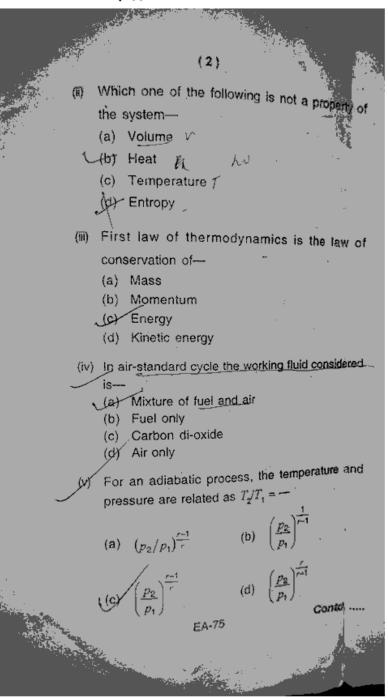


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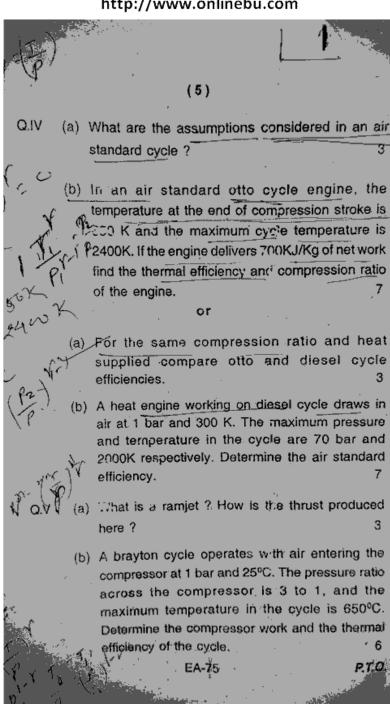
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(4)or (a) What are the limitations of the first law of thermodynamics? (b) A mass of 1.5 kg of air is compressed in a quasistatic process from 0.1 MPa to 0.7 MPa for which pv = constant. The initial density of air is 1.16 kg/m3, find the work done by the piston to compress the air. (a) What is Kelvin-Planck statement of second law of thermodynamics? Explain. (b) Using an engine of 40% thermal efficiency to drive a retrigerator having a COP of 6, what is the heat input to the engine for each MJ removed from the cold body by the refrigerator. (a) What is the principle of increase of entropy ? Explain. An adiabatic vessel contains 2 kg of water at 25°C, By paddle wheel work transfer, the temperature of water is increased to 30°C. If the specific heat of water is assumed constant at 4.187 KJ/Kg·K, find the entropy change of the universe.

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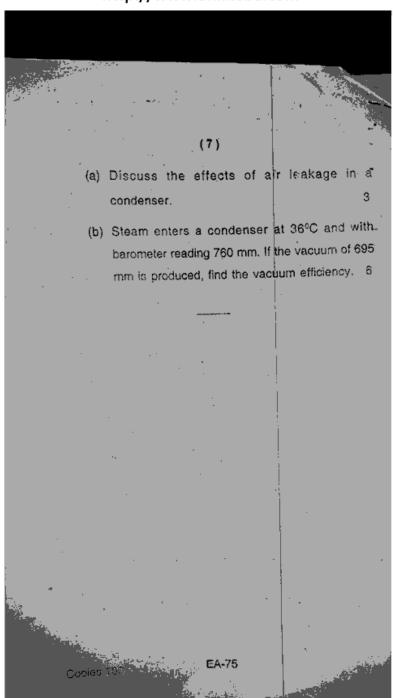
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(a) Explain the effect of pressure ratio on the net output and the efficiency of a brayton cycle. 3 (b) Air enters the compressor of a gas turbine plant operating on Brayton cycle at 1 bar pressure and 200 K temperature. The pressure ratio is 5 and the maximum cycle temperature is limited to 1075 K. If the compressor and turbine efficiences are 80% and 85% respectively, make calculations for the net work output. (a) Explain the advantages of multistage compression. (b) A single cylinder reciprocating compressor has a bore of 120 mm and a strike of 150 mm; and is driven at a speed of 1200 rpm. It is compressing CO, gas from a pressure of 120 KPa and a temperature of 20°C to a temperature of 215°C. Assuming polytropic compression with n= 1.3, no clearance and volumetric efficiency of 100%, calculate the indicated power. Contd. EA-75

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