GANPAT UNIVERSITY

B. TECH. SEMESTER: V CIVIL ENGINEERING

REGULAR EXAMINATION NOVEMBER – DECEMBER- 2015

SUBJECT: 2CI502 HYDROLOGY AND WATER RESOURCES ENGINEERING

TIME: 3 HOURS

Total Marks: 70

Instruction: (1) Answer to the two sections must be written in separate answer books.
(2) Figures to the right indicate full marks.
(3) Assume suitable data if required.

SECTION – I

Q1 **A** A basin has the area in the form of a Pentagon with each side of length 20 km. the five rain gauges located at the corners A, B, C, D and E have recorded 60, 81, 73, 59 and 45 mm of rainfall respectively. Compute the average depth of rainfall over the basin by arithmetic mean and Thiessen polygon methods. **06**

B Enlist methods of measurement of infiltration capacity. Explain Rain fall simulator method. **06**

OR

Q1 **A** During a month a rain gauge went out of order while the other three gauges in the basin reported rainfalls of 107, 89 and 120 mm. if the normal annual rainfalls for these three gauges are 1120, 935 and 1200 mm respectively and the normal annual rainfall of the broken gauge is 978 mm, estimate the missing monthly rainfall at the broken gauge. **06**

B The cumulative depth of infiltration in an experiment on a tube infiltrometer is observed to follow the equation $F = 0.165\ t^{0.65}$, where F is in cm and t is in minutes. Determine the equation for infiltration rate and the average infiltration rate. **06**

Q 2 **A** Enumerate and briefly discuss the various factors which affect the runoff from catchment. **06**

B Derive the Penman's evaporation equation for open water surfaces. Explain how Penman's equation differs from the other empirical equations. **05**

OR

Q 2 **A** In a 140 min storm the following rates of rainfall were observed in successive 20 min intervals: 6.0, 6.0, 18.0, 13.0, 2.0, 2.0 and 12.0 mm/h. assuming the φ (Phi) Index value as 3 mm/hr and an initial loss of 0.8 mm, determine the total rainfall, net runoff and W-index for the storm. **06**

B Evaporation is indirectly a cooling process. Justify the statement. **05**

Q 3 **Answer the following**

A A reservoir with a surface area of 550hectares has following metrological values during given week
Water Temperature : 30^0C
Relative Humidity : 40%
Wind velocity at 1m above : 18km/h
Mean barometer reading : 750mm of Hg
Estimate the average daily evaporation from the lake reservoir and the volume of water evaporated from the lake during this week. Use
(a)Meyer's method (b) Rohwer's method.
Take saturation vapor pressure at $30^0C = 31.82$ mm of Hg **04**

B   Write a short note on DAD curve and flow duration curve.   04
C   Describe the hydrological cycle with a neat sketch.   04

SECTION – II

Q4   A   Explain the process of hydrological modeling with neat flow diagram.   06

     B   The ordinates of a 3 hour unit hydrograph are given below: 06

Time in hr	0	3	6	9	12	15	18	21	24	27	30
Ordinates(Cumec)	0	10	25	20	16	12	9	7	5	3	0

Find the ordinates of a 6 hour unit hydrograph for the same basin, Analytically. Also sketch this unit hydrograph. What is the peak value of a discharge in this Unit hydrograph?

OR

Q 4   A   A flood with the inflow hydrograph given below: 06

Time in hr	0	6	12	18	24	30	36	42	48	54
Flow (Cumec)	1000	2000	7500	10000	7800	6000	4700	3600	2700	2000

The best values of X and K for which had been predetermined to be 0.2 and 0.9 day respectively. Determine the outflow flood hydrograph for this river reach. Plot the suitable results in the graph showing routed hydrograph through river reach.

Q 4   B   Explain the role of simulation modeling in water resource management. What is calibration of model?   06

Q 5   A   What are the various methods of estimating the design flood of a catchment? Explain in detail.   05

     B   State Dupit's assumption for obtaining general equation governing ground water flow. Derive an expression for the confined aquifer.   04

     C   What is Aquiclude? Explain briefly.   02

OR

Q 5   A   Explain briefly causes of flood. Differentiate between wedge and prism storage with neat sketch.   05

     B   A 30cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 5400 liters/minute, the water level in a test well at 90 m is lowered by 0.53 m, and in a well 30 m away the drawdown is 1.11 m. what is the transmissibility of the aquifer?   04

     C   Define Specific Yield.   02

Q 6   **Answer the following**

     A   State and explain the Rational method .What is the limitation of this method.   04

     B   What is S hydrograph? How would you derive S-hydrograph?   04

     C   What return period you would adopt in the design of a culvert on a drain if you are allowed to accept only 5% risk of flooding in the 25 years of expected life of the culvert?   04

END OF PAPER