INDIA METEOROLOGICAL DEPARTMENT

QUESTION BANK

OF

ADVANCED METEOROLOGICAL TRAINING COURSE (AMTC)

SEMESTER-I EXAMINATION

(ELECTIVE SUBJECT)

BASED ON 176-181 BATCHES

(2015-2021)

PAPER-V: HYDRO MET.

PART B

INDIA METEOROLOGICAL DEPARTMENT

METEOROLOGICAL TRAINING INSTITUTE

ADVANCED METEOROLOGICAL TRAINING COURSE

FINAL EXAMINATION

PAPER IV – HYDROMET,

SEMESTER-I (Batch No. 176-181)

SECTION B:- HYDROMETEOROLOGY

Q.1. Fill in the blanks/YES or NO

1. ------ is the longest river in Indian region.
2. Based upon data 1951 – 2000 Normal Rainfall of India is ----------Cm.
3. Fresh water on earth is ---- % of total water on earth of which 0.01% on lakes and rivers available.
4. Generally two approaches followed in QPF are ____ and _____.
5. Heavy rain over long periods (days) in the upper catchment leading to rising water levels and flooding is called _____ flood.
6. Heavy to very heavy rainfall in a smaller catchment for a short duration causing the flood is called _____ flood.
7. Hydrological Cycle is also known as ----------.
8. Hydrological flood of _____ (longer/shorter) period than meteorological flood.
9. If the record contains in a series only events of magnitude above a pre –selected base, the series is called a ----------.
10. In general, as global distribution of disasters caused by natural hazards, loss of life is _____ (More/less) in flood than drought.
11. In India Rainfall is highly variable in time and ---- % of annual rainfall occurs during 4 months of SW Monsoon Season.
12. ------is the driest met sub Division of India.
13. It is desirable to have at least --------% of the raingauge stations equipped with self-recording raingauges.
14. Losses particularly of lives and movable property due to flood can be minimized by structural measures. (Yes/No)

15. Non-uniformity of the distribution of precipitation gauge data can produce biases in areal estimates of precipitation. (Yes/No).
16. Northward shift of axis of Monsoon causes active monsoon condition. (Yes / No.).
17. QPF is the expected amount of rainfall over specified time period and over a specified area. (Yes/No).
18. Quantitative Precipitation Forecast (QPF) is the expected amount of rainfall accumulated over a specified ------ over specified -------.
19. Seawater is different from freshwater and typically contains about ….. grams per liter of dissolved solids, most of which is sodium chloride. Freshwater typically has ……. gram per liter or less of dissolved solids.
20. The Long Period Average Rainfall (Normal Rainfall) is worked on the basis of ---- years of rainfall data of given area.
21. Three principal means of estimating precipitation that are used by the National Weather Service (NWS) ____, ____ and _____.
22. Aridity Index (AI):

$$AI = \frac{PE - AE}{PE} \times 100$$

Where PE= …. and AE= ….

Q.2 State with brief reasons whether the following are true or false.

1. All areas of the country receive almost equal amount of rainfall during southwest monsoon season.
2. Drought is caused as an impact of climate change.
3. Evaporation, Transpiration and Evapotranspiration are the same physical parameter/s.
4. Flood level/danger level is same for all the rivers in an area/basin.
5. FMOs are nonfunctional during Non-flood season.
6. In Northern Hemisphere snow on southern slopes melts more rapidly than that on northern slopes.
7. Infiltration capacity has a significant role in runoff flow.

8. Maximization for Moisture (Moisture Adjustment Factor) is applied while estimating Standard Project Storm (SPS).
9. Rainfall of moderate intensity but for continuous two-three days will always bring flash flood.
10. Relatively poor spatial and temporal resolution of raingauge networks, radar offers high-resolution, more evenly distributed spatial coverage.
11. Response time of hydrological drought is less than agricultural drought.
12. River floods may occur in an area without experiencing rain in that area.
13. SPS value is greater than PMP Value in design storm studies.
14. Structural measure is less costly for minimization of flood damages than non-structural measure.
15. Sublimation causes significant cooling of snowpack.
16. The Return Period of an event is equal to probability of occurrence of event of same or lower magnitude.
17. The 1/10th of mean snow depth may be recorded as water equivalent of snowfall.
18. The average areal rainfall is determine from moisture and rainfall data observed at number of stations in given area.

