N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assuming **suitable** data where **necessary** stating them **clearly**.

B.E (C) VII Rev Irrigation Engg. 21/5/09 Page(1)

1. (a) Establish relation between duty, delta and base period. 5
(b) What are the methods of irrigation, explain any one with neat sketch. 7
(c) Explain with neat sketch procedure to determine seepage line for a homogeneous earth dam without horizontal drainage blanket. 8

MASTER

2. (a) Explain methods to compute average rainfall over a basin. 10
(b) The gross command area for an irrigation canal is 20,000 hectares out of which 75% is culturable commanded area. The intensity of irrigation is 40% for rabi and 10% for rice. If Kor period is 4 weeks for rabi and 2·5 weeks for rice, determine the outlet discharge. Outlet factors for rabi and rice may be assumed as 1800 hectare/cumec and 775 hectares/cumec. Also calculate delta for each case. 10

3. (a) The stream flows due to three successive storms of 2·9, 4·9 and 3·9 cm of 6 hours duration each on a drainage basin are given below. The area of the drainage basin is 118·8 sq. km. Assuming a base flow of 20 cumec, derive a 6 hour unit hydrograph for the drainage basin. An average storm loss of 0·15 cm/hr may be assumed. 10

| Time (hr) | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow (cumec) | 20 | 50 | 92 | 140 | 199 | 202 | 204 | 144 | 84·5 | 45·5 | 29 | 20 |

(b) Enlist different types of spillways and explain any two in detail. 10

4. (a) A 0·4 m diameter well fully penetrates an unconfined aquifer whose bottom is 80 m below the undisturbed ground water table. When pumped at a steady rate of 1·50 $m^3$/min. The drawdowns observed in two observation wells at radial distances of 5 m and 15 m are, respectively, 4 m and 2m. Determine the drawdown in the well. 10
(b) Explain the following terms :– 10
(i) Specific yield (ii) Transmissibility
(iii) Aquifer (iv) Aquiclude.

5. (a) A 20 m high concrete dam having trapezoidal section has top width 2 m and bottom width 16 m. The face of the dam exposed to water has a batter of 1 : 10. On the reservoir side water stands upto top. Assumping weight of concrete = 23·54 $\frac{kN}{m^3}$, coefficient of friction = 0·75 and allowable shear stress = 490·5 $\frac{kN}{m^2}$, and taking into account, only the weight of the dam, water pressure and uplift pressure, calculate the factor of safety against overturning, against sliding and shear friction factor. 10
(b) Describe with neat sketches the various methods adopted for controlling seepage through the body of the dam and through the foundation. 10

6. (a) Design an irrigation channel for the following data : Discharge = 20 cumecs, Silt factor = 1·0. 10
(b) List the salient features of cross–drainage works. Sketch and explain syphon aqueduct and super passage. 10

7. Write notes on :– 20
(a) Arch dam (b) Bandhara irrigation