

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST III EXAMINATION (June - 2016)
M. Tech. (II- SEM.)

COURSE CODE: 14M31CE213

MAX. MARKS: 35

COURSE NAME: Industrial Wastewater Treatment

COURSE CREDIT: 3

MAX. TIME: 2 HRS

Note: Attempt all Questions. Carrying of mobile phones during exams will be treated as case of unfair means. Assume suitable data if required.

1. With a neat flow sketch, if appropriate, discuss the different manufacturing steps involved in producing paper using the 'Kraft process'. Explain the significance of the ancillary processes and describe the different ancillary processes (including chemical reactions) associated with production of paper in the paper industry. **(4+4)**
2. With a neat flow sketch, if appropriate, explain the various steps involved in cement production. Explain the composition of cement including (a) oxide content in cement and (b) compound content in cement clinker. **(4+2+2)**
3. Discuss with chemical reactions and neat sketches where appropriate (a) precipitation method and (b) chemical oxidation method for heavy metal removal. **(4)**
4. With a neat sketch, explain the functioning of an UASB reactor. **(3)**
5. Design a low rate digester system for a population of 50,000 with a fresh sludge generation of 0.15kg dry solids per capita. The volatile solids are 70% of dry solids. Dry solids are 5% of sludge production and the wet specific gravity is 1.01. About 60% of volatile solids are destroyed in the digestion process and there is no change in fixed solids concentration during digestion. The digested sludge has 9% dry solids with a wet specific gravity of 1.03. The operating temperature is 35°C and the digestion time associated with this temperature is 25 days. The sludge storage time is 50 days. Assume that sludge occupies lower half of tank depth and supernatant and gas occupy upper half **(4)**
6. Write short notes on (a) advantages and disadvantages of equalization basin (b) flow sheets for in-line and off-line systems of equalization basin (c) composite volume multiplier (d) importance of Henry's Law in Flootation principle. **(8)**