108 108 13/11/23 D.3 NOV-23

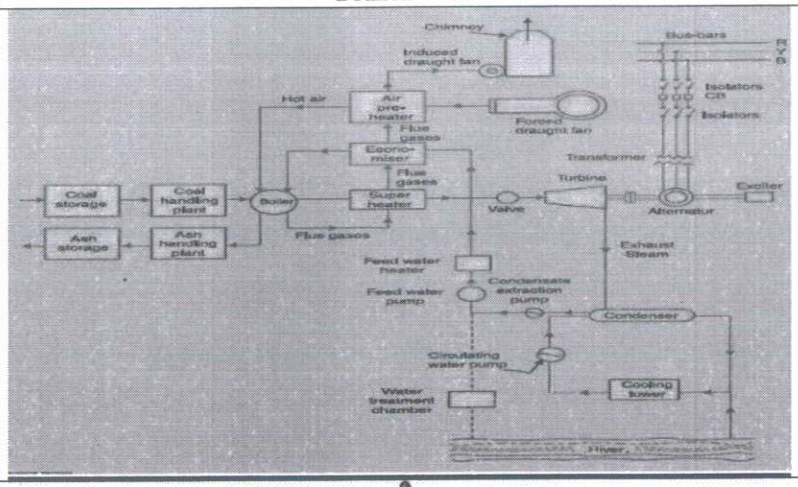
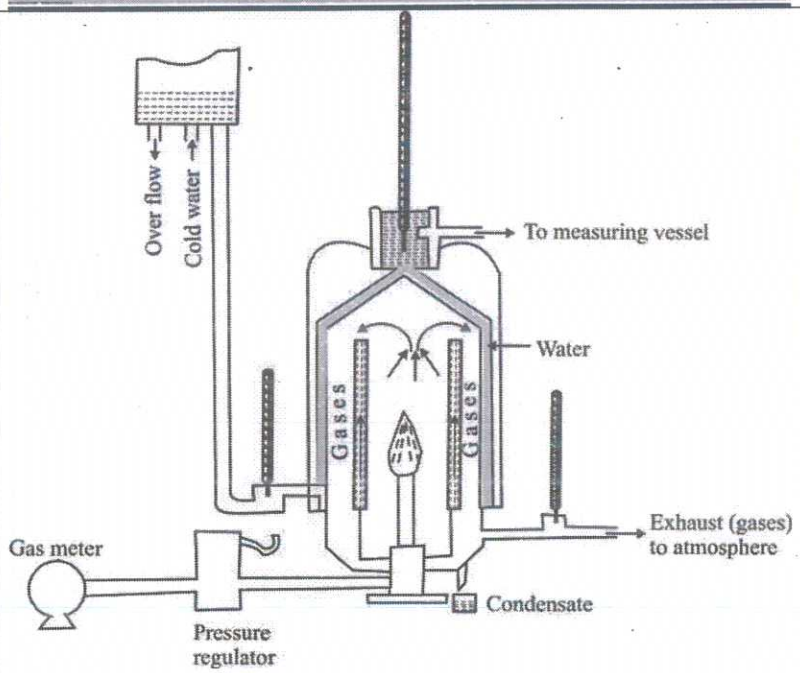
Scoring Indicator-2

