ALMUSTANSIRIYAH -UNIVERSITY

COLLAGE OF SCIENCE

DEPARTMENT OF ATMOSPHERIC SCIENCE

FORECASTING -LAB

(THIRD GRADE)

LUCTURERS

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FORECASTING -LAB

Experiment No.1

Experiment Name: Fronts Worksheet

Theory:

A front is defined as "the interface or transition zone between two air masses of different density, Although fronts are typically drawn on weather charts as lines, it is more useful to think of them as "zones" [1]. Fronts can be defined as regions of enhanced horizontal temperature or potential temperature gradient; "enhanced" could be taken to be an order of magnitude than the typical synoptic-scale value. Sanders (1999) proposed to classify temperature gradients of 8°C per 220 km as "moderate" and 8°C per 110 km as "strong." [2]. There are different types of fronts, Cold fronts are marked by blue lines with blue triangles pointing in the direction of frontal motion, while warm fronts feature red lines and red semicircles also oriented in the direction of motion. Stationary fronts are identified by alternating blue triangles and red semicircles on opposite sides of the alternating blue and red line. Finally, occluded fronts have alternating triangles and semicircles but are always purple [1].

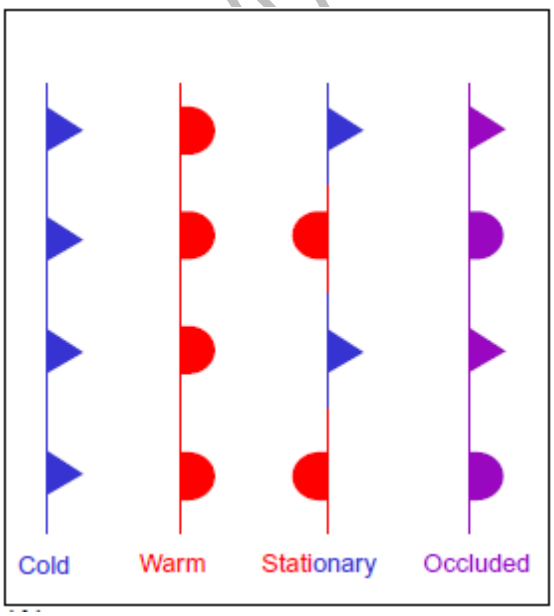

Figure (1): Fronts Types [1].

Tools: Sheet of Surface pressure map figure (2).

Methodology:

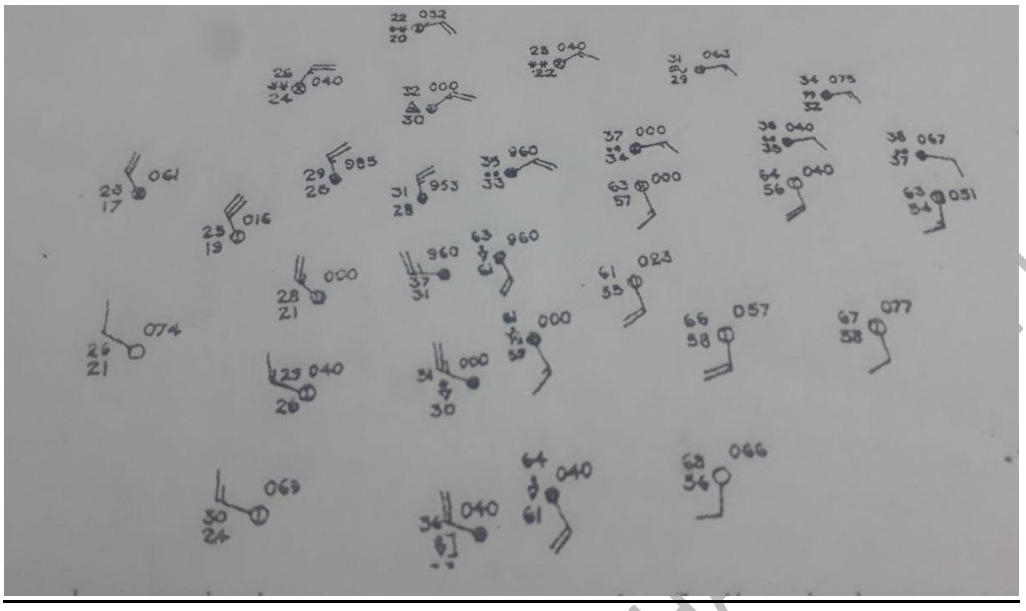

Figure (2): Surface pressure map

STEP 1: Locate the Low-pressure system by finding the lowest pressure values and by the fact that winds around a low circulate in a counterclockwise direction Fig (3).

