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M.E. DEGREE EXAMINATION, 2002

(FIRST SEMESTER)

(ENVIRONMENTAL)

ENVC-102. ENVIRONMENTAL CHEMISTRY

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE full questions.
All questions carry equal marks.

1. (a) Explain the aerobic and anaerobic heterotrophic bio-chemical reactions and its end products occurring in waste water treatment. (6)

   (b) Explain the bio-degradation process of protein in food stuff. (6)

2. (a) Explain the stratification of atmosphere with the species present in each sphere. (6)

   (b) Write a brief note on 'Global warming'. (6)

3. (a) Discuss the presence of SO_2 and other gaseous sulphur compounds in the atmosphere. (6)

   (b) Explain the ambient air sampling techniques. (6)

4. (a) Discuss the effect of CO, SO_2 and NO_2 on human - beings. (6)

   (b) Discuss the control of air pollutants from vehicles. (6)

5. (a) Discuss the causes and effects of 'acid rain'. (6)

   (b) Write briefly the sources and bio - chemical effects of Cadmium and Arsenic. (6)

6. (a) List the anthropogenic sources of radiation pollution and explain briefly the problems associated with it. (6)

   (b) What are the chemical analysis to be made on the municipal solid waste ? What are its typical values for Indian condition ? (6)

7. List the treatment techniques available for the removal of Total Dissolved Solids (TDS) from waste water. Explain any one of them in detail. (12)

8. Write short notes on the following :

   (a) B.O.D. of the waste water.

   (b) Gas chromatography.

   (c) Ozone depletion in the upper atmosphere. (3 × 4 = 12)

(c) Wiener process.

(d) Stationary random process.

(e) Birth and death process.

(3 × 4 = 12)

8. (a) Fit a trend line from the following data by using semi-average method. Estimate the rain-fall in 2003.

Year	Rain-fall in mm (Annual)
1997	1,000
1998	1,200
1999	1,400
2000	1,500
2001	1,300
2002	2,000

(8)

(b) Write down expression for

(i) second order AR model.

(ii) second order MA model. (4)

M.E. DEGREE EXAMINATION, 2003

(FIRST SEMESTER)

(ENVIRONMENTAL)

ENVC-101. APPLIED PROBABILITY AND STOCHASTIC PROCESSES

(Common with Part - Time)

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE full questions.
All questions carry equal marks.
Use of Statistical Tables are permitted.

1. (a) State the three axioms of probability. (3)

(b) In a certain group of computer personnel, 65 % have insufficient knowledge of hardware, 45% have inadequate knowledge of software and 70% are in either one or both of

the two categories. What is the percentage of people who know software among those who have a sufficient knowledge of hardware ? (9)

2. (a) Consider the distribution function for x defined by

$$f(x) \begin{cases} 0 & , \ x < 0 \\ 1 - \frac{1}{4} e^{-x}, & x \geq 0 \end{cases}$$

Determine $P[x = 0]$ and $P[x \geq 0]$. (3)

(b) The amount of TDS (in *ppm*) that a certain sample has is found to be a random phenomenon, with a probability function specified by the function.

$$f(x) = \begin{cases} Ae^{-x/5}, & \text{for } x \geq 0 \\ 0 & , \text{ otherwise.} \end{cases}$$

(i) Find the value of A that makes f(x) a *p.d.f.*

(ii) What is the probability that the TDS in the sample is

more than 10 *ppm?*

less than 5 *ppm* ?

and between 5 and 10 *ppm?* (9)

3. In a test on 2,000 samples, it was found that samples of a particular plant was normally distributed with an average pesticide residue of 2,040 *ppm* and a standard deviation of 60 *ppm*. Estimate the number of samples likely to have the pesticide residue of

(i) more than 2,150 *ppm*,

(ii) less than 1,950 *ppm*,

and (iii) more than 1,920 *ppm*, but less than 2,100 *ppm*. (12)

4. The following Table gives, according to the presence of No_x (x), the frequency, of No_x, quantity (y) obtained from 100 samples in a test. Measure the degree of relationship between presence and quantity of No_x

