SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : STEAM ENGINEERING (18ME3106) **Course & Branch**: M.Tech - TE
Year & Sem: I-M.Tech & II-Sem **Regulation:** R18

Introduction UNIT –I

1.	(a)	State how the boilers are classified and also mention their standards	6M
	(b)	Give an outline sketch showing the arrangements of water tube boilers and furnace of Babcock and Wilcox boiler	6M
2.	(a)	Mention the applications of high pressure boilers and also write its classification	6M
	(b)	Difference between fire tube and water tube boiler	6M
3.		Define the following terms (a) Dry steam (ii) Wet steam (iii) Dryness fraction (iv) Dry saturated steam (v) Superheated steam (vi) Enthalpy of steam (vii) Degree of superheat (viii) specific volume of steam	12M
4.	(a)	Classify the water tube boilers and explain anyone with a neat sketch	6M
	(b)	Explain briefly the construction and operation of air preheater	6M
5.		What is the necessity of boiler mountings? Name and explain their functions for the safety of boiler	12M
6.		Explain the accessories needed for increasing the efficiency of boiler.	12M
7.	(a)	Explain briefly about flue gases in boilers and their effect	6M
	(b)	What is the importance of feed water and its quality in the steam generation	6M
8.	(a)	What are the essential characteristics of good boiler?	6M
	(b)	What is adiabatic flame temperature? Explain in detail	6M
9.		A vessel of volume $0.04m^3$ contains a mixture of saturated Vapour and saturated steam at temperature of 250^oC. The mass of liquid is 9 Kg. Find the pressure, specific volume, enthalpy, entropy, internal energy.	12M
10.		What are the various heat losses in a boiler	12M

UNIT-II

Piping and Insulation

1.	(a)	What are the various reasons for proactive insulation of steam and condensing systems	6M
	(b)	Name various types of insulations used for steam piping and how do they help in increasing the efficiency of boiler	6M
2.	(a)	Name various materials used for the insulation of steam and condensing systems and also explain which material is best for the insulation.	6M
	(b)	Derive an expression for the economic thickness of insulation	6M
3.	(a)	Name the components to be insulated in the steam and condensing system.	6M
	(b)	Write the procedure for the calculation of economic thickness of insulation	6M
4.	(a)	What are the general requirements of refractory materials	6M
	(b)	Name various types of refractories used in industries	6M
5.		A Steam pipeline of 100 mm diameter is not insulated for 100 m length supplying steam at 10 kg/cm^2 to the equipment. Find out the fuel savings if it is properly insulated with 66Mm insulating material. Assume Boiler efficiency as 80%, fuel cost Rs.15000/ton; surface temperature without insulation and with insulation are 170^{0}C and 65^{0}C. Consider ambient temperature as 25^{0}C.	12M
6.		Write the classification of the refractories on the basis of chemical composition	12M
7.		Explain the factors on which the heat losses from furnace walls depend?	12M
8.	(a)	What factors are to be considered for the selection of refractories	12M
	(b)	Mention the applications of insulations	
9.		Explain in detail about the properties of refractories	12M
10.	(a)	What are the various reasons for proactive insulation of steam and condensing systems	6M
	(b)	Explain the uses of the following with regards to boilers (i) Insulation (ii) Refractories	6M

UNIT-III

Steam Systems

1.	(a)	Explain the steam distribution system with a neat sketch	6M
	(b)	What are the factors to considered for supplying more quantity of steam at right pressure in steam pipe line	6M
2.		What is steam trap and explain its functions in detail	12M
3.		How do you classify the steam traps? Explain the working of any one steam trap with a neat sketch	12M
4.		Explain the working of float trap with a neat sketch. Also mention its merits and demerits	12M
5.		Describe the working of inverted bucket steam trap with a neat sketch. Also mention its merits and demerits	12M
6.		What factors are to be considered for the successful installation of steam traps	12M
7.		Name the common problems found in the steam traps and how do you avoid that.	12M
8.	(a)	Mention the reasons for condensate recovery	6M
	(b)	Write short notes on condensate heat recovery system with its benefits	6M
9.		Explain about various performance assessment methods for steam traps	12M
10.	(a)	What are the best engineering practices used for the energy saving	12M
	(b)	Explain about flash steam recovery system with its benefits	

UNIT-IV

Boiler Performance Assessment

1	(a)	Define boiler efficiency and evaporation ratio	6M
	(b)	What are the factors which affect the boiler performance	6M
2		Briefly explain the procedure of direct method testing of boiler with its merits and demerits	12M
3	(a)	Explain in detail about various testing standards of boiler	6M
	(b)	Why boiler efficiency by indirect method is more useful than direct method	6M
4		In a coal fired boiler the quantity of steam generated is 8 TPH with a pressure of 10 kg/cm^2 at a temperature of 180^oC, Consider the enthalpy of steam at 10 kg/cm^2 is 665 kCal/kg and for feed water is 85kCal/kg at 85^0C. The coal consumed is 1.6TPH whose GCV 4000kCal/kg. Determine the boiler efficiency and evaporation ratio.	12M
5		Explain the procedure of indirect method testing of boiler with its merits and	12M

		demerits	
6.		For a coal fired boiler the following data has been given. Fuel firing rate-5599.17 kg/hr; steam generation rate-21937.5 kg/hr; Steam pressure-43 kg/cm^2; steam temperature –377^{0}C; Feed water temperature- 96^{0}C; Percentage of CO & CO2 in Flue gases are 0.55 & 14; Flue gas temperature- 190^{0}C; Ambient temperature-31^{0}C; Humidity in air – 0.0204 kg/kg of dry air; Surface temperature of boiler – 70^{0}C; Wind velocity – 3.6M/s; surface area of boiler – 90m^2; GCV of bottom ash and fly ash are – 800 kCal/kg & 452.5 kCal/kg and its ratio as 90:10; In the flue gases the contents of various parameters in fuel are as follows Ash – 8.63; Moisture – 31.6; Carbon – 41.65; Hydrozen -2.0413; Nitrogen-1.6; Oxygen-14.48; GCV – 3501 kCal/kg. Find the following (i) Theoretical air requirement (ii) Percentage of CO2 (iii) Excess air supplied (iv) Heat balance (v) boiler efficiency	12M
7		Explain in detail about various heat losses from boilers	12M
8		Explain various parameters needed for performance Assessment Test in Indirect Method test of boiler	12M
9		Name and analyze the losses from boilers	12M
10		Mention various performance evaluation accessories of boilers in detail	12M

UNIT-V

Energy Conservation and Waste minimization

1		What are the various waste minimization Techniques available and explain them in detail	12M
2		Explain the concept of waste minimization with suitable examples	12M
3	(a)	What are the 3R's in waste minimization techniques?	6M
	(b)	Which would you prefer between recycling and source reduction? Justify	6M
4	(a)	Explain how modifying a product can help in minimizing the wastes with few examples	6M
	(b)	Can employee be a factor in reducing wastes? Explain	6M
5	(a)	Write a short notes on Energy conservation of boiler	6M
	(b)	What are the benefits of waste minimization	6M
6	(a)	What are the factors which affect the performance of boiler	6M

	(b)	How do you measure the water flow in the boiler.	6M
7		Name various process instrumentation components in boiler	12M
8		Explain the selection process of instruments for the measurement of various parameters in boiler	12M
9		Explain the working of pressure and temperature measurements with neat diagram	12M
10		Explain in detail about the energy conservation opportunities in Boilers	12M

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