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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
07 THRISSUR CLUSTER

SECOND SEMESTER M.TECH. DEGREE EXAMINATION APRIL 2018
Civil Engineering
(Environmental Engineering)

**07CE 6102 BIOLOGICAL METHODS IN ENVIRONMENTAL
ENGINEERING**

Time : 3 hours

Max.Marks: 60

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1a	What are the objectives of biological treatment?	4
	Answer b or c	
b	Explain the role of enzymes in biological treatment.	5
c	Differentiate between Attached growth and suspended growth treatment systems.	5
Q.no.	Module 2	Marks
2a	Explain the terms: (i) biomass yield and (ii) observed yield.	4
	Answer b or c	
b	Derive an expression for micro-organism concentration of a CFSTR without recycle.	5
c	Explain the relation between process safety factor and minimum mean cell residence time.	5
Q.no.	Module 3	Marks
3a	Explain Simplex aerator with a neat sketch.	4
	Answer b or c	
b	Derive an expression for substrate utilization rate using MONOD'S equation.	5
c	Explain the operational difficulties of ASP and remedial measures.	5

Q.no.	Module 4	Marks
4a	Explain the process description of Trickling filter.	4
Answer b or c		
b	Differentiate between single-stage and two-stage Trickling filter.	5
c	Explain the process analysis of Trickling filter with the help of Atkinson's equation.	5
Q.no.	Module 5	Marks
5a	Write short notes on (i) Wet air oxidation and (ii) Dewatering of sludge.	5
Answer b or c		
b	Explain the classification and design considerations of Stabilization ponds.	7
c	What is meant by sludge thickening? List the various methods of sludge thickening.	7
Q.no.	Module 6	Marks
6a	Explain the stoichiometry of nitrification process?	5
Answer b or c		
b	Mention the various methods used for the removal of nitrogen from sewage. Discuss in detail any one method	7
c	Explain different types of financial expenditures needed for biological treatment systems.	7