SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK

Subject with Code : Steam Engineering (20ME3106) **Course & Branch**: B.Tech - ME

Year &Sem:M.Tech (TE) & II-Sem**Regulation:** R20

UNIT –I (Introduction of Boilers)

1		Explain the formation of steam with T-S Diagram	[L2}	[CO1]	[10M]
2		Define the quality of steam and also write the method of measuring the steam quality	{L1}	[CO1]	[10M]
3	(a)	Draw and identify various lines in Mollier Diagram	[L3]	[CO1]	[5M]
	(b)	Find the Enthalpy and Entropy of steam when the pressure is 2 MPa and Specific Volume 0.09 m^3/Kg	[L3]	[CO1]	[5M]
4		A Vessel of Volume 0.04 m^3 contains a mixture of Saturated Water and Saturated Steam at Temperature 250^{o}C. The mass of Liquid Pressure is 9 Kg. Find the Pressure, Mass, Specific Volume, Enthalpy, Entropy and Internal Energy	[L4]	[CO1]	[10M]
5	(a)	How Boilers are classified. Explain	[L1]	[CO1]	[5M]
	(b)	How do you check the quality of feed water supplied to the Boiler	[L1]	[CO5]	[5M]
6	(a)	Differentiate between Fire tube boiler and Water Tube Boiler	[L4]	[CO1]	[5M]
	(b)	Elucidate the working of Babcock and Wilcock Boiler with a neat sketch	[L2]	[CO1]	[5M]
7	(a)	What is the purpose of High Pressure boiler and describe the working of Lamount boiler with a neat sketch	[L1]	[CO1]	[5M]
	(b)	Name various types of Boiler Mountings used for the safety of Boilers and explain any one in detail	[L1]	[CO5]	[5M]
8		Illustrate the working of the following boiler mountings (i) Safety Valve (ii) Feed Check Valve (iii) Blow of Cock	[L2]	[CO5]	10M
9		Name the accessories used for increasing the efficiency of Boiler and explicate the function of any three with a neat sketch	[L1]	[CO5]	[10M]
10	(a)	Calculate the adiabatic Flame temperature for the combustion of flue gas containing 96% Methane, 0.8% Carbon dioxide and 3.2% Nitrogen when burnt in theoretical air	[L2]	[CO1]	[[5M]]
	(b)	Write a brief note on IBR and Boiler standards	[L2]	[CO5]	[[5M]]

UNIT –II (Piping & Insulation)

1		Write the procedure for the designing of Steam piping System	[L2]	[CO5]	10 M
2	(a)	What are basic requirements of piping system in Boilers	[L1]	[CO5]	[5M]
	(b)	Name the materials used in the Piping system of Boilers along with its functions	[L1]	[CO5]	[5M]
3	(a)	Describe the importance of the Insulation for steam piping system	[L2]	[CO2]	[5M]

	(b)	Name the insulating materials used for the steam piping along with its properties	[L1]	[CO2]	[5M]
4		Derive an expression for the economic thickness of Insulation	[L4]	[CO2]	10 M
5	(a)	What is the importance of heat recovery systems in Boiler	[L1]	[CO2]	[5M]
	(b)	List out the advantages of heat recovery system	[L1]	[CO2]	[5M]
6	(a)	State the objectives of refractory materials	[L1]	[CO3]	[5M]
	(b)	Explain the classification of refractory material with an examples	[L2]	[CO3]	[5M]
7	(a)	List the properties of refractory materials	[L1]	[CO3]	[5M]
	(b)	Summarize the applications of refractory material	[L2]	[CO3]	[5M]
8		Mention the importance and types of furnace wall design	[L1]	[CO3]	[10M]
9		What are the factors affecting the Performance of Boiler. Explain them in detail	[L1]	[CO5]	[10M]
10		List out various types of heat losses in boilers	[L1]	[CO5]	[10M]
		UNIT –III (Steam Systems)			
1		Draw the line diagram of steam generating facility and explain all the components	[L2]	[CO3]	[10M]
2		Write the procedure for the design of steam generating facility for commercial use	[L1]	[CO3]	[10M]
3	(a)	Proper drainage and steam lines are needed to reduce the steam distribution losses. Justify	[L5]	[CO4]	[5M]
	(b)	Determine the steam distribution losses between two points of a steam pipe 1 km apart in a 150mm bore horizontal pipe work system. The water flow rate is 4[[5M]]^3/hr at 15^{0}C and the friction factor for this pipe is taken as 0.005	[L2]	[CO4]	[5M]
4		How do you assess the steam distribution losses in a steam pipe of steam power plant	[L1]	[CO4]	[10M]
5	(a)	What is the importance of steam leakage in steam distribution system	[L1]	[CO4]	[5M]
	(b)	Mention the remedial actions for eliminating the steam leakage	[L1]	[CO4]	[5M]
6	(a)	Steam traps increase the efficiency of the distribution system. Justify	[L5]	[CO6]	[5M]
	(b)	Illustrate the working of Inverted bucket steam trap with a neat sketch	[L2]	[CO6]	[5M]
7		Discuss about steam traps used in steam distribution system in detail	[L2]	[CO6]	[10M]
8	(a)	Explain the installation procedure of steam traps in distribution system	[L2]	[CO6]	[5M]
	(b)	Evaluate the benefits of condensate recovery system	[L2]	[CO3]	[5M]
9	(a)	Write a short note on flash steam recovery	[L2]	[CO3]	[5M]
	(b)	The hot condensate at 7 bar with heat content of 721 kJ/kg released to atm. Pressure with heat content of 419 kJ/kg. The excess heat is used for flash steam generation. Find percentage of flash steam	[L1]	[CO3]	[5M]