Quantity \ Presence	16 - 17 *ppm*	17 - 18 *ppm*	18 - 19 *ppm*	19 - 20 *ppm*
30 - 40 (*ml*)	20	10	3	2
40 - 50 (*ml*)	4	28	6	4
50 - 60 (*ml*)	0	5	11	0
60 - 70 (*ml*)	0	0	2	0
70 - 80 (*ml*)	0	0	0	5

(12)

5. (a) The university claims that 80% of all single women employed for teaching job get married and quit the job within two years of time. Test this hypothesis at 5% level of significance, if among 200 such teachers, 112 got married within two years and quit their jobs. (6)

(b) A random sample of size 16 has 53 as mean. The sum of the squares of the deviations taken from mean is 150. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limit of the mean of the population. (6)

6. Define :

(i) Continuous random process,

(ii) Discrete random process,

(iii) Deterministic random process,

(iv) Non- deterministic random process,

(v) Equal random processes

and (vi) Ergodic random process

(6 × 2 = 12)

7. Write notes on any three of the following with suitable explanation :

(a) Markov Chain.

(b) Poisson process.

Register Number: **2178**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2003

(FIRST SEMESTER)

(ENVIRONMENTAL)

ENVC-105. UNIT OPERATIONS AND PROCESS IN WATER & WASTE WATER TREATMENT

November [(Common with Part-time)] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE full questions.
All questions carry equal marks
Draw the sketches wherever necessary

1. a) Explain about the screening process. (6)

   b) Discuss about limiting velocities. (6)

2. a) Describe the process of flocculation. (6)

   b) Explain the mean velocity gradient. (6)

3. a) Explain the analysis of discrete particle settling. (6)

   b) Discuss about the settling velocity analysis. (6)

4. a) Explain about a uniform bed filter. (6)

4. b) Design a sand filter for a hydrostatic head of 2 m is maintained above a 0.6 deep bed of filter sand. The sand diameter = 0.5 mm. Specific gravity = 2.65 shape factor 0.85 and porosity 0.4. Determine the flow rate through the bed if the water temperature is 20° C. (6)

5. a) Explain the mechanisms of Disinfectants. (6)

   b) Describe the mechanical Aerators. (6)

6. a) Describe an Air-stripping reactor with sketch. (6)

   b) Derive the equation for height of packed column using mass balance method. (6)

7. a) Discuss about the importance of Langmuir isotherm equation. (6)

   b) Describe the Bed fluidization and point of fluidization. (6)

8. a) Discuss about the Anoxic processes and their uses. (6)

   b) Explain different types of biological reactors. (6)

Register Number: 2179

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2003

(Environmental Engineering)

First Semester

ENVE-106. NOISE POLLUTION AND CONTROL

(Elective-I)
(Common with Part-time)

November) (Time: 3 Hours

Maximum: 60 Marks

Answer any five full question.
All questions carry equal marks.
Assume suitable assumptions, if required and state them clearly

1. Explain the various sources of noise during execution and operation of road projects.

2. Explain the effects of noise on human beings.

3. Explain the characteristics of sound propagation and measurement of sound.

4. a) Estimate the average sound level for the following 4 observations 40, 50, 62 and 72 dB (A). (4)

   b) What is meant by equivalent noise level. (2)

4. c) Find the equivalent noise level for a fluctuating noise level indicated below: 80dB lasting for 10 minutes followed by 60dB for 80 minutes followed by 100 minutes for 5 minutes. (6)

5. Explain the following with respect to sound level meters:

   a) Network weighting b) Octave band analysis.

6. Explain the various noise control measures.

7. Discuss the following:

   a) Ambient note levels permissible

   b) Indoor noise levels permissible

8. Discuss how you will assess the environmental impact assessment due to noise from a new industry.

Register Number: 8013

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2004

(Environmental Engineering)

First Semester

ENVC-101. Applied Probability and Stochastic Processes

(Common with Part-time)

May) (Time: 3 Hours

Maximum: 60 Marks

Answer any five full questions.
All questions carry equal marks
Use of Statistical tables are permitted

1. a) With suitable examples, explain joint probability and conditional probability. (4)

b) A pot 'P' contains 2 white and 4 black balls. Another Pot 'Q' contains 5 white and 7 black balls. A ball is transferred from Pot 'A' to Pot 'B'. Then a ball is drawn from Pot 'B'. Find the probability that it will be white. (8)

