



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Use of non programmable calculator is permitted.
  11. Steam table and mollier chart are allowed.

1. a) Give the various methods to improve specific power output and thermal efficiency of constant pressure gas turbine plant. 7
- b) Following are the details of a gas turbine having a regenerator and reheater. 7  
 Inlet air pressure = 1 bar.  
 Inlet air temp = 295 k.  
 Pressure ratio = 5  
 Maximum temp of cycle = 1023 k  
 Effectiveness = 0.7  
 $P_i / P_1 = P_2 / P_i$   
 Reheat temp = 1023 k  
 Turbine and compressor effi. = 0.85.  
 Find thermal efficiency, work Ratio, net shaft work per kg of air.
- OR**
2. a) A gas turbine set having a heat exchanger gave the following data at design speed, 11  
 Isentropic efficiency of the compressor = 85 %  
 Isentropic efficiency of the turbine = 85 %  
 Combustion efficiency = 95 %  
 Mechanical transmission effi = 98 %  
 Pressure ratio = 5: 1  
 Mass flow = 20 kg/sec  
 Heat exchanger effectiveness = 75%  
 Maximum cycle temp = 720°C  
 Ambient temp. and pressure of air are 15°C and 1.01325 bar respectively.  
 Determine : i) The power output ii) Specific fuel consumption iii) Thermal efficiency  
 iv) Back work v) Back work ratio.  
 Assume no pressure loss in the heat exchanger and combustion chamber  
 Take C V of fuel = 43510 kJ / kg  
 $C_{p_a} = 1.05$  KJ/kgk,  $r = 1.4$  during compression  
 $C_{p_g} = 1.15$  KJ/ kgk,  $r = 1.4$  during heating and expansion.
- b) State merits and demerits of closed cycle over open cycle gas turbine plant. 3

3. a) A turbojet engine consumes air at the rate of 60.2 kJ/s flying at the speed of 1000 km/hr. Calculate. 7  
 i) Exit velocity of jet when enthalpy change for nozzle is 230 kJ/kg and velocity coefficient is 0.96.  
 ii) Fuel flow rate in kJ/sec if air fuel ratio is 70.  
 iii) Propulsive power and propulsive efficiency.
- b) Write a short note on 6  
 i) Ram jet engine. ii) Pulse jet engine.
- OR**
4. a) Classify Nuclear Reactor's. Explain construction & working of CANDU reactor. 8  
 b) Compare Nuclear plants with thermal plants. 5
5. a) Explain the prospects of solar energy and its utilization in India. 6  
 b) What is solar pond? Explain it in details with neat sketch. 7
- OR**
6. a) Discuss closed type MHD generator, with help of neat sketch. 7  
 b) How the wind energy conversion system classified? Explain any one of them in brief. 6
7. a) Enlist the various instruments used for energy Auditing. Explain any one in detail. 7  
 b) Discuss energy conservation opportunity with energy conservation measures. 7
- OR**
8. a) Write a short notes on 8  
 i) Need and Importance of energy conservation.  
 ii) Sankey diagram.
- b) Explain terms payback period, Return on investment (ROI), life cycle cost. 6
9. a) Describe the operation of meter out circuit with neat sketch. 7  
 b) Explain in brief. 6  
 i) Pressure relief valve. ii) Pressure compensated FeV.
- OR**
10. a) Describe sequencing circuit and regenerative circuit for hydraulic systems. 8  
 b) Classify Hydraulic pumps and explain any one in detailed. 5
11. a) Write a short note on types of various compressors used in pneumatic system. 6  
 b) Draw and explain the pneumatic speed control circuit used for controlling double acting cylinder. 7
- OR**
12. a) Write a short notes on 'Flow control valve for pneumatic circuit'. 4  
 b) Differentiate between hydraulic system and pneumatic system. 4  
 c) Explain construction & Working of FRL also give its functions in pneumatic circuits. 5

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