Registration No: | | | | | | | | | | |

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

HTPE106

1st Semester Back Examination 2017-18
THERMAL AND NUCLEAR POWER PLANTS
BRANCH : HEAT POWER & THERMAL ENGG
Time : 3 Hours
Max Marks : 70
Q.CODE : B1162

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2x10)**

a) Differentiate between Rankine cycle and Carnot cycle.
b) Write two methods of improving the efficiency of steam engines.
c) What is pass-out turbine?
d) What is synfuel?
e) What is the function of draught? How many types of draughts are available?
f) Define void fraction of a two-phase mixture.
g) Define K-capture of an atom.
h) If the decay constant of radium is 1.3566×10^{-11} sec, calculate the half life.
i) Define neutron flux. 1 barn = ……. cm^2.
j) Write function of reheater and its types.

Q2 **a)** Write the difference between water tube and fire tube boiler. Describe the working principle of at least one water tube boiler. **(5)**

b) Write the various efficiencies involved in a steam power plant and from which calculate the overall efficiency of the plant. **(5)**

Q3 **a)** Define the function of a back pressure turbine and calculate the amount of process heat required for that. **(4)**

b) Calculate the overall plant efficiency of the series connection Brayton-Rankine combine cycle. **(6)**

Q4 **a)** Propane gas is reacted with air in such a ratio that an analysis of the dry products of combustion gives CO_2 11.5%, O_2 2.7% and CO 0.7%. What is the percentage of excess air used? **(5)**

b) With neat sketch discuss the working principle of boiling water reactor (BWR). **(5)**

Q5 **a)** During a 10 hour journey between two stations, a railway engine develops an average power of 1200kw. If the engine is propelled by an atomic power plant of 35% efficiency, how much U^{235} atom on fission releases 180 Mev of energy. **(5)**

b) What is draught? Calculate the height of the chimney necessary for a draught. **(5)**

Q6 **a)** Draw a heat balance sheet for a steam generator. **(5)**

b) Discuss the way of classification of coal. **(5)**

Q7 **a)** Define high pressure boiler. Discuss any one of the high pressure steam boiler. **(5)**

b) Differentiate between accessories and mountings. In a supercritical boiler categorize the equipments used for steam generation. **(5)**

Q8. **Write short notes (any TWO):** **(5x2)**

a) Process heat

b) Regeneration cycle

c) Neutron life cycle

d) Indian power generation scenario.