian Boiler Regulation.		1	
	PART B			24
II. 1	Capacity factor is the measure of how often a power plant runs for a specific period of time. It's expressed as a percentage and calculated by dividing the actual unit electricity output by the maximum possible output.		3	
II. 2	Higher calorific value (HCV) is the absolute amount of heat released by unit mass or volume of given fuel after combustion.		3	
II. 3	The cetane number is defined by finding a blend of cetane and isocetane with the same ignition delay. Cetane number is a measurement of the quality or performance of diesel fuel. It is a quantity indicating the ignition properties of diesel fuel relative to cetane as a standard.		3	
II. 4	Runoff River Plant: It utilizes current flow in stream and has pondage to improve load factor and no storage is required here. Most of the small hydro power plants are Runoff river plant as the power is generated only when enough water is available from the river. The pumped storage plant uses electric pump in non peak hours and generate electricity when power from the plant is needed, water	2X 1.5	3	

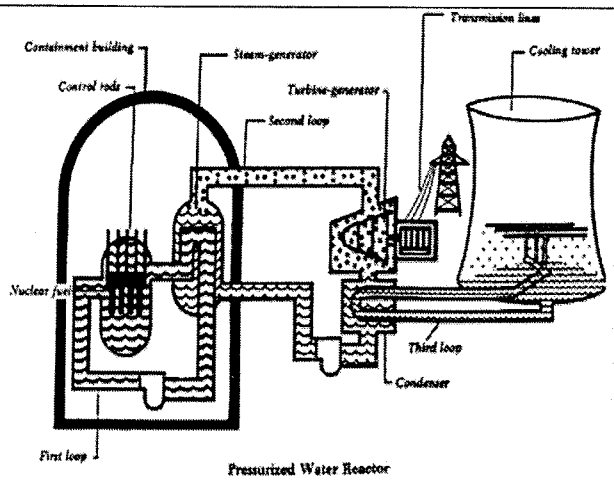
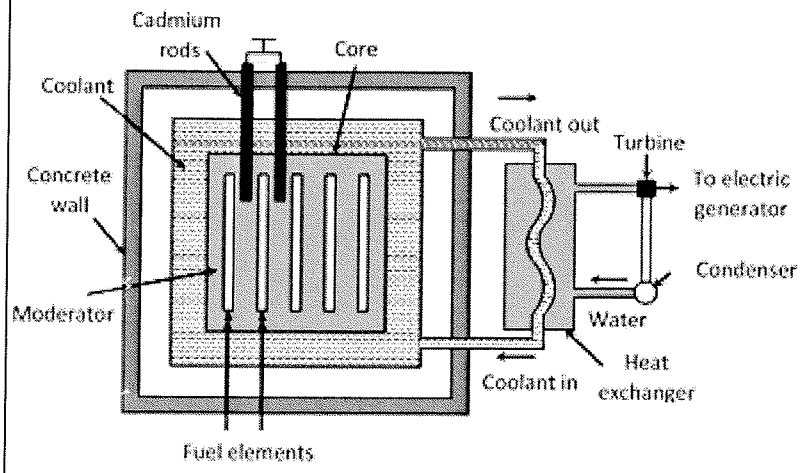
	flows from the upper reservoir, because of gravity, through turbine(s) that rotate generator(s) to produce electricity.			
II. 5	Nuclear fusion is the process by which two light atomic nuclei combine to form a single heavier one while releasing massive amounts of energy. Eg:- Hydrogen atoms under fusion produces helium.(Reaction taking place in sun)		3	
II. 6	Regeneration or recouperation uses a heat exchanger in which exhaust heat is recovered to preheat the feed water to the boiler to enhance efficiency.		3	
II. 7	Acid rain is a form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere.		3	
II. 8	The greenhouse effect is essential to life on Earth, but human-made emissions in the atmosphere are trapping and slowing heat loss to space. Five key greenhouse gases are carbon dioxide, nitrous oxide, methane, chlorofluorocarbons, and water vapor.		3	
II.9	To reduce the greenhouse effect we need to reduce the emission of greenhouse gases. Planting more trees and reducing deforestation. Reducing the consumption of fossil fuels will reduce pollution and the greenhouse effect. Conservation of energy is also a method to reduce greenhouse gases emission.	1X 3	3	
II.10	t has been shown that acid rain has detrimental effects on trees, freshwaters and soils, destroys insects and aquatic life-forms, causes paint to peel, corrosion of steel structures such as bridges, and weathering of stone buildings and sculptures, as well as impacts on human health. Any three points.	1X3	3	
	PART C			42
III.	• Supply of Fuel: The Steam power station should be located near the coal mine so that transportation cost of fuel is minimum. ... • Available of Water: ... • Transportation Facility: ... • Cost & Type of Land: ... • Near to Load Center: ... • Distance from Populated Area: ... • Disposal Facility Provided: ... • Transportation facilities. • Land requirement. • Load center. • Ash handling equipment. Any seven relevant points.	1 X 7	7	7

