METEOROLOGY EXAM
SECTION A
ANSWER QUESTION **ONE** AND TWO **OTHER** QUESTIONS
Q1. Decode the following weather reports;
a) (i) METAR HKJK 170530Z 35007KT 0500 R26L/2400FT R08/0400V0800FT FG OVC000 FEW///CB T07/07 Q1025 FM0535 TL0615 0100 = (8mks)
(ii) TAF AMD HKJK 130930Z 131212 240010KT 7000 SCT025 FEW030CB BKN070 TEMPO 1220 36023G33KT+TSRA BKN005 BECMG 2224 BKN015 TEMPO0306 2000BCFG BKN003 PROB40 0406 0500 FG 0VC000FM0815 03007KT 9999 SCT020 = (13mks)
b) Differentiate between a landing forecast and terminal aerodrome forecast. (4mks)
c) Define advection fog giving conditions of formation, times of occurrence and location. (10mks)
d) Define tropopause and its significance. (What it usually marks). (7mks)
e) Briefly describe the following veer, backing, standard atmosphere, aircraft turbulence, wind shear, lapse rate, gusting, and wind shift. (8mks)

Q2. a) List the hazards associated with small-scale low pressure areas. What is generally associated with poor visibility?
(7mks)
b) Differentiate between Advection and convection of air.
(4mks)
c) Name any four Jet streams known to you.
(4mks)
d) Distinguish the five lifting mechanisms in formation of precipitation.
(5mks)

Q3.a) Discuss the effect of humidity on density clearly showing their relationship
(8mks)
b) List the clouds types referred to as low and middle level
(7mks)
c) What is included in flight documentation?
(5mks)

Q4. a). Define turbulence. Give where in jet streams turbulence is most severe?
(6mks)
b) List any three hazards related to CB clouds.
(3mks)
c) List the various pressure systems and briefly discuss one of them.
(7mks)

d) What conditions are required for METAR report to be entered as CAVOK?
(4mks)

Q5. a) Define relative humidity and radiation fog.
(4mks)

b) Discuss the diurnal variation of humidity stating clearly when the maximum and minimum occurs.
(8mks).

c) Define precipitation and give the conditions for it to take place
(6mks)

d) Name two types of meteorological instruments
(2mks)

SECTION B

ANSWER **ALL** QUESTIONS

1. In high a pressure systems
   a. The winds tend to be stronger in the morning
   b. The angle between the isobars and the wind direction is greatest in the afternoon.
   c. The winds tend to be stronger at night
   d. The winds tend to be stronger in early afternoon.

2. The main factor which contribute to the formation of very low clouds ahead of a warm front is
a) Saturation of the cold air by rain falling into it and evaporating
b) Saturation of the warm air by rain falling into it and evaporating
c) Reduction of outgoing radiation due to clouds
d) Warm air moving over a cold surface

3. Which of the following conditions are most favourable to the formation of mountain waves?
   a) Unstable air at mountain top altitude and a wind at least 20 knots across the mountain ridge
   b) Either stable or unstable air at mountain top and a wind of at least 30knots blowing parallel to the mountain ridge
   c) Moist unstable air at mountain top and a wind of less than 5knots blowing across mountain ridge
   d) Stable air at mountain top altitude and a wind at least 20knots blowing across mountain ridge

4. For the same pressure gradient at 50^0N, 60^0N and 40^0N the geostrophic wind speed is?
   a. Greatest at 60N
   b. Least at 50N
   c. Greatest at 40N

d. The same at all latitudes

5. What is the effect of a strong low level inversion?
   a. Good visibility
   b. Calm conditions
   c. Windshear
   d. Unstable conditions

6. A mass of unsaturated air is forced to rise till just under the condensation level. It then settles back to its original position
   a. Temp is greater than before
   b. Temp stays the same
   c. Temp is less than before
   d. It depends on QFE

7. ATC will only report wind gusting if:
   a. Gust speeds exceeds mean speed by >15kts
   b. Gusts to over 25kts
   c. Gusts exceeds mean speed by 10kts
   d. Gust to over 25kts

