Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.Tech**
HTPE211

2nd Semester Back Examination 2016-17
Power plant practice and control
BRANCH: HEAT POWER & THERMAL ENGG, HEAT POWER ENGG, THERMAL ENGG, THERMAL POWER ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE: Z1085

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the main circuits in the thermal power plant?

b) What is the overall efficiency of the thermal power plant or steam power plant?

c) What are different types of steam boilers used in thermal power plants?

d) What is the difference between safety valve and pressure relief valve? Mention their applications.

e) What are the methods are used for steam temperature control in boiler?

f) What is priming and foaming of Boiler? How to prevent priming and foaming?

g) What is PCFB? Explain its operation.

h) What is Cavitation And what are the disadvantages Of Cavitation? Explain how to prevent it.

i) What do you mean by critical velocity in fluidized bed combustion?

j) What do you mean by Nuclear density and how to find it?

Q2 **a)** Draw the typical layout of power plant. Show all its components. **(5)**

b) An industry requires 10 t/h of steam for process heating at 3 bar saturated and 1000 kW of power, for which a back pressure turbine of 70 % internal efficiency is to be used. Find the steam condition required at inlet of the turbine. **(5)**

Q3 **a)** Explain the working principle of a combined cycle plant used for cogeneration with proper diagram. **5)**

b) Show that the optimum pressure ratio of a gas turbine plant for maximum specific work is **(5)**
$(r_p)_{opt} = (\eta_T \eta_C (T_{max}/T_{min}))^{\gamma/(2(\gamma-1))}$

Q4 **a)** Briefly explain the combustion of fuel particles in a fluidized bed. **(5)**

b) A bed of particles of mean size 427 μm is fluidized by air under the ambient conditions, where the air density is 1.21 kg/m^3 and the viscosity is 1.82×10^5 kg/m-s. the density of the loosely packed bed is 1620 kg/m^3. If the density of solids is 2780 kg/m^3, find (a) the voidage of the bed, and (b) the minimum fluidization velocity. **(5)**

Q5	**a)**	Briefly explain about the pulverized coal burning systems.	**(5)**
	b)	What is PFBC? Discuss its scope, advantages and disadvantages.	**(5)**
Q6	**a)**	Write down detail about kinetics of combustion reaction and its control.	**(5)**
	b)	The half-life of radium 226(atomic mass = 226.095) is 1620 years. Calculate (a) the decay constant (b) the initial activity of 1g of radium 226.	**(5)**
Q7	**a)**	Briefly explain safety Interlocks.	**(5)**
	b)	Explain the chemical methods to reduce emissions.	**(5)**
Q8		**Write short answer on any TWO:**	**(5 x 2)**
	a)	Fluidized bed combustion	
	b)	PWR	
	c)	BWR	
	d)	Coal Gasification	