2. a) A continuous random variable X has a p.d.f $f(x) = 3x^2, 0 \le x \le 1$. Find 'a' and 'b' such That i) $P\{x \le a\} = P\{x > a\}$ and

ii) $P\{x > b\} = 0.05$ (6)

2. b) Find the characteristic function of a random variable X defined by the density function.

$$f(x) = \begin{cases} 0, & x < 0 \\ 1, & 0 \le x \le 1 \\ 0, & x > 0 \end{cases}$$ (6)

3. a) Assume that the height of clouds above the ground at some location is a gaussian random variable X with m = 1830m and σ = 460m. Find the probability that clouds will be higher than 2750m, given that F(2)=0.9772. (6)

b) Write expressions for Binomial and Poisson's distributions and show the condition, where Binomial distribution is the same as a Poisson's distribution. (6)

4. If $f(x,y) = \frac{(6-x-y)}{8}$

$0 \le x \le 2, 2 \le y \le 4$, find γ_{xy} (12)

5. The average annual rainfall and the corresponding run-off of a watershed for a period of 10 years are given below. Establish

i) a linear dependance between the rainfall and run-off and

ii) a quadratic dependance between the fainfall and run-off. Compare the two results and give your critical comments.

Rainfall (mm)	1130	1300	1270	1040	1080	1150	1670
Run-off (m^3/s)	740	1040	960	610	590	820	1090

Rainfall (mm)	1540	1490	990
Run-off (m^3/s)	1020	1060	750

(12 marks)

6. a) With a suitable example, discuss the use of Chi square test of goodness of fit of a theoretical distribution to an observed frequency distribution. State also the condition for validity of chi square test. (6)

b) Explain with a suitable example where tests based on 't' distribution are employed. (6)

7. Write notes on any three of the following:

a) Standard error.
b) Non parametric tests
c) Markov chains
d) Ergodic process
e) Wiener process. (3x4=12)

8. a) State and explain the significance of Yule-walker equations. (3)

b) Write down expressions and explain the following (i) AR(P) process (ii) MA(q) process and ARMA (p,q) process. (6)

c) What is a time series? State the basic components of a time series. (3)

Register Number: 5920

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2005

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106. NOISE POLLUTION AND CONTROL

(Common with Part-time)

November) (Time: 3 Hours

Maximum: 60 Marks

Answer any five questions
All questions carry equal marks

1. Discuss the various sources of noise generation? (12)

2. Discuss the various effects of noise on human beings. (12)

3. a) Explain the basic concepts of sound propagation and measurement. (8)

   b) Discuss the ambient noise levels permissible as per B.I.S. (4)

4. Explain the various components of a typical sound level meter and their significance. (12)

5. Explain how you will conduct a noise level survey in an industrial complex in order to assess the impacts? (12)

6. a) Explain how will you arrive at average noise level and equivalent noise level from observed data? (6)

   b) Find the equivalent noise level if; the sound level of 80 dB was lasting for 10 minutes followed by 60 dB sound lasting for 80 minutes and 100 dB sound lasting for 5 minutes. (6)

7. a) Explain the various measures recommended for protection of an industrial worker. (6)

   b) Explain how community noise can be controlled. (6)

8. a) Explain the following:

      a) Weighting networks. (6)

      b) Selection of sound absorbing materials. (6)

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Register Number:

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2016

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC 7105. PIPE LINE ENGINEERING

(Common with Part Time)

[Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE Questions

1. Formulate all the equations for the following network. The single source network shown in fig.1. Node 1 as a source with HGL 100.00m, and nodes 2,3,4 & 5 as demand nodes with demands as shown in fig.1. The length, diameter and HW coefficient of the pipes are as follows.
   Pipe 1 300m, 250mm, 120
   Pipe 2 250m, 300mm, 100
   Pipe 3 300m, 200mm, 120
   Pipe 4 400m, 160mm, 100
   Pipe 5 200m, 200mm, 100
   Pipe 6 300m, 150mm, 100

2. Analyse the network shown in fig.2 by head balancing method and by Hardy cross method.

3. Explain linear theory method with known pipe resistance.

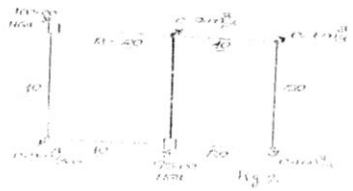

Fig. 2.