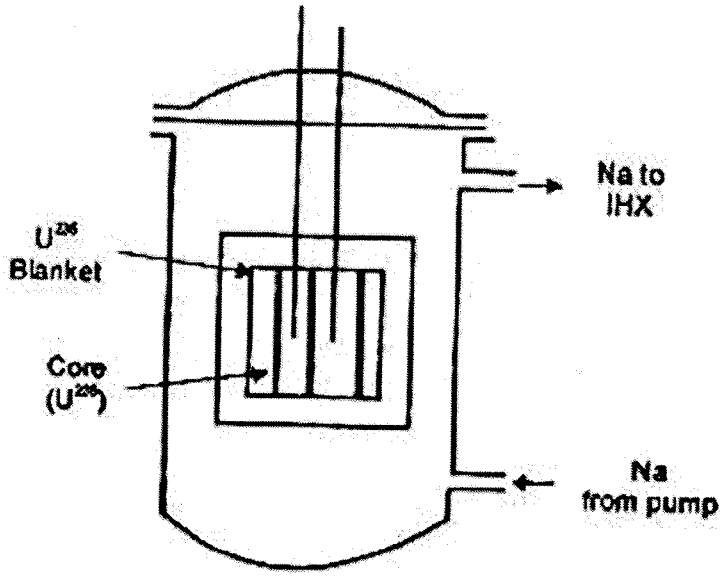
IV.	 Junker gas calorimeter used to determine the calorific value of gaseous fuel. It is a flow device, mainly used to determine the heat of combustion and the calorific value of gaseous fuels. Junkers gas calorimeter consists of a combustion chamber surrounded by water jacket. A gas pipe line is connected with a burner kept in combustion chamber. A gas flow meter and pressure regulator are provided in a gas pipe line. The formula, Calorific Value of Gas X Volume of Gas = Volume of water X Rise in Temperature, is then used to determine the Calorific Value of the Gas	Fig:-4 Exp:-3	7	7

V.	 Any relevant diagram with compressor, combustion chamber turbine and generator. Working: Atmospheric air is compressed in a compressor coupled to the turbine. The compressed air goes to the combustion chamber where the fuel is ignited. As the hot combustion gas expands through the turbine, it spins the rotating blades. The rotating blades perform a dual function: they drive the compressor to draw more pressurized air into the combustion section, and they spin a generator to produce electricity.	Fig:-4 Working :-3	7	7
VI	Advantages • Hydro electric power is a renewable source of energy. • Hydro electric power is fueled by water, making it a clean source of energy. • Comparatively very low running cost. • Hydroelectric power is a domestic source of energy, allowing each state to produce its own energy without being reliant on international fuel sources. Disadvantages. • It Has an Environmental Impact. Perhaps the largest disadvantage of hydroelectric energy is the impact it can have on the environment. • It Displaces People from the reservoir area. • It's Expensive.(High initial cost) • There are Limited Reservoirs. • There are possibility of Droughts in the down side of reservoir. Any seven points.	1 X 7	7	7

VII	 Any relevant diagram with Gas turbine, steam turbine and compressor	Fig:-4 Marking :-3	7	7
VIII.	Advantages. • Fuel Efficient. • Great Durability. • Uninterrupted Power. • Safe to Store the fuel. • Extended Lifespan. Disadvantages. • They create high noise. • They require high maintenance. • They have limited capacity. • They have comparatively lower life. • High air pollution. • They have poor overload performance. • Power produced is comparatively costly. Any seven points.	1X 7	7	7

