Question Paper

Exam Date & Time: 21-Dec-2022 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - DECEMBER 2022
III SEMESTER B.Sc (Applied Sciences) in Engg.
THERMAL ENGINEERING [IME 231]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data if any, may be suitably assumed and to be stated.
Use of Steam tables is permitted

1)	A)	A Bell-Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from the cold chamber at 9^0C compressed and then it is cooled to 29^0C before entering the expansion cylinder. Expansion and compression follow the law $pv^{1.35}$=C. For air take Adiabatic index (Y)=1.4 and C_p=1.003 kJ/kg K.	(5)
	B)	Explain the Carnot cycle with sketch and relevant equations.	(5)
2)	A)	A reversible heat engine operates between two reservoirs at 827ºC and 27ºC. Engine drives a Carnot refrigerator maintaining -13ºC and rejecting heat to reservoir at 27ºC. Heat input to the engine is 2000 kJ and the net work available is 300 kJ. How much heat is transferred to refrigerant and total heat rejected to reservoir at 27ºC?	(5)
	B)	Define heat and work. Derive the equation for work transfer for an Isothermal process.	(5)
3)	A)	A single stage single acting reciprocating air compressor has air entering at 1 bar, 20°C and compression occurs following polytropic process with index 1.2 up to the delivery pressure of 12 bar. The compressor runs at the speed of 240 rpm and has L/D ratio of 1.8. The compressor has mechanical efficiency of 0.88. Determine the isothermal efficiency and cylinder dimensions. Also find out the rating of drive required to run the compressor which admits 1 m^3 of air per minute.	(5)
	B)	Answer the following:	(5)