



APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Scheme for Valuation/Answer Key

Scheme of evaluation (marks in brackets) and answers of problems/key

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (S), MAY 2019

Course Code: CE405

Course Name: ENVIRONMENTAL ENGINEERING- I

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) List the various sources with explanation 1 mark each. (5)
- b) Explanation – 3 marks, design periods of components – 2 marks. (5)
- c) Explanation – 3 marks (5)
- Figure of daily variation in demand- 2 marks
- 2 a) Description – 3 marks (5)
- Figure – 2 marks
- b) The computations about increment, % increment and incremental increase per decade are arranged in the table given below: (10)

Year	Population	Increment per decade	% increment per decade	Incremental increase
1941	12500			
1951	17000	4500	36.00	
1961	27000	10000	58.82	+5500
1971	42000	15000	55.56	+5000
1981	58000	16000	38.10	+1000
1991	68000	10000	17.24	-6000
2001	74000	6000	8.82	-4000
Total		61500	214.54	+1500
Average		10250	35.76	300

In the above table, percentage increase for the first decade (1941 to 1951)

$$= \frac{17000-12500}{12500} \times 100 = \frac{4500}{12500} \times 100 = 36\%$$

Similarly, % increment for other decades has been calculated.

(a) Arithmetical Increase Method

$P_n = P + n.C$

Where, P = Population in 2001 = 74000

$$n = \text{number of decades} = \frac{2021 - 2001}{10} = 2$$

$$C = \text{average increase per decade} = 10250$$

$$\therefore P_{2021} = 74000 + 2 \times 10250 = \mathbf{94500}$$

(b) Geometrical Increase Method

$$P_n = P \left(1 + \frac{I_G}{100}\right)^n$$

Where, I_G = geometric mean (%) = $\sqrt[n]{I_{g1} \times I_{g2} \times \dots \times I_{gt}} = 29.67\%$

P = Present population = 74000

$$n = \text{number of decades} = \frac{2021 - 2001}{10} = 2$$

$$\therefore P_{2021} = 74000 \left(1 + \frac{29.67}{100}\right)^2 = \mathbf{1,24,425}$$

(c) Incremental Increase Method

Population after n^{th} decade is $P_n = P + n d + \frac{n(n+1)}{2} r$

Where, P_n = Population after n^{th} decade = P_{2021}

P = Present population = 74000

d = Average increase = 10250 (from table)

r = Incremental increase = 300 (from table)

$$\therefore P_{2021} = 74000 + 2 \times 10250 + \frac{2(2+1)}{2} \times 300 = \mathbf{95,400}$$

- 3 a) Any 10 parameters – each carrying 1/2 mark. (5)
- b) Two intake – figure – 2 marks, explanation – 3 marks (5)
- c) Any five chemical characteristics – 1 mark each (5)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) On thorough mixing of coagulants in raw water – floc formation – colloidal particles are attracted and absorbed by the flocs- bigger sized particle – easy settlement. (5)
Alum , 2) copperas, 3) chlorinated copperas, 4) sodium aluminate
- b) Maximum demand – 1 mark (10)
Total quantity of water to be treated in 6 hr – 1 mark
Capacity of tank- 1 mark
Length of tank- 2 marks
Width of tank- 1 mark

- Depth of tank with free board – 1 mark
Check – 1 mark
Sketch – 2 marks
- 5 a) Max demand – 1 mark (15)
Design of flash mixer (DT: 30 s – 2 min)– 3 marks
Design of flocculator (DT : 20 min – 60 min) – 3 marks
Design of sedimentation tank - 3 marks
Check for surface loading – 1 mark
Sketch – 4 marks
- 6 a) Explain four actions – 1 mark each. (4)
b) Fig. – 2 marks, explanation – 4 marks. (6)
c) Any 5 comparisons – 1 mark each. (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Requirements (4 marks) (4)
b) Theory of chlorination with equations (6 marks) (6)
c) Types – Need – Explanation (10 marks) (10)
- 8 a) Ion exchange - Explanation – 4 marks, Equation & Figure – 3 marks, (10)
Advantages – 3 marks.
b) Lime Soda process-Explanation (5), Equation (3) Adv & Disadvantages (2) (10)
- 9 a) Any 5 points such as pressure head, economic and maintenance, degree of (5)
purity, safe against future contamination, water tight and leakage.
b) 1. Dead end system, 2. Grid iron system, 3. Circular or ring system, 4.Radial (10)
system. With figures
c) Explanation with figure – 2 marks, conditions for parallel and series – 3 marks (5)