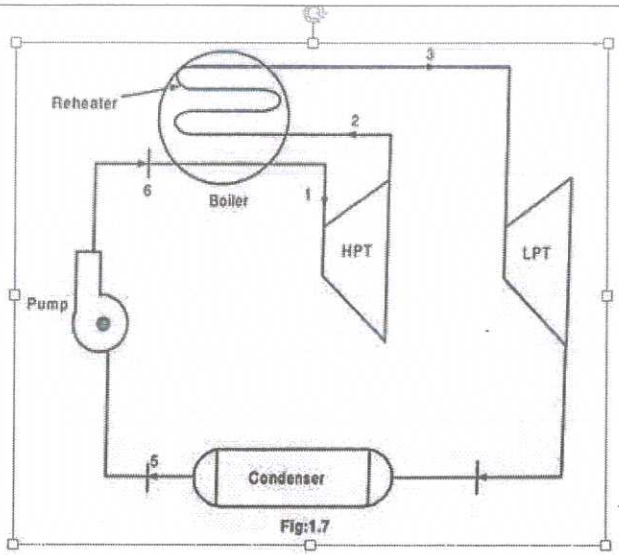
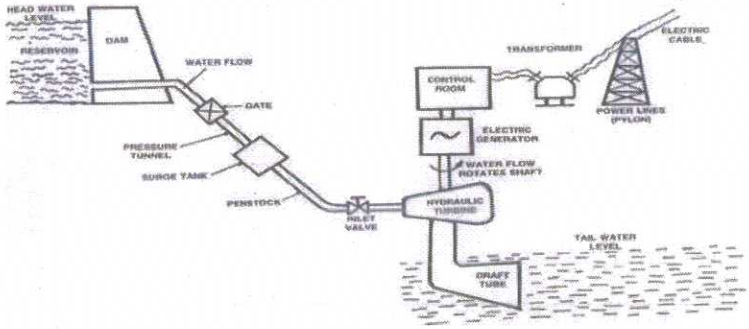
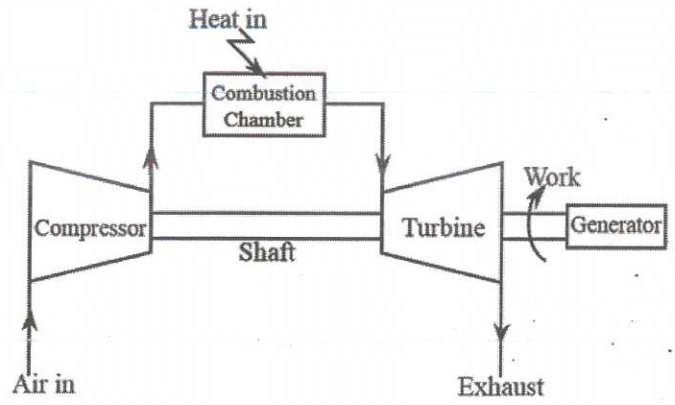
Course Name: **Powe Plant Engineering**

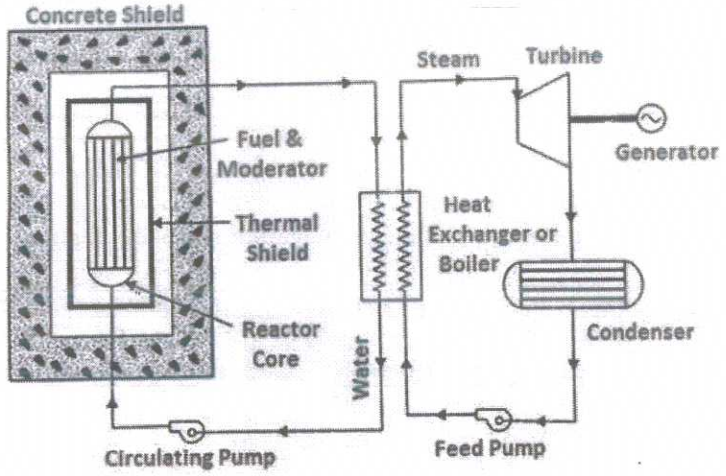
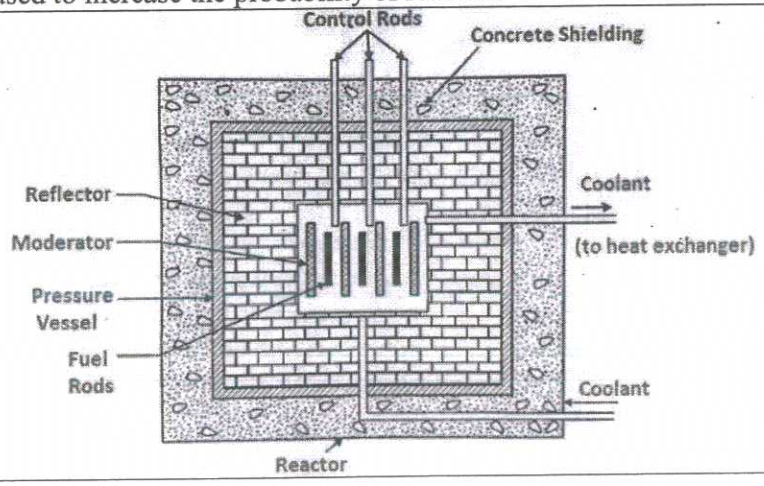
Course Code: **Rev (21)-5023C** **QID: 2109230043**

