Registration No :

Total Number of Pages : 02   **M.Tech.**
                                                                                HTPE205

2nd Semester Back Examination 2017-18
THEORY OF COMBUSTION AND EMISSION
BRANCH : HEAT POWER & THERMAL ENGG,
HEAT POWER ENGG, THERMAL ENGG, THERMAL POWER ENGG
Time : 3 Hours
Max Marks : 70
Q.CODE : C831
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1   **Answer the following questions :**   **(2 x 10)**
  a)   What are the assumption considered in practical gas power cycle?
  b)   Which process is better heat addition process between constant volume process and constant pressure process and why?
  c)   What are the advantages of gas power cycle over internal combustion engine?
  d)   Define higher heating value and lower heating value?
  e)   What is stagnation properties of gas?
  f)   Why mass of air is constant in gas turbine although mass of fuel is added to the combustion chamber?
  g)   What is the effect Cp and dissociation in gas power cycle?
  h)   Describe the causes of hydrogen emissions from SI engine.
  i)   What is the reason for smoke formation in CI engine?
  j)   What do you mean by energy balance?

Q2 **a)** What are the different methods of fuel ranking? Explain briefly.   **(5)**
      b) What are different refrigeration cycles used commercially? Briefly explain any one.   **(5)**

Q3   Methane is burned with atmospheric air. The analysis of the products on a dry basis as follows: CO_2=10%,O_2=2.37%, CO=0.53%, N_2=87.1%. Calculate the air-fuel ratio and percent theoretical air and determine the combustion equation.   **(10)**

Q4   What do you mean by FBC? Explain its working principle with a neat sketch. What are the different merits of FBC over conventional ones?   **(10)**

Q5 **a)** Briefly discuss about gas turbine spray combustion system.   **(5)**
      b) Differentiate between stationary flame, burning velocity and flame velocity.   **(5)**

Q6 **a)** Explain Exhaust emissions, its measurement and control in IC engine.   **(4)**
      b) A single cylinder 4-stroke diesel engine running at 1500 rpm uses 2.5 kg of fuel per hour of sp. gravity 0.88. It has an open type injector with a single orifice nozzle and the injection period is 25o crank angle. The average injection pressure is 150 bar and the average pressure inside the cylinder is 30 bar. Estimate the diameter of the fuel orifice. Cd of the nozzle is 0.88.   **(6)**

Q7 **a)** Discuss the various stages of normal and abnormal combustion in SI engines **(5)**
with a sketch.

b) With diagrams, explain the different stages of CI engine combustion process. **(5)**

Q8 **Write short notes (any TWO)** **(5 x 2)**

a) combustion modeling

b) Second law analysis of Rankine cycles

c) Combined power cycles