MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR
AE/SDO
UNDER MINOR IRRIGATION DEPARTMENT, MAY, 2016.

ENGINEERING PAPER – II

Time Allowed : 3 hours FM : 100 PM : 40

Marks for each question is indicated against it.

Attempt all questions.

1. Define 'Hydrology' **(2)**

2. Chose the correct one. **(5×1=5)**

(a) Base flow/surface runoff is water that flows to streams from natural storage.

(b) Thiessen Polygon method is used for estimation of missing rainfall record in a basin/ average rainfall over a basin

(c) Intensity of rainfall is directly/inversely proportional to runoff

(d) Infiltration capacity is directly/inversely proportional to runoff

(e) Isohyet/Isobar is the line joining areas of equal rainfall on a map

3. Name the instruments for measuring **(5×1=5)**

(a) Temperature

(b) Atmospheric pressure

(c) Altitude

(d) Wind velocity

(e) Relative humidity

OR

What are the units of measurement usually used for the following?

(a) Temperature

(b) Discharge of a river

(c) Intensity of rainfall

(d) Infiltration rate

(e) Discharge velocity

4. The hydrologic cycle has no beginning or end. Discuss with an illustration. **(8)**

5. Choose the most appropriate word from the choices given. **(5×1=5)**

(a) The branch of science that deals with the atmospheric phenomenon and the basic law that produce atmosphere, the agent through which many of the hydrologic characters are brought about is known as Climatology/Meteorology/hydrology/hydrologic cycle

(b) For discharge measurement, one of the methods generally use is Area- Slope method /Arithmetic-average method / Double Mass Curve method /Isohyetal method.

(c) The formula $I = O + \Delta S$, Where I = inflow, O = Outflow and S = Storage, is used for expressing hydrologic equation/water balance equation/ evapo-transpiration /infiltration in a given area.

(d) The rational formula $Q_P = 1/36$ CIA is used for determining peak discharge / flow through pipes / flow through Parshall flume/base flow.

(e) Discharge hydrograph is a graphical representation of discharge *versus* distance /time / area / watershed.

6. Write 'T' for correct statement and 'F' for false statement. **(5×1=5)**

(a) Meteorology is a sub-division of Climatology

(b) Atmospheric pressure varies with Earth rotation

(c) Wind speed is directly proportional to evaporation

(d) Rate of evaporation is directly proportional to depth of water

(e) Mean velocity of a river, if measured at one point, is usually measured at 0.4 D (depth)

7. What do you understand by surveying? Differentiate between Geodetic (Trigonometrical) Surveying and Plane Surveying. **(5)**

8. Define the following terms: **(5)**

(a) Datum

(b) Reduced Level

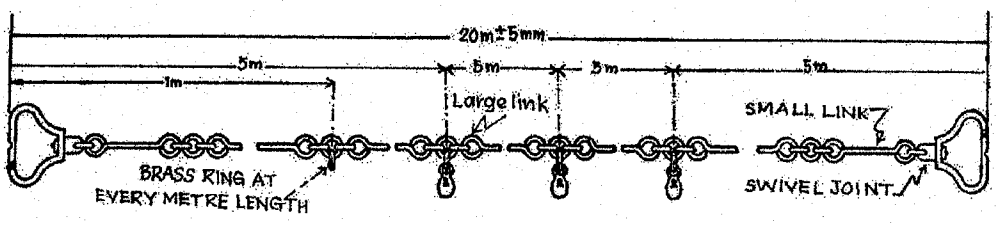
(c) Height of Instrument

(d) Bench Mark

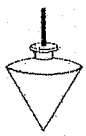
(e) Line of collimation

9. Name the following instruments and mention their uses **(5×1=5)**

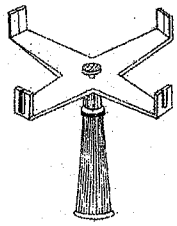
(a)



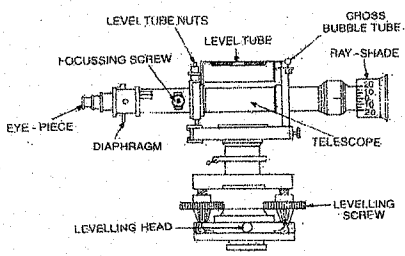
(b)



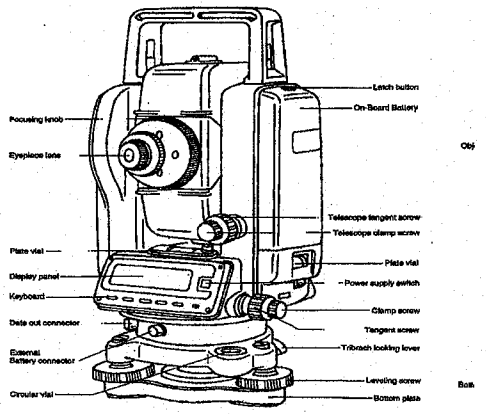
(c)



(d)



(e)



10. The following consecutive readings were taken with an auto level: **(10)**

0.565, 0.854, 0.940, 1.005, 0.640, 0.660, 0.785, 0.800, 0.635, 1.135, and 1.420. The level was shifted after the fourth and the seventh readings. The first reading was taken on the bench mark of R.L. is 100.565. Calculate the reduced levels of the change points, and the difference of level between the first and last points and check the result mathematically using $\sum$B.S - $\sum$F.S = Ist R.L. - Last R.L or $\sum$B.S - $\sum$F.S = $\sum$Rise - $\sum$Fall. You may use any method.

OR

Discuss the characteristics of contour lines with diagram.

11. What do you understand by Remote Sensing? How does GPS help in modern surveying? **(3)**

12. Write the full form of the following abbreviations associated with remote sensing: **(4×0.5=2)**

(a) GIS (b) GPS

(c) DEM (d) LIDAR

13. What do you understand by the term 'Soil erosion'? Discuss in brief 'Geological erosion' and 'Accelerated erosion'. **(4)**

14. Differentiate between biological (agronomical) and mechanical (engineering) measures for control of soil erosion with examples. **(5)**

15. Write 'T' for correct statement and 'F' for false statement. **(5×1=5)**

(a) Terrace spacing is generally expressed as the vertical distances between two terraces.

(b) Batter slope is mainly for the stability of the fill or the embankment.

(c) In order not to lose the top soil, it is necessary to start construction of terraces from the top towards the bottom.

(d) Construction of bund is one of the most effect engineering measures of soil conservation.

(e) Loose rock dams are temporary gully control structures.

16. Choose the correct one **(5×1=5)**

(a) Stream channel erosion occurs at the lower end/ upper end of head tributaries

(b) Terracing is the biological/mechanical measure for controlling erosion

(c) In high rainfall areas with steep slopes, inward/outward sloping type of terraces are generally used

(d) Stream bank/coastal erosion is the wearing a way of land and the removal of beach or dune sediments by wave action.

(e) In soil and water conservation, the agronomical /mechanical measure is a more economical, long lasting and effective technique

(f) A term that is used to describe the potential for soil to be washed off from disturbed, de-vegetated areas and move with into surface waters during storms is 'erositivity of rainfall' / 'erodibility of soil'.

17. What are they? **(3×2=6)**

(a) Dugout Ponds (b) Percolation dams

(c) Contour bunds

18. Discuss the scope of farm mechanization in Mizoram. **(5)**

19. What do you understand by primary and secondary tillage? Name common implements use for their operations. **(5)**

20. Discuss in brief the instruments generally used for ploughing, sowing and interculture operation of crops? **(5)**

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