Q.No	Scoring Indicator	Split Score	Sub Total	Total Score
	PART - A			9
I.1	Solar, Tidal etc. (any one)		1	
I.2	Octane		1	
I.3	Idukki , Pallivasal Hydroelectric Project etc. (any one)		1	
I.4	Penstock		1	
I.5	Nuclear fusion		1	
I.6	moderator		1	
I.7	Use particulate matter filters at exhaust		1	
I.8	Carbon dioxide,methane,ozone,CFC		1	
I.9	Any one		1	
	PART - B			24
II.1	• The type of fuel available • availability of water • fuel transportation cost • land required • foundation cost • availability of cooling water • type of load to be taken by the power plant • Reliability in operation • Plant life. **(any three)**	1 Mark/ Point	3	
II.2	Turbine is submerged in rivers in hilly areas. Water is directly fed to submerged runners instead of storing in reservoirs. The output or capacity of plant is limited. Hence the utility of plant is limited		3	
II.3	Engine – Air supply system – Fuel system – Exhaust system – Cooling system – Lubricating system – Starting system – Governing system **(Any three)**	1 Mark/ Point	3	
II.4	Fuel cost is zero, No harmful emissions during the working, Low maintenance cost, Construction is simple, Longer life time. **(Any three)**	1 x 3	3	

II.5	Reservoir , Dam , Sluice gate , Penstock , Surge tank , Spill way Turbine , Power house	1 x 3	3	
II.6	The nuclear fission can be defined as the reaction in which the energy is released by means of splitting of a massive nucleus into photons in the form of gamma rays, free neutrons and other subatomic particles $^{235}_{12}U + n = {}^{236}_{92}U$ Followed by $^{236}_{92}U = {}^{144}_{56}Ba + {}^{89}_{36}Kr + 3n + 177MeV$		3	
II.7	Demonstration of organization commitments to the safety priorities. • Defining and providing clear authority and responsibility for every organization and employees of the power plant. • Providing assistance and budgetary support for all safety activities. • Scheduling regular workplace inspection. These may be a visual inspection of facilities, equipment, and the tool to identify hazards, physical deterioration, and defects	1 Mark/Point	3	
II.8	Keep the work area clean and uncluttered. • Name the chemical products clearly and display the company. Identification of chemical containers. • Give complete information about the composition of the chemical and way of using along with safety measures to be taken on containers. • Maintain lean, well-managed chemical inventories to avoid fire code violation. Follow Chemical storage and compatibility guidelines	1 Mark/Point	3	
II.9	Acid fog is a type of atmospheric condition in which fog or mist has an acidic pH level, usually below the neutral value of 7 on the pH scale. This acidity is typically a result of pollutants, such as sulfur dioxide (SO2) and nitrogen oxides (NOx), released into the atmosphere through human activities like industrial processes and the burning of fossil fuels. When these pollutants combine with water vapor in the air, they can form sulfuric acid (H2SO4) and nitric acid (HNO3), which lower the pH of the fog or mist		3	
II.10	Water pollution caused by thermal power plants is a serious problem. The water pollution is caused by discharging hot condenser water and water discharged into the river carrying the ash of the plant. The discharge of polluted water causes hydrological and biological effects on the surrounding ecology. The biological study should determine the types of aquatic organisms in the area and their adaptability to the environmental variations		3	