IX.	 **Fig:3.6 Boiling Water Reactor** Boiling Water Reactor In this type of reactors the water is used as heat exchange medium and it boils directly inside the reactor. The steam thus produced will directly conveyed to the turbine or an intermediate heat exchanger.	Fig:-4 Working :-7	7	7

X.	 Pressurized Water Reactor Points to be valued Pressurised water is used to exchange heat. The high pressure of water prevents boiling of water. This hot pressurized water is supplied to the steam generator to produce steam.	Fig:-4 Exp:-3	7	7
XI.	 Nuclear reactors are the heart of a nuclear power plant. They contain and control nuclear chain reactions that produce heat through a physical process called fission. That heat is used to make steam that spins a turbine to create electricity 1. The main job of a reactor is to house and control nuclear fission —a process where atoms split and release energy. Reactors use uranium for nuclear fuel. The uranium is processed into small ceramic pellets and stacked together into sealed metal tubes called fuel rods. Typically, more than 200 of these rods are bundled together to form a	Fig:4 Working :-3	7	7

	fuel assembly. A reactor core is typically made up of a couple hundred assemblies, depending on power level. Inside the reactor vessel, the fuel rods are immersed in water which acts as both a coolant and moderator. The moderator helps slow down the neutrons produced by fission to sustain the chain reaction. Control rods can then be inserted into the reactor core to reduce the reaction rate or withdrawn to increase it. The heat created by fission turns the water into steam, which spins a turbine to produce electricity.			
XII.	 **Figure: Fast breeder reactor.** Points to be valued:- The main feature of FBR is that it produce a fissible material as the product of fission and hence continuous recharging of fuel is not needed. Working:- A Fast Breeder Reactor (FBR) is a nuclear reactor that uses fast neutron to generate more nuclear fuels than they consume while generating power, enhancing the efficiency of the use of resources. Nuclear fission by fast neutron causes the increase in neutrons generated.	Fig:-4 Exp:-3	7	7
XIII	Causes of Greenhouse Effect. The primary causes of the greenhouse effect are: Burning of Fossil Fuels: The utilization of fossil fuels in transportation and electricity production releases carbon dioxide into the atmosphere3. Deforestation: Cutting down trees leads to an increase in greenhouse gases, as plants and trees absorb carbon dioxide and release oxygen3. Farming: The use of nitrous oxide in fertilizers contributes to the greenhouse effect3.		7	7

	Industrial Waste and Landfills: Industries and factories produce harmful gases that are released into the atmosphere. Landfills also release carbon dioxide and methane, adding to the greenhouse gases Effects:- Global Warming: The increase in greenhouse gases leads to a rise in Earth's temperature, causing global warming. This has long-term adverse effects on the climate and affects various natural systems3. Extreme Weather Events: Greenhouse emissions contribute to an increase in the frequency and intensity of extreme weather events such as flooding, droughts, wildfires, and hurricanes. These events affect millions of people and cause significant economic losses3. Disruption of Ecosystems: Climate change disrupts the usual balance of nature, impacting ecosystems worldwide. Changes in temperature and precipitation patterns can lead to habitat loss, species extinction, and altered migration patterns1. Rising Sea Levels: As global temperatures rise, glaciers and ice caps melt, causing sea levels to rise. This poses a threat to coastal communities, low-lying islands, and vulnerable ecosystems1. Food Supply Disruptions: Changes in temperature and precipitation patterns can affect agricultural productivity, leading to crop failures and food supply disruptions **Any seven points.**			
XIV	• Label Your Lubricants. Industrial sites generally have several different lubricants for varying applications in the storage area. • Use the Right Container. • Avoid Contamination During Dispensing. • Handle with Care. • Dispense Lubricants with Proper Equipment. • Don't goof around or conduct horseplay within the lube room. • Don't wear open-toed shoes. • Don't leave ANY lubricant container open to the environment. Any seven points.		7	7