4. Explain the step by step procedure for carrying out dynamic analysis of a network by direct method.

5. Obtain the node flow analysis of the serial network shown in Fig 3. The pipe head loss relationship is $h = kQ^{1.85}$ in which h is in meters and Q in cubic meters per minute.

Fig. 3

6. A serial network consists of source node1 and demand nodes 2 and 3. The demand nodes 2 and 3 are 1500 & 2000m^3/day respectively. The pipes are labeled as 1 and 2. The length in meters and diameters in millimeters for different pipes given in parantheses are: pipe 1 →(2500m, 350mm, and pipe 2 →(2000, 300). Chlorine concentration at source node is continuously maintained at 0.8mg/l. Calculate the concentration at demand nodes 2 and 3. Assume bulk and wall decay rate constants of chlorine are 1 per day and 0.4 per day.

-3-

7. Define calibration and explain the calibration methods.

8. Write short notes on any THREE of the following:
   a) Parameter interrelationships (4)
   b) Sensitivity analysis (4)
   c) Unsteady flow analysis (4)
   d) Computer application and software packages (4)

M.E. DEGREE EXAMINATION, 2007

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC -102.ENVIRONMENTAL CHEMISTRY
(Common With Part Time)

Nov.)

(Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE questions
All question carry equal marks

1. a) Define Enzymes of factors affecting biochemical reactions. (6)

   b) Discuss the Kinetics of B.O.D and factors affecting B.O.D (6)

2. What are the environmental segments and reactions involved in atmosphere? Given a detail account on Global Warming. (12)

3. Give an account on the oxidation of so_2 and organic compound. with their effects. (12)

4. a) Define photochemical Smog and Acid rain. (4)

   b) What are the effects of air pollutants on man & environmental. (8)

5. What are the Equipments used in Air Sampling? How does air sampling survey is done? What are the emission sampling techniques? (12)

6. a) What are the Biochemical effects of Mercury, Nickel Cadmium and head? (4)

   b) Explain Radio activity and radio active wastes.(8)

7. Explain in detail the AAS, technique or the instrumental chemical analysers. What are the limitations in using AAS? (12) Atomic Absorption Spectr

8. Explain (3×4=12)

   i) HPLC.
   ii) Ion-selective Electrodes.
   iii) Exhaust gas analyzers.

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M.E. DEGREE EXAMINATION, 2007

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC -103. ENVIRONMENTAL MICROBIOLOGY
(Common with Part- Time)

Nov.)

(Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE FULL questions

1. a) With examples differentiate between Grain Positive and Grain negative bacteria. (4)

   b) When $NADPH_2$ and $FADH_2$ are oxidized how many ATP molecules will be synthesized? (3)

   c) Define M.P.N and M.F techniques and explain their significance in water analysis. (5)

2. a) Enlist and classify the types of algae occurring in water supply system. (6)
   b) Discuss the different methods of control of algae. (6)

3. a) Explain in detail the role of nucleic acids in the synthesis of protein. (12)

4. a) Classify and explain the characteristics of Viruses. (6)
   b) Describe a method for the concentration of virus particles from water samples. (6)

5. a) State the common milk borne diseases and the sources of contamination. (6)
   b) Explain the different tests for monitoring milk quality. (6)

6. Compare and contrast Glycolsis, Kreb's cycle and pentose phosphate pathway. (12)

7. Explain in detail the role played by microorganisms in the purification of waste waters in stabilization pond. (12)

8. Write notes on any THREE of the following: (3×4=12)
   a) Bio degradation of Toxic pollutants.
   b) Bio magnification.
   c) Culture medium.
   d) LC 50 and EC_{50}.
   e) Genetic engineering.

7. Write notes on any THREE of the following: (5×4=12)
   a) Stationary random process.
   b) Ergodic process.
   c) Poisson process.
   d) Markov chain.
   e) Birth and death process.

8. Write notes on any THREE of the following: (3×4=12)
   a) Single exponential smoothing.
   b) Moving average models.
   c) Auto regressive models.
   d) Yule-walker equations.
   e) Auto regressive moving average models.

