Registration no: ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Total Number of Pages: 2 **B.Tech**
HSSM3303

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5th Semester Regular / Back Examination 2016-17
ENVIRONMENTAL ENGINEERING AND SAFETY
BRANCH: AEIE, BIOMED, CHEM, CIVIL, ECE, EEE, EIE, ELECTRICAL, ETC, MANUFAC, MANUTECH, MINERAL, MINING, PE, PLASTIC
Time: 3 Hours
Max Marks: 70
Q.CODE: Y169
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

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Q1   **Answer the following questions:**   **(2 x 10)**
   a) Explain with a diagram the detritus food chain.
   b) Describe with a suitable diagram the concept of an environmental gradient. What mathematical function best describes a tolerance curve?
   c) Write the expression for sound Intensity in terms of pressure, density and velocity in a medium. Would a loud noise travel faster or slower in water compared to air?
   d) State Darcy's law for groundwater flow in an aquifer.
   e) Differentiate between BOD and COD.
   f) State two Indian Environmental Protection Laws.
   g) What are secondary air pollutants? Name two of them.
   h) What are the three 'Rs' associated with solid waste management ?
   i) What is the role of OSHA in workplace safety?
   j) Write about some of the common hazards in a steel manufacturing plant.

Q2 **a)** List three physical properties (characteristics) of soil; how is bulk density different from particle density?   **(5)**

   b) Draw and explain the Oxygen Cycle. What are the primary 'source(s)' of oxygen in our atmosphere, and what are the 'sinks'?   **(5)**

Q3 **a)** Explain with a flow diagram, the various operations in a typical water treatment plant.   **(5)**

   b) A 'chlorinator' setting is 20 kg/day for a water-treatment plant, treating a flow of 5 MLD (million liters/day) of water for domestic use. What is the chlorine dosage expressed in mg/L?   **(5)**

Q4 **a)** What is the activated sludge process, and where is it used? Describe the process with a diagram. **(5)**

b) The Monod Kinetics model for microbial growth and substrate utilization is commonly used in designing wastewater treatment reactors. Explain the model and the pertinent terms in it. **(5)**

Q5 **a)** Describe the various types of chimney plumes that may occur from a smoke stack. Is a stable atmospheric condition always desirable? **(5)**

b) A plate-type electrostatic precipitator for use in a cement plant consists of 10 equal channels. The spacing between the plates is 0.15m, and the plates are each 2 m high and 2 m long. The unit handles 10,000 m^3/hr of cement dust-laden air. Assume that a cement particle has a settling velocity of 0.1 m/s. What is the collection efficiency of the precipitator ? **(5)**

Q6 **a)** What are the various electrical hazards in a typical manufacturing industry and what precautions can a worker take to avoid electrical shocks and burns? **(5)**

b) What is a fire triangle? Give two methods of extinguishing a fire emanating from a burning hydrocarbon, like aviation kerosene. **(5)**

Q7 Distinguish between Type I and Type II Sedimentation (settling) of particles. A grit particle of 0.2 mm diameter and density of 1500 kg/m^3 is to be captured in a rectangular horizontal grit (settling) chamber of length 18 m, width 1 m. The approach water velocity carrying the grit particle is 0.3 m/s and the flow rate is 0.15 m^3/s. Will the particle settle in the chamber? Take the density and viscosity of water to be 1000 kg/m^3 and 0.001 kg/m-s (Pa-s) respectively. Assume Stokes' flow regime. **(10)**

Q8 **Write short answers on any TWO:** **(5 x 2)**
a) Fugitive Emissions
b) Eutrophication in ponds and lakes
c) Material Safety Data Sheet (MSDS)
d) Environmental Impact Assessment (EIA)