B. Tech III Year I Semester Examinations, November/December - 2016 R13

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THERMAL ENGINEERING - II

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i	Explair Draw tl	ii) The mass flow rate of condenser iii) The the mal efficiency of eyele iv) The ration of heat supplied and Neglet K.E. and P.E. changes.	2.ii): "Draw combined cycle diagram and explain briefly, b) —In a steam turbine installation running on ideal Rai 10 MPa and 700°C and leaves turbine at 0.005 MP and cocling water entering and leaving condenser a i) The mass flow rate of steam in ke/s		Explain the purpose of regeneration in g :::Write equation for Thrust power and pr ::-Explain liquid propellant rocket engine	Draw R What is Write tl Draw d Draw v Explain	'l.'	Part A consists 10 marl	Time: 3 hours Note: This question paper contains two parts A and B.
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1,11,1	Explain the significance of adiabatic flame temperature. Draw the line diagram and explain the flue gas analysis using Orsat apparatus	ii) The mass flow rate of condenser cooling water in kg/s (ii) The the mass flow rate of condenser cooling water in kg/s (iii) The the mass flow rate of condenser respectively). (iv) The ration of heat supplied and rejected (in boiler and condenser respectively). (iv) The ration of heat supplied and rejected (in boiler and condenser respectively). (iv) The mass flow rate of condenser respectively). (iv) The the mass flow rate of condenser respectively). (iv) The the mass flow rate of condenser respectively).	Draw combined: cycle diagram and explain brieffy, in a steam furbine installation running on ideal Rankine cycle steam leaves the boiler at 10 MPa and 700°C and leaves turbine at 0.005 MPa. For the 50 MW output of the plant and cooling water entering and leaving condenser at 15°C and respectively determine. i) The mass flow rate of steam in ke/s		Explain the purpose of regeneration in the gas turbine? Explain the purpose of compressor in gas turbine plant. Write equation for Thrust power and propulsive power. Explain liquid propellant rocket engine.	Draw Rankine cycle on p-V and T-S diagrams. What is meant by Reheating and its advantages? Write the significance of accessories of a boiler Draw different nozzle crossistettions and explain them. Draw velocity triangle at exit for impulse turbine. Explain the working principle of Ejector condenser.	i.h.i	Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.	äper cor
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5.a) Derive the equation for critical pressure ration nozzles.

b) An impulse turbine of IMW has steam entering at 20 bar 300°C and steam 6.a)9 each nozzle. Solve using mollier diameter. nozzle is 1 cm then determine (i) the number of nozzle required (ii) exit diameter of lost in overcoming friction in deveining portion of nozzle. If throat diameter of each consumption of 8 kg per kW hour. Steam leaves at 0.2 bar and 10% of total heat drop is Draw the line diagram and explain pressure compounded impulse turbine.

diagram. shock into blades, determine the nozzle angle and blade angles. Solve using velocity diagram. [15+5] A single stage of simple impulse turbine produce 120 kW at blade speed of 150 m/s the stage axially. Considering velocity coefficient of 0.9 and smooth entry without when steam mass flow rate is 3 kg/s. Steam enters moving blade at 350 m/s and leaves

Draw the line diagram and explain the working of evaporative condenser.

7.a) b) amounting to t0% of total and efficiency of werking steam is 85%. Considering bladeblade speed to steam velocity ratio of 0.8. There occurs tip leakage of steam at all rows outlet angles for both fixed and moving blades to be 20°, determine the following analytically. Turbine has eight pairs on mean diameter of 50 cm and run at 3000 rpm with mean In a reaction turbine 6 kg/s steam is admitted at 15 bar dry saturated in the first stage.

i) The output from turbine in hp

The pressure of steam leaving turbine,

jii) The mean blade height.

8.a) Briefly derive the equation for Brayton cycle efficiency.

<u>b</u> after the first-stage of compression. The entire expansion is carried out in jone stage only. The isentropic efficiency of both compressors is 0.85 and that of the turbine is working fluid. Take $\gamma = 1.4$. 0.9. Determine the overall pressure ratio that would give the maximum net work per kg pressure ratio with intercooling of the working to the minimum temperature of the cycle the cycle are 300 K and 1200 K, the compression is carried out in two stages of equal In a Brayton cycle gas turbine power plant the minimum and maximum temperature of

Draw the line diagram and explain the Reheat gas turbine cycle.

A gas turbine plant has air being supplied at 1 bar, 270 C to compressor for getting compressed up to 5 bar with isentropic efficiency of 85%. Compressed air is heated turbine, if thermal efficiency of plant is 20%. Subsequently expansion occurs to 1 bar in turbine. Determine isentropic efficiency of upto 1000 K in combustion chamber where also occurs a pressure drop of 0.2 bar.

.....Neglect the air property variation throughout cycle. Take γ=1.4.....

10;a) Explain the working of Turbolet engine with the help of pressure, yelocity, temperature variations.

atmospheric piessure of 1 bar: The ambient temperature is 285 K. Determine (1) power A jet propulsion engine has compressor with pressure ratio 4 and compressed air enters at turbine inlet. Actual temperature at inlet to combustion chamber is 10% more than that of isentropic compressor temperature rise. Exhaust from turbine is expanded up to into combustion chamber where combustion occurs so as to yield temperature of 500°C required to derive compressor, (ii) air fuel ratio if calorific value of fuel is 43100 kJ/kg (iii) static thrust developed per kg of air per second.

11.a) Derive the equation for propulsive efficiency of rocket propulsion. an in Antail