Reg. No._____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

**ME204: THERMAL ENGINEERING (ME)**

Max. Marks: 100 Duration: 3 Hours

**PART A**

***Answer any 3 questions. Ten marks each.***

1. Explain the methods of increasing the thermal efficiency of a Rankine cycle.
2. Compare the characteristic features of a fire tube boiler and water tube boiler.
3. Discuss the methods of energy transfer in impulse and reaction turbines.
4. A simple Rankine cycle works between pressure 28 bar and 0.06 bar, the initial condition of the steam being dry saturated. Calculate the cycle efficiency.

**PART B**

***Answer any 3 questions. Ten marks each.***

5. Compare a 2 stroke and 4 stroke engines. Which engine do you prefer for two wheelers? Why?
6. Define Flash point, Fire point, Calorific value, volatility and carbon residue of a fuel.
7. Explain the working of a Rotary Engine and Stratified Charge Engine.
8. Explain turbo charging and super charging. How does it affect the engine performance and pollution levels?

**PART C**

***Answer any 4 questions. Ten marks each.***

9. Show that efficiency of an ideal Stirling cycle is same as that of Carnot cycle, both operating under same temperature limits.

10. Compare the Otto cycle and actual cycle with p-v diagram. Explain the effect of variable specific heats on the performance and efficiency of an Otto Cycle.

11. Define i. Equivalence Ratio, ii. Mean Effective Pressure, iii. Specific fuel consumption, iv. Flash Point and v. Time loss factor.

12. Compare the various stages of combustion in SI and CI engine with p-θ diagram.
13. In an engine working on diesel cycle inlet pressure and temperature are 1 bar and $17^0$C respectively. Pressure at the end of adiabatic compression is 35 bar. The ratio of

expansion (ie, after the constant pressure heat addition) is 5. Calculate the heat supplied and Efficiency. Also find Mean Effective Pressure by considering air as ideal gas.

14. The velocity of steam entering simple impulse turbine is 1000 m/s, and the nozzle angle is 20. The mean velocity of blades is 400 m/s and the blades are symmetrical. If the steam is to enter the blades without shock, what will be the blade angles?
Neglecting friction effects on the blades calculate the tangential force on the blades and the diagram power for amass flow of 0.75kg/s, estimate the axial thrust and diagram efficiency. If the relative velocity at exit is reduced by friction to 80% of that at inlet estimate the axial thrust, diagram power and diagram efficiency.

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