Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent unit of MAHE, Manipal)

## VII SEMESTER B.TECH. END EXAMINATION (OPE)

## SUBJECT: Process integration for Petroleum Industries (CHE4054)

Date: 27/12/2021, Time: 75 min (75+10 min); Max. Marks: 20

Instructions to Candidates: Answer ALL the questions & missing data may be suitable assumed

1a	Explain the types of heat engines (at least three types) used in Industry	2
1b	Extract the streams from the diagram given below and calculate the pinch temperature using problem table method with $\Delta T_{min} = 20^{\circ}C$ $H_{0C} = \frac{230^{\circ}}{P_{c}} = \frac{230^{\circ}}{REACTOR!} = \frac{200^{\circ}}{P_{c}} = \frac{200^{\circ}}{P_$	5
1c	Using the maximum heat recovery principle, identify the heat exchanger network/better matches for process heat transfer STREEPAN CP Transfer $H_1 0.045 T20CII P I ATmin=20°C I A ATmin=20°C$	3
2a	Explain the three golden rules of heat integration in Pinch technology?	2
2b	Calculate the heat transfer area and number of tubes required for given heat duty of counter current flow and unmixed cross flow mechanism. The overall heat transfer coefficient is 5000 W/m <sup>2</sup> <sup>O</sup> C. The pipe outer diameter is 12 mm and length is 1.5 m. The cold fluid enters the heat exchanger at 50 <sup>o</sup> C and leaving at 120 <sup>o</sup> C with CP 3 KW/ <sup>o</sup> C and hot fluid enters the heat exchanger at 170 <sup>o</sup> C and leaving at 65 <sup>o</sup> C with CP 2 KW/ <sup>o</sup> C.	3