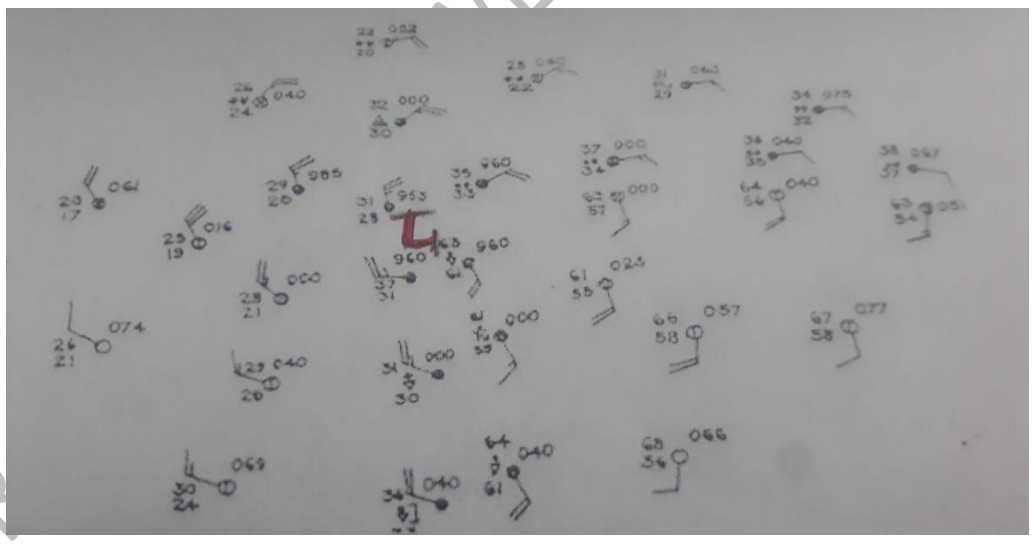

Figure (3): Step 1

STEP 2: Find and draw the COLD FRONT, which generally extends Southward or Southwestward from the center of the Low-pressure system. Winds in advance of the COLD FRONT generally come from a South or Southwesterly direction while behind the COLD FRONT the winds are generally from the West or Northwest.

Temperatures are generally warm in advance of the COLD FRONT while behind the COLD FRONT temperatures are cold Fig (4).

