C U SHAH UNIVERSITY

WADHWAN CITY

SUMMER EXAMINATION – 2015

Branch: Automobile Engineering **Semester: IV**

Subject Name: Thermodynamics Subject Code: 4TE04TDY1

Instructions: **Total Marks: 70**

1. **Make suitable assumptions whenever necessary.**
2. **Figures to the right indicate full marks.**
3. **Question one is compulsory.**

SECTION – I

Q – 1	a	Explain zeroth law of thermodynamics.	02
	b	Write the difference reasons for the impartibility of Carnot cycle.	02
	c	Explain perpetual motion machine of the first kind – PPM 1.	02
	d	Which law states that heat and work mutual converted?	01
Q – 2	a	Explain Thermodynamic equilibrium.	05
	b	Air at 12^0 C and 85 KPa enters the diffuser of jet engine steadily with a velocity of 220m/s. the inlet area of diffuser is $0.38m^2$. The air leaves the diffuser at a negligible velocity compared to in late velocity. Calculate (1) Mass flow rate of air (2) The temperature of air leaving the diffuser.	05
	c	Explain about Electric work, Magnetic work and Elastic work.	04
		OR	
Q – 2	a	Derive steady flow energy equation for Nozzle.	05
	b	The piston of an oil engine of area 0.005 m^2move down to 8mm drawing fresh air from atmosphere. Calculate the displacement work done by the piston. During the process pressure is constant as 0.82bar.	05
	c	Explain throttling process and derive its SFEE .	04
Q -3	a	Prove the equivalence of Clausius and Kelvin statements.	05
	b	Derive the equation of availability of closed system (non-flow process)	05
	c	Explain reversible and irreversible process with suitable example.	04
		OR	
Q -3	a	A system at 500 K reeves 7200 KJ/min heat from a source at 1000K.The temperature of atmosphere is 300K. assuming that the temperature of system and source remain constant during heat transfer find out (i) the entropy produced during heat transfer (ii) the decrease in available energy after heat transfer.	05
	b	Derive expressions for entropy change for open system	05
	c	Explain Causes of irreversibility.	04

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SECTION – II

Q – 4	a	Write different conditions or criterion for Reversibility.	02
	b	Show the Rankine cycle on P-V and T-S diagram.	02
	c	State law of corresponding states..	02
	d	What is air- fuel ratio?	01
Q – 5	a	The tata nano car has a four stork cylinder in-line diesel engine with compression ratio 16:1 and expansion ratio 11:1 calculate the cot-off ratio and air standard efficiency.	05
	b	State the constitution of air by mass and by volume for Hydrogen	05
	c	State the four process of the diesel cycle.	04

OR

Q – 5	a	Write comparison of Otto, Diesel and dual cycle.	05
	b	Explain Orsat apparatus in detail with neat diagram.	05
	c	A fuel has the following composition by mass: Carbon= 86%, Hydrogen= 14% and Oxygen= 23.2%. Determine (i) the stoichiometric mass of air required for complete combustion of fuel (ii) The percentage composition by mass of dry products of combustion.	04
Q -6	a	State and explain Avogadro's Law.	05
	b	Derive COP for reversed heat engine or carnot heat pump.	05
	c	Discuss the deviation of real gases from ideal gases.	04

OR

Q -6	a	Derive the equation for the Bottle or tank emptying process..	05
	b	Explain adiabatic mixing of perfect gas.	05
	c	Explain pure substance.	04