Printed Pages: 6 **NEV-602**

(Following Paper ID and Roll No. to be filled in your Answer Books)	
Paper ID :197612	**Roll No.**

B.TECH.

Theory Examination (Semester-VI) 2015-16

ENVIRONMENTAL SYSTEM AND ANALYSIS

Time : 3 Hours ***Max. Marks : 100***

Section-A

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

(a) Compare stochastic and deterministic models.

(b) Mention the demerits of sensitivity analysis.

(c) What two atmospheric factors influence the buoyancy of an air parcel?

(d) When does subsidence inversion occurs?

(e) The dissolved oxygen in an unseeded sample of diluted wastewater having an initial DO of 9.0 mg/L is measured to be 3.0 mg/L after 5 days. The dilution fraction is 0.03 and reaction rate constant k = 0.22 day-1.

Calculate:

(a) 5 day BOD of the waste

(b) ultimate carbonaceous BOD.

(f) Relate theoretical oxygen demand and ultimate BOD.

(g) Enlist the elements of EPA Storm water management model.

(h) Define unit hydrograph.

(i) Draw a flowchart for the computational procedure for a LPP using simplex method.

(j) Identify the use of sensitivity analysis.

Section-B

Q2. Attempt any five questions from this section.(10×5=50)

(a) (i) Discuss the necessity of models in management of environmental system.

(ii) Outline the importance of model calibration, validation and verification.

(b) (i) State lapse rateand distinguish between dry adiabatic, wet adiabatic and environmental lapse rates.

(ii) List five types of plume behaviour and relate each to atmospheric conditions.

(c) Sulphur dioxide is emitted at a rate of 2 kg/s from the top of a chimney that is 120m high. The plume initially rises vertically a further 10m above the chimney exit, before being convected horizontally by a wind speed of 15 m/s under conditions of neutral stability. The surrounding terrain is flat with a roughness length z_o of 0.01 m. Calculate:

(i) The concentration (kg/m^3) on the plume center-line at a distance of 800 m downwind of the chimney.

(ii) The ground level concentration at a distance of 800 m downward of the chimney

(iii) The location (x) where the maximum ground level concentration occurs downwind the chimney on the x-axis.

(iv) The concentration at this location.

(d) (i) Derive the equations for channel routing method.

(ii) Illustrate computational methods of runoff by infiltration method.

(e) Describe in detail the evapotranspiration and peak flow component in EPA SWMM.

(f) With a neat sketch, explain oxygen sag curve and significance of critical Deficit?

(g) A company makes two kinds of leather belts. Belt 'A' is a high quality belt and belt 'B' is of lower quality. The respective profits are Rs.3 and Rs.4 from these varieties. Each belt of type A requires twice as much as belt B and if all belts were of type B the company could make 1000 per day. The supply of leather is sufficient for only 800 per day and both the belts require same amount of leather. Belt A requires a fancy buckle of which only 400 are available per day and an ordinary buckle needed for B type is available to the extent of 700 per day. Formulate this as a linear programming problem and solve it using simplex method.

(h) Summarize the application of transportation problems and dynamic programming in water supply engineering.

Section-C

Note: Attempt any two questions from this section.

(15×2=30)

Q3. (a) Distinguish in detail about analytical and montecarlo methods of simulation.

(b) Elaborate how atmospheric stability and inversions affect air pollutant dispersion.

Q4. (a) Obtain a unit hydrograph for a basin of 315 km^2 of area using the rainfall and stream flow data tabulated below.

Stream flow data

Time (hr)	0	1	2	3	4	5	6	7	8	9	10	11
Observed hydrograph (m^3/s)	100	100	300	700	1000	800	600	400	300	200	100	100

Rainfall data

Time (hr)	0-1	1-2	2-3	3-4
Gross PPT (GRH) (cm/h)	0.5	2.5	2.5	0.5

(b) Describe in brief about rain fall run off modeling

Q5. (a) Elucidaie the applications of SWMM with examples.

(b) Maximize $3X_1 + 5X_2 + 4X_3$ subject to:

$2X_1 + 3X_2 \leq 8$

$2X_2 + 5X_3 \leq 10$

$3X_1 + 2X_2 + 4X_3 \leq 15, \quad X_1 \geq 0.$