Q.3. Answer the following

1. (a) Define the Hydrologic Cycle, list out its physical processes and explain the following processes in detail:
   I. Infiltration and Percolation
   II. Evaporation and Runoff

   (b) Define SPS &PMP and explain which method gives a better estimation of PMP for a large project, the Physical method or the statistical method; and why:

2. What do you mean by Moisture Adjustment Factor (MAF)? Explain:
3. What do you mean by Barrier Adjustment Factor (BAF)? Explain:
4. As per WMO standards, how much error in the precipitation amount measurement is acceptable with a confidence level of 95%: …….. .
5. What do you mean by Storm Transposition? Explain in detail.
6. Write down the Cumulative probability distribution function that an extreme value will not exceed than the value. Explain the terms used.

7. What do you mean by Return Period and Isopluvial map? Explain:
8. Define drought. Discuss different types of droughts
9. White is QPE? Discuss different types of QPE and their advantages and limitations
10. Define hydrological flood. Discuss in details the various causes of flood.
11. What is drought? Discuss various indicators used for monitoring drought.
12. How the meteorological sub divisional rainfall is estimated from district rainfall in DRMS?
13. Define GLOF.
14. Define infiltration and percolation processes in water cycle.
15. What are the advantages and limitations of estimation of average areal rainfall by Arithmetic averaging method?
16. What is the equation for the optimum number of raingauge, when the mean rainfall is calculated by simple arithmetic average as per BIS?
17. The isohyetes due to a storm in a catchment were drawn and the area of the catchment bounded by isohyetes were tabulated as below;

Isohyetes(cm)	**Area(sq. Km)**
Station-12	30
12-10	140
10-8	80
8-6	180
6-4	20

Estimate the mean precipitation due to the storm.

18. Calculate the Average Rainfall of Met. Sub-division Rayalaseema (Andhra Pradesh) having four districts, as per data given below:

S.No.	Area(sq.km)	15000	Area(sq.km)	12000	Area(sq.km)	10000	Area(sq.km)	13000
	DISTRICT: ANANTAPUR	**Rain (mm)**	**DISTRICT: CHITTOOR**	**Rain (mm)**	**DISTRICT: CUDDAPAH**	**Rain (mm)**	**DISTRICT: KURNOOL**	**Rain (mm)**
1	AMARAPURAM	5.0	AROGYAVARAM	54.0	BADVEL	23.0	ALLAGADDA	4.0
2	ANANTAPUR(A)	6.0	CHITTOOR	26.0	CUDDAPAH	12.0	ALUR	56.0
3	ANANTPUR	15.0	KALAKADA	24.0	JAMMALAMADUGU	5.0	ATMAKUR	N/A
4	CHILAMATTUR	8.0	KUPPAM	56.0	KAMALAPURAM	6.0	DHONE	11.0
5	DHARMAVARAM	8.0	PAKALA	13.0	LAKKIREDDIPALAM	4.0	HOLALAGUNDA	22.0
6	GOOTY	12.0	PALAMNER	6.0			KOILKUNTLA	12.0
7	TADPATRI	0.0						
District Rain:			**District Rain:**		**District Rain:**		**District Rain:**	

Average rain of the met. sub-division:

Q. 2 Write short notes on the following:

1. SPS and PMP for design storm studies
2. Thiessen Polygon and Isohyetal techniques for aerial rainfall analysis
3. Water Cycle
4. DRMS
5. Degree-Day Method for snow melt
6. Areal rainfall
7. Determine the average depth of Annual Rainfall over catchment from following data:

   Isohyets (mm) - 40 35 30 25 20 15 10

   Area (Sq Km) - 20 70 150 320 450 600
8. Isohyetal Method for estimation of average areal rainfall.
9. Necessity of estimation of Design Storm studies.
10. Write short notes on Hydromet support of IMD for flood forecast.
11. Write short notes on Water Cycle.