Ref No. -Ex/CE/5/T/204/2018

B.E.C.E. (PART TIME) 2nd YEAR EXAMINATION, 2018

(2nd Semester)

SUBJECT: Hydrology

Time: Three hours | Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	Part I	Marks

Answer question no.1 (compulsory) and any three from the rest. Assume relevant data if necessary.

Q1. a) **Fill in the blanks:** 1×10

i. The example of a recording type raingauge is _____

ii. The maximum rate at which a given soil at a given time absorb water is defined as_____

iii. The instrument used to measure evapotranspiration is _____

iv. The chemical that is most suitable for controlling evaporation from a water body is_____

v. Consistency of rainfall for a particular area is checked by _____

vi. In a single point observation method the depth at which the stream velocity measured is _____

vii. In tropical cyclone, wind movement is _____direction in the northern hemisphere.

viii. The most accurate method for measuring mean precipitation for a particular area is_____

ix. Line joining area of equal rainfall depth_____

x. Unit of river discharge is_____

b) **Write short note on (Any two)** 5 ×2=10

i. Convective precipitation

ii. Energy budget equation

iii. Constant rate injection method dilution technique of discharge measurement

Q 2. **Distinguish between** 2.5×4=10

i. PET and AET

ii. Interception loss and transpiration loss

iii. Double ring infitrometer and single ring infiltrometer

iv. Hyetograph and mass curve

Q 3. Results of an infiltrometer test of a catchment area is provided below. Determine the Horton's infiltration capacity equation graphically for the area. 10

Time from the beginning of storm (hr)	0	0.5	0.75	1.00	1.25	1.5	1.75	2.0
Infiltration capacity (cm/hr)	5.6	3.2	2.1	1.5	1.2	1.1	1.0	1.0

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Q 4. Following are the data of a storm as recorded by a self-recording rain guage at a station. If the storm produced a direct runoff of 3.5cm at the outlet of the catchment area, estimate the φ-index of the storm and duration of rainfall index.

Time from the beginning of storm (hr)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Cumulative rainfall(cm)	0	0.25	0.5	1.1	1.6	2.6	3.5	5.7	6.5	7.3	7.7

Q5. Write three advantages of isohyet method over Theissen polygon method for determining average rainfall for a particular area. Write and explain two factors affecting evaporation. Determine the probability of occurring a 24 hour rainfall of magnitude 250mm of recurring interval 50 years (a) once in 20 years, (b) at least once in 20 years and (c) Non occurring at all in 20 years 3-

Q6. The following data are obtained in a stream gauging operation. A current meter with a calibration equation V=(0.32×N+0.032) m/s, where N is revolution per second was used to measure the velocity at average depth. Using area velocity method, determine the discharge of the river.

Distance from left bank(m)	0	1.5	3.0	4.5	6.0	7.5	9.0
Depth(m)	0	1.3	2.5	1.7	1.0	0.4	0
Number of revolution	0	80	83	131	139	121	0
Observation time (S)	0	180	120	120	120	120	0

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B. E. CIVIL ENGINEERING EXAMINATION (PART TIME) SECOND YEAR SECOND SEMESTER EXAM 2018

HYDROLOGY

Time: Three Hours

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(50 marks for each part)

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No. of questions	Part II	Marks
	*Answering of Question **no. 1** is mandatory and any **three** questions from remaining **four**.* *Assume reasonable values of data, if not supplied.*	
1. A.	Define the following terms	
(i)	Well loss	
(ii)	Gravel packing	2x4
iii)	Darcy's law	
iv)	Cross sectional diagram showing the ground water flow in uniformly permeable material	
B. i)	An aquifer, which is confined at its bottom but not at the top, is called a a) Confined aquifer, b) Semipermeable aquifer, c) Unconfined aquifer, d) Semiconfined aquifer	1x6
ii)	The geological formation. which does not contain any amount of ground water is an a) Aquifer, b) Aquiclude c) Aquifuse d) Aquitard	
iii)	The volume of water (M^3) that can be expected from a unit volume of aquifer material (one M^3) under the force of gravity is called a) Specific capacity b) Specific yield c) Storage Co-efficient d) Specific co-efficient	
iv)	Uniformity Co-efficient is defined as the ration of the sieve size a) $\frac{D_{10}}{D_{50}}$, d) $\frac{D_{60}}{D_{15}}$, c) $\frac{D_{60}}{D_{10}}$, d) $\frac{D_{50}}{D_{10}}$	
v)	The ground water accretion may eventually discharge into river as a) Run-off b) Base flow, c) Infiltration, d) Overland flow	
vi)	For determination of permeability (coarse grained soils) water percolated (V) through the soil sample cross section (A) and length (L) in a given time (t) under constant head h, then a) $V = \frac{K}{A}\frac{h}{L}t$, b) $V = KA\frac{h}{L}t$, c) $V = \frac{K}{A}\frac{L}{h}t$, d) $V = \frac{A}{K}\frac{L}{h}t$,	

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No. of questions		Part II	Marks
2.		In an artesian aquifer, the drawdown is 1.2m at a radial distance of 12m from a pumped well after three hours of pumping. On the basis of non-equilibrium equation, determine the pumping time for the same drawdown i.e 1.2m at a radial distance of 32m from the main pumped well.	12
3.		Design a tube well [(i) Diameter of Pipe; (ii) Bore Hole Size; (Iii) Length of Strainer; (V) Type of Pumped required and Capacity of Motor] for required discharge of 4.5×10^{-2} cumec at a depression head of 4.5m. The average ground water level is 10m below the GL in November and maximum 16m in early June. The bore log data at the boring site are given below,	12
4.	a)	Develop the equation of co-efficient of permeability for fine grain soil in laboratory test.	10
	b)	What is seepage velocity?	2

Thickness of soil strata below GL in m	Type of strata
0-5.5	Surface Clay
5.5-20	Sandy Clay
20-30.5	Clay
30.5-55	Coarse Sand
55-70	Clay
70-85.4	Medium Coarse Sand
Below 85.4	Clay

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No. of questions	Part II	Marks
5.	A 0.4m dia. well is pumped at a uniform rate of $0.045m^3$/sec. from the pumping well for 24hr. While observations of drawdown from observation wells were located at distance 3.0m and 6.5m from the main pumped well are 3.5m and 1.7m respectively. Depth of well 20m from ground level and water table 4m from ground level. Find coefficient of permeability and transmissibility along with velocity of water.	6+3+3