B. E. CIVIL ENGINEERING EXAMINATION SECOND YEAR SECOND SEMESTER EXAM- 2018

HYDROLOGY

Time: Three Hours

Full Marks 100
(40 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I	Marks
	Assume reasonable values of data, if not supplied.	
1. (i)	Write a short note on La Nina	2+2+
(ii)	Describe the factor affecting evapotranspiration process.	3+3
iii)	Briefly Discuss about Environmental flow of a stream. Or, Surface water resources in India.	
iv)	Explain with neat figure the stream order number of river network in a catchment.	
2. (a) i.	A catchment of 160 Sq km area received a rain fall of 110mm in 100 minutes due to a storm. At the outlet of the catchment, the stream draining the catchment was dry before the storm and experienced a runoff lasting 10 hours with an average discharge of 20 m^3/sec. The river was again dry after runoff event. Calculate (i)The loss due to infiltration and evapotranspiration. (ii) Ratio of runoff to precipitation.	6+4
ii.	Following are the data of a storm as recorded in an automatic weather station at Digha, West Bengal from beginning of the storm. Plot the hyetograph of the storm.	

Time in minutes	10	20	30	40	50	60	70	80
Cumulative rain fall	21	42	48	70	92	124	152	160

OR

(b)	Explain the different methods of determining average rainfall over a watershed due to rainfall. Discuss the relative merits and demerits of those method.	10

B. E. CIVIL ENGINEERING EXAMINATION SECOND YEAR SECOND SEMESTER EXAM- 2018

HYDROLOGY

Time: Three Hours

Full Marks 100
(40 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I	Marks
3.(a) (i)	What is curve number (CN) and why it is widely used?	5
(ii)	The area of a small watershed with black subsoil (soil type – Group C) at central India is 250 hectre. The land cover can be classified as 30% open forest and 75% poor quality pasture. Estimate the direct runoff volume due to rainfall of 8.2cm in 24 hours using SCS-CN equation. Assume Antecedent Moisture Condition(AMC-II) with CN 60 and CN 86 for open forest and poor pasture respectively.	5
	Or	
(b)	Write a brief note on the following topics related to a watershed (i) drainage density; (ii) Hypsometric curve and (iii) Different catchment shape parameter with formula	3+3+4
4. i.	What factors should be considered while selection of any river gauge site?	3
ii.	Name a modern instrument used for generation of stage discharge curve of a stream gauge station?	1
iii.	Explain briefly the area- velocity method for calculation of discharge of a river at gauge site with the help of current meter.	6
	Or	
	Describe the slope area method for estimating discharge in a stream.	6

Ref No. –Ex/CE/T/224/2018

BACHELOR OF CIVIL ENGINEERING EXAMINATION, 2018
Second year, 2nd Semester

SUBJECT: HYDROLOGY

Full Marks 30/100

Time: ~~Two hours~~/Three hours~~/Four hours/ Six hours~~

Use a separate Answer-Script for each part

No. of Questions	Part II (Marks:60)	Marks
	Answer Question No.1.(compulsory) and any 4 (four) from the rest Assume relevant data if necessary.	
Q 1.	Distinguish between (any four)	4x3=12
i)	DRH and UH	
ii)	Base flow and interflow	
iii)	Influent and Effluent stream	
iv)	Pellicular water and ground water	
v)	Leaky aquifer and perched aquifer	
vi)	Phearatic water table and perched water table	
vii)	Design Flood and Peak Flood	
viii)	Recession and recuperation.	
Q2. a)	On the basis of isopluvial maps the 50 years 24hr maximum rainfall at Patna town is found to be 55 cm. Determine the probability of 24hr rainfall of magnitude equal to or greater than 55cm occurring at Patna (a) At least once in 10 successive years (b) Two times in 10 successive years. (c) Once in 10 successive years.	6
b)	Flood frequency computation yields the following results:- Return period yrs:- 50 100 Flood flow, m3/sec:- 20500 25,400 Using Gumbels method, Estimate the probable flow for a return period of 150 years.	6

Ref No. –Ex/CE/T/224/2018

BACHELOR OF CIVIL ENGINEERING EXAMINATION, 2018
Second year, 2nd Semester

SUBJECT: HYDROLOGY

Full Marks 30/100

Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~

Use a separate Answer-Script for each part

No. of Questions	Part II (Marks:60)	Marks
Q3. a)	What are the important parameters to assess for ascertaining safe aquifers for drinking water supply?	3
b)	A tracer took 23 hour to travel from a well no 1 to well no 2 325 m away from each other. Map of the water table contour shows a difference of 0.628 m in their water table elevations. The aquifer is made of mixed sandy soil with porosity of 32%. Calculate the intrinsic permeability in Darcy. Check also Reynolds number. Assume kinematic viscosity 1.08 centistokes.	6
c)	A confined aquifer 1000 mm wide discharges 0.05 m^3/day/km to a dry river in a particular time. Determine transmissibility, if the slope of the piezometric surface is 0.87 m/km.	3
Q4. a)	A 300mm dia well completely penetrate a confined aquifer of permeability 45m/day. The length of the strainer is 20 m. Under steady state condition of pumping the drawdown at the well was found to be 3.0m, Radius of influence (R) is 300m, Calculate the discharge of the well. Deduce the necessary equation for solving the problem.	7
b)	Describe the different techniques of base flow separation.	5
Q5. a)	An outfall has to drain 600 ha of land with a maximum length of travel of 3.60 km. The general slope of the catamounts is 1 in 1400 and its run off Co-eff. is 0.52. Estimate the peak flow by the rational method for designing the culvert for a 50 year flood. Information on the 50 year storm is given below:- Duration in (min) – 10 15 20 30 45 60 100 Rainfall (mm) – 35 40 45 60 75 100 120	8
b)	Discuss the components of a typical hydrograph and prove discharge at any time is proportional to storage remaining at that time	4
Q6. a)	Rainfall of magnitudes 2.8cm and 3.8 cm occurring on two consecutive 4 hr duration on a catchment on area 31 km2 produced the following hydrograph of flow at the outlet of the catchment. Compute the rainfall excess and φ index. Time from Start of rainfall hr: -6 0 6 12 18 24 30 36 42 48 54 60 66 Ordinate, m3/sec 6 5 13 26 21 16 12 9 7 5 5 4.5 4.5	8
b)	Discuss the factors which affect the pattern of hydrograph.	4