		evaporated. Consider Latent heat as 22.58kJ/kg.			
10	(a)	Describe the working of flash vessel with a neat sketch	[L2]	[CO3]	[[5M]]
	(b)	Elaborate the applications of steam based systems	[L2]	[CO3]	[[5M]]
		UNIT –IV (Boiler Performance Assessment)			
1	(a)	Express the importance of assessing boiler performance	[L2]	[CO5]	[5M]
	(b)	The following data relates to a coal fired boiler. Steam generated is 8 tons/hr: steam pressure and temperature are 10 kgf/cm^2 and 180^{0}C; Enthalpy of Steam (Dry & Saturated) at 10 kgf/cm2 is 665 Kcal/Kg Feed water temperature is 85 Kcal/kg; Quantity of coal Consumed is 1.6 tons/hr; Gross Calorific Value is 4000 Kcal/Kg. Find the efficiency of the boiler and the evaporation rate.	[L1]	[CO5]	[5M]
2		Estimate the performance of the boiler in Direct and Indirect Methods	[L2]	[CO5]	[10M]
3		Discuss in detail about the Performance test codes of boilers	[L2]	[CO5]	[10M]
4		Describe the working of Orsat Apparatus for Flue gas analysis with a neat sketch	[L2]	[CO5]	[10M]
5		In detail discuss about the various losses associated with the operation of Boiler	[L2]	[CO5]	[10M]
6	(a)	Write a short notes on Proximate and Ultimate analysis of coal	[L1]	[CO5]	[5M]
	(b)	Ultimate analysis of coal burnt in a boiler consists of 84% Carbon, 9% Hydrogen and the remaining 7% combustibles. Determine the mass of dry flue gases if the orsat analysis has given the following results: CO2- 8.75%, O2- 8%, Co- 2.25% and N2- 81%	[L5]	[CO5]	[5M]
7		The following data referred to oil fired boiler. Find the boiler efficiency. **Ultimate Analysis**: C-84%, H2- 12%, N2-0.5%, O2-1.5%, S-1.5%, Moisture – 0.5%, GCV of fuel – 10000 Kcal/Kg, Fuel firing rate – 2648.125 Kg/hr, Surface temperature of the boiler as 80^{0}C, Surface area of boiler- 90m^2, humidity- 0.025 kg/kg of air, Wind speed 3.8 m/s **Flue gas analysis:** Flue gas temperature- 190^{0}C, Ambient temperature – 30^{0}C, % CO2 in flue gas by volume – 10.8, %O2 in flue gas by Volume- 7.4.	[L1]	[CO5]	[10M]
8		Elaborate the factors affecting the boiler performance	[L2]	[CO5]	[10M]
9		Name and Explain the parameters needed for measuring boiler efficiency	[L2]	[CO5]	[10M]
10		Boiler accessories increase the performance of boiler? Justify	[L5]	[CO5]	[10M]
		UNIT –V (Energy Conservation and Waste Minimization)			
1.	(a)	How can you conserve the energy in Boilers?	[L1]	[CO5]	[5M]
	(b)	Write a short note on Waste Minimization	[L2]	[CO3]	[5M]
2		Classify the Waste Minimization Techniques and explain them in detail	[L2]	[CO3]	10M

3		Illustrate various steps involved in the Waste Minimization program	[L2]	[CO3]	10M
4		Asses the basic causes of Waste in Steam Power Plant	[L5]	[CO3]	10M
5	(a)	How do you Evaluate the Economic Variability of Waste Minimization	[L1]	[CO2]	[5M]
	(b)	Identify various types of Wastes and its possible resources in Steam Power Plant	[L2]	[CO3]	[5M]
6		Explain various Process Control Loops in Boilers	[L2]	[CO6]	10M
7	(a)	Process Instrumentation system is needed for controlling the Boiler. Justify	[L5]	[CO6]	[5M]
	(b)	Write a short notes on the importance of Control and Monitoring System of Boilers	[L2]	[CO6]	[5M]
8		Discuss about the working of various flow measurement Instruments in Boilers with neat sketch	[L2]	[CO6]	10M
9	(a)	Describe the working of Bourdon tube pressure gauge with a neat sketch	[L2]	[CO6]	[5M]
	(b)	Name different type of temperature measurement Instruments used in boilers and explain them in brief	[L1]	[CO6]	[5M]
10		What are the factors to be considered for the selection of Instruments in Boilers	[L1]	[CO6]	[10M]

Prepared by :**Dr.S.Sunil Kumar Reddy**