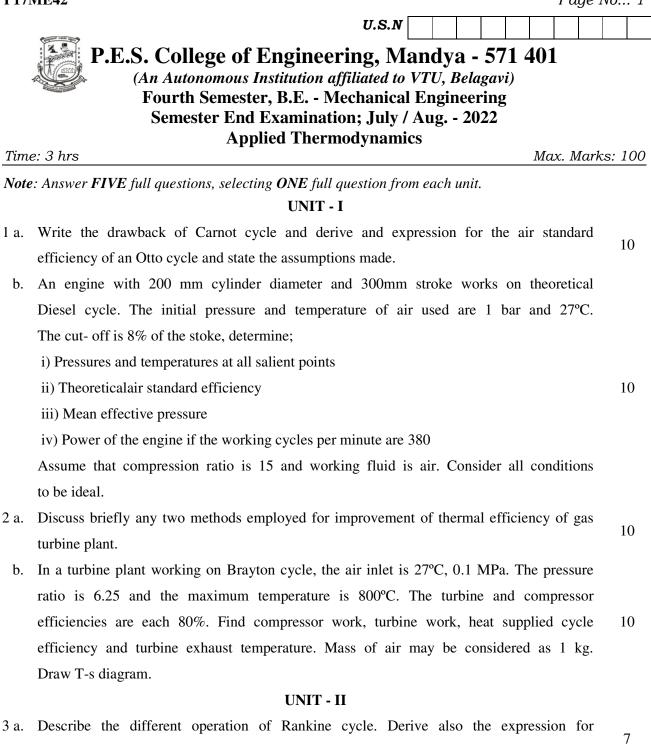
its efficiency.



- b. In a steam turbine steam at 20 bar, 360°C expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the 9 boiler. Assume ideal processes; find per kg of steam the net work and the cycle efficiency.
- c. Briefly explain effects of maximum pressure and maximum temperature on the performance of simple Rankine cycle.
- 4 a. Explain the working and analysis of the regenerative Rankine cycle with closed feed water heater.

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b. A turbine is supplied with steam at a pressure of 32 bar and a temperature 410°C. The steam expands isentropic ally to a pressure of 0.08 bar. Find the dryness fraction at the end of expansion and thermal efficiency of the cycle. If the steam is reheated at 5.5 bar to a 10 temperature of 400°C and then expanded isentropic ally to a pressure of 0.08 bar, what will be the dryness fraction and thermal efficiency of the cycle.

UNIT - III

- 5 a. Obtain the optimum pressure ratio for minimum works in a two-stage compressor with perfect inter cooling and deduce the equation for minimum work.
 - b. A single-eating, single-cylinder reciprocating air compressor has a cylinder diameter of 200 mm and a stroke of 300 mm. Air enters the cylinder at 1 bar; 27° C. It is then compressed polytrophic ally to 8 bar according to the law $PV^{1.3}$ = constant. If the speed of 8 the compressor is 250 rpm, calculate the mass of air compressed per minute, and the power required in kW for driving the compressor.
- 6 a. Define the volumetric efficiency and isothermal efficiency. Explain the effect of clearance 10 volume on volumetric efficiency of a single-stage reciprocating compressor.
 - b. A single-acting, single-stage reciprocating air compressor of 250 mm bore and 350 mm stroke runs at 200 rpm. The suction and delivery pressures are 1 bar and 6 bar respectively. Calculate the theoretical power required to run be compressor under each of the following conditions of compression:

i) Isothermal ii) Polytrophic n = 1.3 and iii) Isentropic, $\gamma = 1.4$,

Neglect the effect of clearance and also calculate isothermal efficiency in each of the above cases.

UNIT - IV

- 7 a. Explain the effect of superheating and sub-cooling of liquid in a refrigeration system. 10
 - b. Sketch and explain the vapour compression cycle on a T-S diagram and deduce an expression for its COP.
- 8 a. Write short notes on the following terms:
 - i) Properties of good refrigerant
 - ii) Steam jet refrigeration
 - iii) Refrigeration effect and TON of refrigeration
 - A simple vapour compression plant produces 5 tones of refrigeration. The enthalpy values at inlet to compressor, at exit from the compressor, and at exit from the condenser are 183.19, 209.41 and 74.59kJ/kg respectively. Estimate;
 - i) The refrigerant flow rate
 - ii) The C.O.P
 - iii) The power required to drive the compressor
 - iv) The rate of heat rejection to the condenser

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9 a. Explain the following:

i) The Morse test for determining the indicated power of a multi-cylinder engine

ii) Air box method to determine air consumption

- b. The following observations were made during a test on a two-stroke oil engine.
 Room temperature = 22°C, Bore = 20 cm, Stroke = 25 cm, speed = 350 rpm, Brake drum diameter = 1.2 m, Net brake load = 450 N, Mean effective pressure = 2.8 bar, Oil consumption = 3.6 kg/hr, Calorific value of oil = 41800 kJ/gk, Quantity of Jacket cooling water = 455 kg/hr, Rise in temperature o jacket water = 28°C. Temperature of exhaust gases entering and leaving the exhaust gas calorimeter are 320°C and 220°C respectively. Quantity of water passing through the exhaust gas calorimeter is 8 kg/min. Temperature rise of calorimeter water = 9°C. Determine the indicated and brake power, mechanical efficiency and brake thermal efficiency. Draw the heat balance sheet on one minute basis.
- 10. Write short notes on;
 - a) Motoring Method
 - b) Basic measurements for engine performance
 - c) Willian's line method
 - d) Indicated power, Brake power and Friction Power

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