Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

HTPE207

2nd Semester Back Examination 2016-17
GAS TURBINE AND JET PROPULSION
BRANCH : HEAT POWER ENGG, THERMAL ENGG, THERMAL POWER ENGG
Time: 3 Hour
Max Marks: 70
Q. CODE: Z817

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:** (2x10)

a) Define dynamic temperature.
b) Write two methods to improve the thermal efficiency of simple cycle gas turbine plant.
c) Write steady flow energy equation for the turbine of a gas turbine plant.
d) Define compressor work.
e) What is combustion intensity of combustion chamber?
f) Define degree of reaction of a compressor.
g) Define effectiveness of a heat exchanger.
h) Differentiate between radial flow and axial flow turbine.
i) What is the stress on the blade of a rotor and how many types?
j) What is the aspect ratio of a blade?

Q2 **(a)** An open cycle gas turbine plant has a single stage compressor and a single stage expander incorporating a heat exchanger. The air suction temperature is 17^0C and the pressure 1 bar. For an overall pressure ratio of 4.5 and shaft output of 4000KW, the mass flow is 40kg/sec. If the thermal ratio of the heat exchanger is 0.6 and the isentropic efficiency of compressor is 0.85, calculate the isentropic efficiency of the gas turbine for a plant thermal efficiency of 0.30. Take for air, $\gamma = 1.4$, $C_{pa} = 1.005$ KJ/kg^{0}K, for gas $\gamma = 1.365$, $C_{pg} = 1.07$ KJ/kg^{0}k. (5)

(b) Write the assumptions for open cycle gas turbine plant and derive the efficiency for it. (5)

Q3 **(a)** Write different components of a centrifugal compressor and explain the working principle of each component. Calculate the work done by the compressor from velocity triangles. (6)

(b) Draw the h-s diagram of a radial flow turbine. (4)

Q4	**(a)**	Calculate the degree of reaction of a axial flow compressor.	(5)
	(b)	Write the factors affecting the combustor design.	(5)
Q5	**(a)**	Write different components of a radial flow turbine and explain its working principle. Calculate the specific work output from the velocity triangles.	(6)
	(b)	Explain the methods of improving the part-load performance of gas turbine.	(4)
Q6	**(a)**	Describe matching procedures of turbofan engine.	(5)
	(b)	Describe the control systems of a gas turbine.	(5)
Q7	**(a)**	Explain turbofan engine and turbojet engine.	(5)
	(b)	Write a comparison between open cycle and closed cycle gas turbine.	(5)
Q8		**Write short note on: (any two)**	(5x2)
	(a)	Turbo shaft engine.	
	(b)	Compressibility effect on gas flows.	
	(c)	Transient behavior of gas turbine.	