THERMAL ENGINEERING-II

QUESTION BANK

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1. Short questions (2 marks)
    a) Define pressure ratio of air compressor
    b) Define FAD
    c) Define brake thermal efficiency
    d) Define latent heat of vaporization
    e) Differentiate between gas and vapour
    f) State Kirchhoff's law.
    g) State Kirchhoff's law of radiation.
    h) Explain Newton's law of cooling.
    i) Define specific fuel consumption
    j) Define wet steam and dry saturated steam
    k) Write the mountings of boiler
    l) What is thermal conductivity and state its unit
    m) What are the various modes of heat transfer
    n) What are the function of boiler mountings
    o) Define steam and its uses
    p) Define indicated thermal efficiency
    q) Define dryness fraction of steam
    r) Write the function of steam stop valve
    s) Define fire tube boiler
    t) State Fourier's law of heat conduction
2. Questions (5 Marks)
    a) Classify steam boilers.
    b) Write down advantages of multi stage compression
    c) What is the difference between reheat and regenerative cycle
    d) Give a comparison between forced draught and induced draught
    e) Differentiate between fire tube and water tube boiler
    f) Explain the modes of heat transfer.
    g) Classify air compressors.
    h) Explain the working of single stage reciprocating air compressor.
    i) Calculate the enthalpy of 1 kg steam at a pressure of 8 bar and dryness fraction of 0.8. Also, find out the amount of heat required to raise 2 kg of this steam from water at 20°C.
    j) A gas engine has piston diameter of 150 mm, length of stroke 400 mm and mean effective pressure of 5.5 bar. The engine makes 120 explosions per minute. Determine mechanical efficiency of engine, if its brake power is 5 KW.
    k) A power plant is supplied with dry saturated steam at a pressure of 16 bar and exhaust at 0.3 bar. Using steam table, find the efficiency of Carnot cycle.
    l) What is the difference between reheat and regenerative cycle

m) Thermal efficiency of a carnot heat engine is 60%. The minimum temperature of the cycle is 25°C. Find the maximum temperature of the cycle.
n) Deduce the formula for workdone by single stage single acting reciprocating air compressor when law of expansion is $PV^n = C$.
o) Explain the working of Cochran Boiler
p) Steam at a pressure 10 bar and df 0.95 expands isentropically to a pressure of 4 bar. Determine final condition of steam.

3. Questions (10 marks)
   a) Derive the expression of work input for a single acting air compressor without clearance volume.
   b) A steam power plant is supplied with dry saturated steam at a pressure of 12 bar and exhaust into a condenser at 0.1 bar. Calculate Rankine efficiency by using steam Table.
   c) The steam power plant operates on Rankine cycle has a boiler and condenser presser of 60 bar and 0.1 bar respectively. Steam coming out of the boiler is dry and saturated. Calculate thermal efficiency of the plant.
   d) Explain different boiler draught.
   e) Deduce the thermal efficiency of Rankine cycle with the help of P-V, T-S and H-S diagram
   f) Deduce the thermal efficiency of Carnot cycle with the help of P-V, T-S and H-S diagram
   g) An engine uses 6.5kg of oil per hour of calorific value of 30000 KJ/Kg. If the B.P of the engine is 22 KW and mechanical efficiency is 85%. Calculate (i) Indicated thermal efficiency, (ii) Brake thermal efficiency and (iii) specific fuel consumption in kg/bp/hr
   h) Steam is being generated in a boiler under pressure of 12 bar. Find enthalpy of 5kg of this steam when (i) steam is wet with df 0.75, (ii) dry saturated steam, (iii) temperature of steam is 300°C, Take Cp= 2.1 KJ/Kg
   i) A single cylinder two stroke petrol engine develops 4KW indicated power. Find average speed of the piston, if MEP is 6.6 bar and piston diameter is 100mm.
   j) Calculate the enthalpy of 1kg of steam at a pressure of 8bar and df 0.8. How much heat would be required to raise 2kg of this steam from water at 20°C.