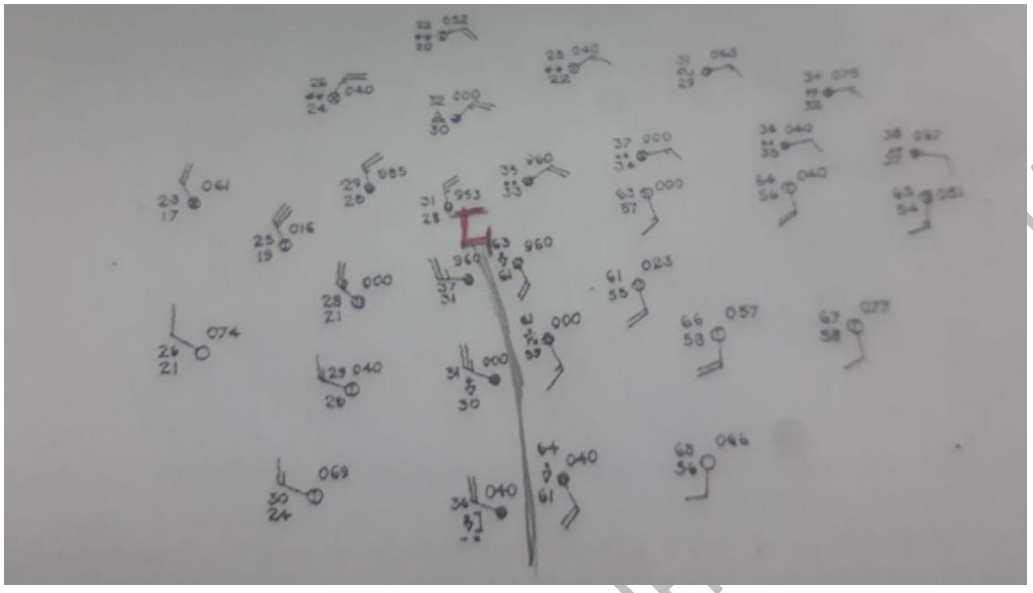

Figure (4): step 2

STEP 3: Find and draw the WARM FRONT, which usually extend Eastward, Northeastward or Southeastward from the center of the Low-pressure system.

- WINDS to the North of the WARM FRONT are usually blowing from the East or Southeast, while winds to the south of the WARM FRONT winds are generally from the South.
- TEMPERATURES to the North of the warm front are generally cold while temperatures to the South of the WARM FRONT are generally warm.
- PRECIPITATION is most often found north of the warm front and very rarely South of the front. (Except near the oncoming cold front) Fig(5).

STEP 4: Draw isobars so that the pressure interval is 4 millibars. Isobars are nearly straight lines in the warm sector of the Low- pressure system and also that the isobars 'bend' as they cross the warm and COLD FRONT, always bending away from Low-pressure Fig (6).

