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KOH NO. I						

Total No. of Pages : 02

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B.Tech.(ME) (2011 Onwards) (Sem.-4) APPLIED THERMODYNAMICS-II Subject Code : BTME-404 Paper ID : [A1214]

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a. What is the difference between reciprocating and rotary compressor?
- b. Draw a neat sketch of actual P-V diagram for a two stage compressor.
- c. What is Euler work?
- d. What do you understand by surging and choking?
- e. When it is necessary to provide prewhirl?
- f. Define angle of attack.
- g. State the assumptions made for thermal efficiency of a gas power plant.
- h. What is degree of reaction?
- i. Write down the methods of cooling the turbine blades.
- j. Write two differences between jet propulsion and rocket propulsion.



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SECTION-B

- 2. Explain the effect of inter-cooling in a multistage reciprocating compressor.
- 3. A centrifugal compressor delivers 50 kg of air per minute at a pressure of 2 bar and 97°C. The intake pressure and temperature of the air is 1 bar and 15°C. If no heat is lost to the surrounding, find: a) index of compression and b) power required, if the compression is isothermal. Take R=287 J/Kg K.
- 4. Explain the function of impeller and diffuser in centrifugal compressor.
- 5. Derive an expression for air standard efficiency of ideal brayton cycle in terms of pressure ratio.
- 6. Explain the working of ram jet and pulse jet.

SECTION-C

- 7. A two stage air compressor compresses air from 1 bar and 20°C to 42 bar. If the law of compression is $pv^{1.35}$ = constant and the intercooling is complete to 20°C, find per kg of air: a) The work done is compressing and b) The mass of water necessary for abstracting the heat in the intercooler, if the temperature rise of cooling water is 25°C. Take R = 287 J/Kg K and c_p= 1 KJ/Kg K.
- 8. A turbojet engine draws air at the rate of l kg/s while flying at a speed of 900 kmph. The velocity of gases at the exit of the nozzle is 620 m/s. The engine uses fuel at the rate of 0.0125 kg/s of calorific value 45000 KJ/Kg. Find :
 - a. Fuel-air ratio
 - b. Fuel consumption in kg/hr
 - c. Thrust, Thrust power and Thrust specific fuel consumption
 - d. Propulsive power and propulsive efficiency
 - e Thermal and overall efficiency of turbojet.
- 9. Write a short note on the following :
 - a. Clearance in compressor
 - b. Free air delivered (F.A.D) and displacement
 - c. Compressor performance