8. How does humidity and the dewpoint in an unsaturated air mass change with varying temperature?
   a. When temperature increases, the relative humidity decreases and the dewpoint remain constant
   b. When temperature increases, the relative humidity increases, and the dewpoint decreases
   c. When temperature decreases, the relative humidity decreases and the dewpoint increases
   d. When temperature decreases, the relative humidity and the dewpoint remain constant

9. A gust front is
   a) Normally encountered directly below a thunderstorm
   b) Characterized by heavy lightning
   c) Another name for a cold front
   d) Formed by the cold air outflow from a thunderstorm

10. A layer of air cooling at the SALR compared to the DALR would give what kind of cloud?
    a) Stratus if saturated
    b) Cumulus if saturated
    c) No clouds if saturated
    d) Convective cloud

11. When flying from south to north in the Southern Hemisphere, you cross over the Polar Frontal Jet. What happens to the temperature?
    a. Increases
    b. It decreases
    c. It remains the same
    d. Impossible to determine

12. When the temperature and dew point are less than one degree apart the weather conditions are most likely to be:
    a) Clear and cool
    b) High scattered clouds
    c) Unlimited visibility
    d) Fog and cloud

13. Divergence in the upper air results, near the surface, in
    a) Falling pressure and likely dissipation of clouds
    b) Falling pressure and likely formation of clouds
    c) Rising pressure and likely formation of clouds
    d) Rising pressure and likely dissipation of clouds

14. Thunderstorms in exception circumstances can occur in warm front if
    a. The cold air is convectively stable
    b. The warm air is convectively stable
    c. The warm air is convectively unstable
    d. The cold air is convectively unstable

15. The rate of cooling of ascending saturated air is less than the rate of cooling of ascending unsaturated air because:
    a) Water vapour doesn't cool as rapidly as dry air.
    b) Water vapour absorbs the incoming heat from the sun
    c) Heat is released during the condensation process
    d) Moist air is heavier than dry air.

16. What happens to the temperature of a saturated air mass descending?
    a) It heats up more than dry because of expansion
    b) It heats up less than dry because of evaporation
    c) It heats up more than dry because of compression
    d) It heats up less than dry because of latent heat released during condensation.

17 The polar front jet stream in summer compared to winter in the Northern Hemisphere moves
    a. North and decreases in strength
    b. North and increases in strength
    c. South and decreases in strength

d. South and increases in strength

18. What causes the geostrophic wind to be stronger than the gradient wind around a low?
    a) Centrifugal force adds to the gradient force
    b) Centrifugal force opposes the gradient force
    c) Coriolis force adds to the gradient force
    d) Coriolis force opposes the centrifugal force.

19. In an unstable layer there are cumuliform clouds. The vertical extent of these clouds depends on the
    a. Thickness of the unstable layer
    b. Wind direction
    c. Air pressure at the surface
    d. Pressure at different levels

20). When warm air is advected in the lower part of a cold layer of air:
    a) Stability increases in the layer
    b) Stability decreases in the layer
    c) Stability will remain the same.
    d) Stability will be conditional

21. Lack of cloud at low level in a stationary high is due to:
    a) Instability
    b) Rising air
    c) Sinking air
    d) Divergence at high level

22. Below a low level inversion visibility is often:
    a) Moderate or poor because there is no vertical exchange
    b) Very good at night
    c) Very good in the early morning
    d) Moderate or poor due to heavy snow showers

23. What is a microburst?
    a) A small low pressure system where the wind circulates with very high speeds
    b) A concentrated downdraft with high speeds and a lower temperature than the surrounding air
    c) A concentrated downdraft with high speeds and a higher temperature than the surrounding air
    d) An extremely strong wind gust in a tropical revolving storm

24. What are the requirements for the formation of a thunderstorm?
    a) A stratocumulus cloud with sufficient moisture

b) A cumulus cloud with sufficient moisture associated with an inversion
c) An adequate supply of moisture, conditional instability and a lifting action
d) Water vapour and high pressure

25. The Geostrophic Wind blows at your flight level in Northern Hemisphere the true altitude and indicated altitude remain constant, is the crosswind
    a. From the left
    b. From the right
    c. No crosswind
    d. Impossible to determine