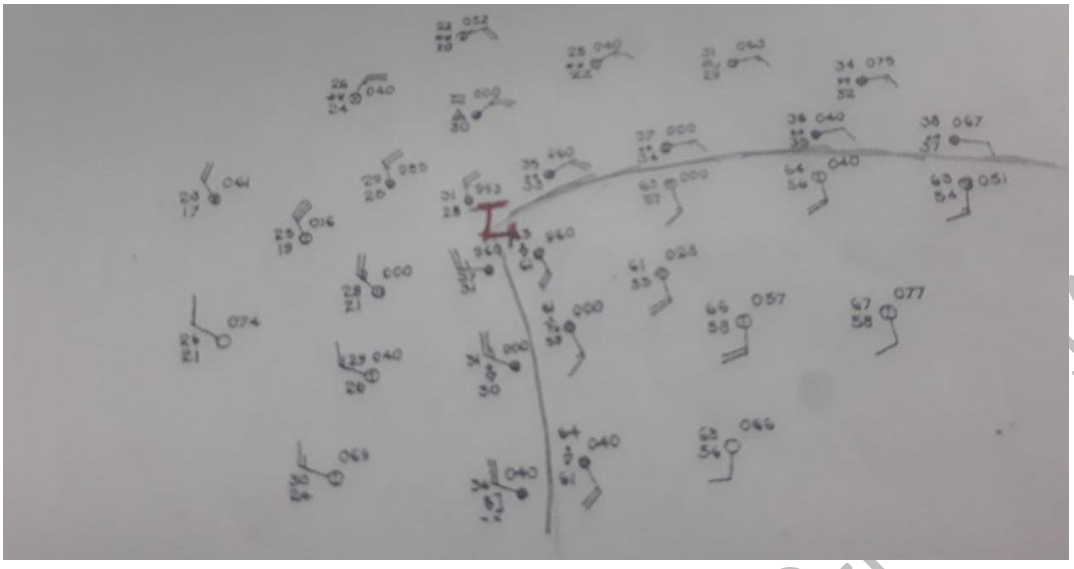

Figure (5): Step 3

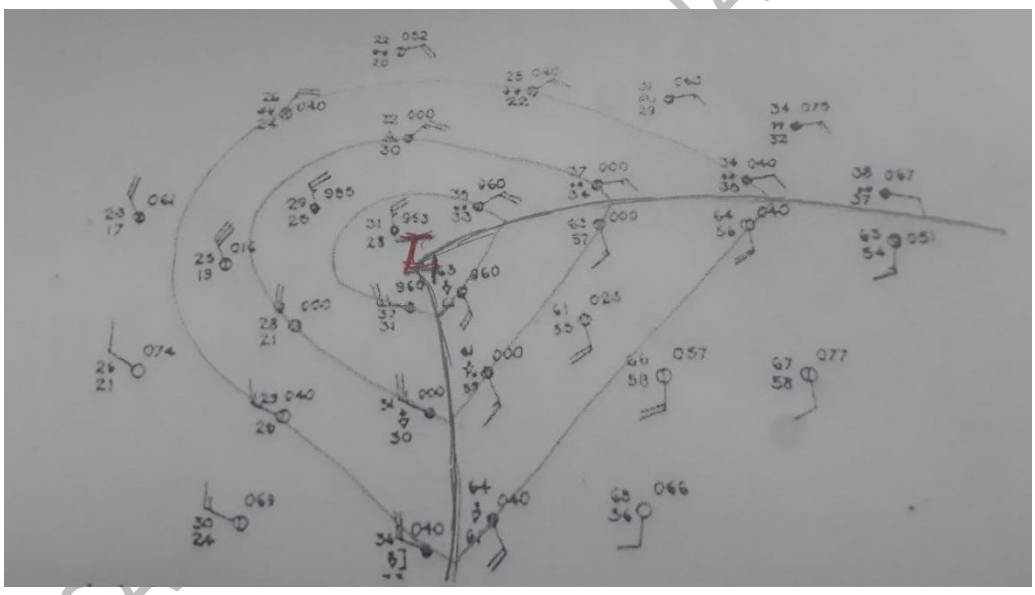

Figure (6): Step 4

STEP 5: Label all isobars (label the isobars that located in the warm sector) Fig (7).

STEP 6: If there is precipitation on the precipitation on the weather map, outline the entire precipitation area and then shade the precipitation area lightly in green. If it is during the cold season, put stars (*) over the snow areas and (..) Dots over the rain areas and then separate the two areas with dividing line. Thunderstorms should be indicated in red.

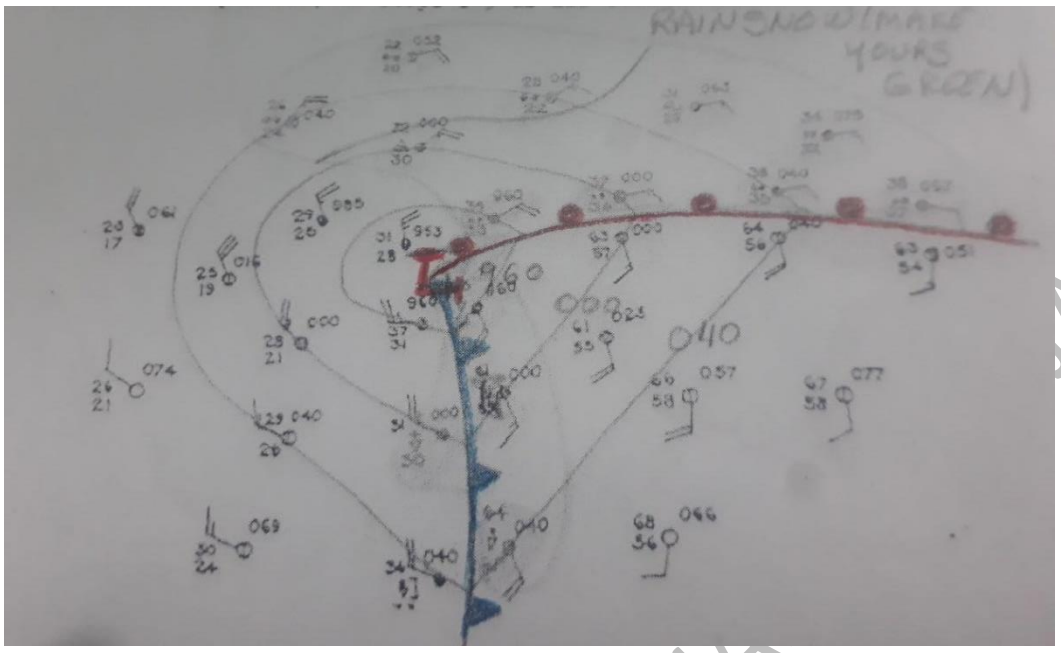

Figure (7): Step 5

References:

[1] S. Milrad, 2017, Synoptic Analysis and Forecasting, Elsevier,128PP.

[2] G. Lackmann, 2011, Midlatitude Synoptic Meteorology, American Meteorological Society, 132PP.