	PART - C			
III.1		figure-4 Explanation-3	7	7
III.2		figure-4 Explanation-3	7	7
III.3	1. **Solid fuels,** 2. **Liquid fuels, and** 3. **Gaseous fuels.** Explain each		7	7

III.4	 Fig:1.7	Fig-4 + Ex-3	7	7
III.5		Fig-4 + Ex-3	7	7
III.6		figure-4 Explanation-3	7	7

III.7		figure-4 Explanation-3	7	7
III.8	The fuels used in reactors are uranium, plutonium and thorium. Among the three uranium and its content are naturally available up to 70% to 90% in the uranium ore and the other two are formed in the nuclear reactor during the fission process. The fuel rods are used to produce the heat, neutrons and radio-isotopes The known fissile materials are: • Uranium-233 • Uranium-235 • Plutonium-238 • Plutonium-239 • Plutonium-241 • Neptunium-237 • Curium-244 MODERATOR- Its main function is to absorb the part of the kinetic energy of the neutrons. The neutrons collide directly with the moderator and thus reduces the kinetic energy of fast neutron to slow neutron. The light water, heavy water and graphite are the most common moderators used in reactors. The moderator is also used to increase the probability of reaction		7	7
III.9		figure-4 Explanation-3	7	7

III.10	COOLANT- The main function of coolant is to absorb a large amount of heat produced in the reactor. The heat carried by the coolant is used for power generation. If water is used as a coolant, it absorbs the heat and gets converted into steam for power . CONTROL RODS The control rods are used to 1. Start the reactor from the cold. 2. For maintaining the chain reaction in a steady-state. 3. To shut down the reactor automatically under emergency condition. The control is necessary to prevent the melting of fuel rods and destruction of the reactor under emergency situation. Cadmium, boron or hafnium are commonly used as a control rod		7	7
III.11	Greenhouse Effect is a natural process that occurs in Earth's atmosphere, where certain Greenhouse gases trap heat from the sun and keep the planet's temperature within a range that is suitable for life. The greenhouse effect is important for maintaining the balance of the Earth's climate, but human activities such as burning fossil fuels have caused an increase in the concentration of greenhouse gases, leading to an enhanced greenhouse effect and global warming. Effects: Global Warming ,Depletion of the Ozone Layer, Smog and Air Pollution, Acidification of Water Bodies Prevention : Reduce Carbon Emissions Promote Afforestation Reduce Waste Adopt Sustainable Agricultural Practices Promote Sustainable Transportation		7	7
III.12	Statutory Instructions under the Boilers Act,1923: 1. Boiler shall not be used unless it is registered and certified.(Sec.7) 2. Boiler shall not be used after expiry of Certificate/P.O. (Sec.8) 3. Boiler shall not be used unless transfer is reported to Chief Inspector of Boilers. (Sec.16) 4. Boiler shall not be used at higher pressure than the maximum pressure for which it is approved and certified . (Sec.6) 5. Boiler shall not be used unless it is in-charge of person holding the certificate of Competency/ Proficiency as required. (Sec.6) . Explosion of boiler/boiler component shall be reported to the Chief Inspector of Boilers within 24 hours and such report shall contain true description of nature of accident and of the damage. (Sec.18) 7. Works such as repairs, welding, tube replacement, alteration/ addition/modification etc. shall not be carried out to boiler/ boiler component without sanction/ approval of Chief Inspector of Boilers in writing.(Sec.12) 8. Registration number as marked on boiler shall not be removed/ altered/ defaced/ tempered. (Sec.25) 9. Boiler shall not be used with tempered safety valves. (Sec.24)		7	7