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Register Number: 0728125 1. **2815**

Name of the Candidate: A. Bhuvaneswari

M.E. DEGREE EXAMINATION, 2007

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC -101.APPLIED STATISTICAL AND STOCHASTIC PROCESSES

(Common with Part-time)

Nov.) (Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE FULL questions
All question carry equal marks
Use of Statistical tables permitted

1. a) Among 24 samples collected to check industrial pollution 4 samples contained heavy metals, while the others do not. If we check randomly 2 of the samples what are the probabilities that

   i) Both will contain heavy metals.
   ii) Neither will contain heavy metals. (4)

   b) In a certain city during the month of May, the probability that a rainy day will be followed by another rainy day is 0.80 and the probability that a sunny day will be followed by a rainy day is 0.60.Assuming that each day is classified as being either rainy or sunny and that the weather on any given day depends only on the weather the day before , find the probability that in the given city a rainy day in May is followed by two more rainy days, then a sunny day and finally another rainy day. (8)

2. Suppose that the probabilities are 0.2466, 0.3452, 0.2417, 0.1128, 0.0395, 0.0111, 0.0026 and 0.0005 that there will be 0, 1, 2, 3, 4, 5, 6 or 7 polluting spills in the Veeranam Lake on any one day, Distribute the four digit random numbers from 0000 to 9999 to the eight values of this random variable, so that the corresponding random numbers can be used to simulate daily polluting spills in the Veeranam Lake.

3. In samples the lead concentration was to be correlated between measured concentration(y) and known concentration (x).the following are the given data:

x	0.00	0.00	1.25	1.25	2.50	2.50	2.50
y	0.7	0.5	1.10	2.00	2.80	3.50	2.30

5.00	10.00	10.00
5.30	9.10	9.40

   a) Plot measured concentration versus known concentration. Comment on the pattern.
   b) Fit a straight line by Least squares.

4. Cooling pipes at three nuclear power plants are examined for deposits that will reduce flow of water. From 30 randomly selected spots at each plant, 13 from the first, 8 from the second plant and 19 from the third plant were clogged.

   a) Use the 0.05 level to test the null hypothesis of equality.
   b) Plot the confidence intervals for the three probabilities of being clogged.

5. The quality control department of a large manufacturer obtained the following sample data (in Newton's) on the breaking strength of a certain kind of sewer pipes:

   153,159, 144, 160, 158, 153, 171, 162, 159, 137, 159, 159, 148, 162, 154, 159, 160, 157, 140, 168, 163, 148, 151, 153, 157, 155, 148, 168, 152, and 149.

   Use the sign test at the 0.01 level of significance to test the null hypothesis $\mu = 150$ against the alternative hypothesis $\mu > 150$.

6. a) What are the components of general time series? (4)
   b) Enlisting the characteristics of a time series applicable to water resources data (rainfall).Explain the methods to estimate and diagnose them. (8)

Register Number: **3537**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2008

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-105. UNIT OPERATIONS AND PROCESSES IN WATER AND WASTE WATER TREATMENT

(Common with part time)

Nov) (Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE FULL questions
All questions carry equal marks
Draw the sketches wherever necessary

1. a) Differentiate between unit operations and unit processes.

   b) What are the common engineered methods of removing solids from Wastewater? Describe and define each of the methods.

2. a) Explain how the power requirement for mixing the contents of a flash mixer is determined?

   b) Design a flocculator for a flow of 10(ten) MLD and estimate the power requirement.

3. a) Define
   i) Discrete Particles.
   ii) Flocculating Particles.
   iii) Dilute Suspension and
   iv) Concentrated Suspension

   b) Describe the four functional zones of a long rectangular Saltling Tank.

4. a) Write the Carman –Kozeney Equation.

   b) Clean water at 20°C is passed through a bed of uniform sand at a filtering velocity of 4m/h. The sand grains are 0.4mm in diameter with a shape factor of 0.85 and a specific gravity of 2.65. The depth of the bed is 0.65m and porosity is 0.4. Determine the head loss through the bed.

5. a) Explain two film theory of Gas Transfer.

   b) Draw and explain the working of a packed column used for Air Stripping.

6. a) Explain the significance of precipitation in Wastewater Treatment.

   b) How does Phosphate removal is achieved from Wastewater?

7. Explain the different units used in the removal of gaseous contaminants by Adsorption.

8. a) What are the specific role of various species of micro-organism in biological Wastewater Treatment.

   b) Compare and contest the suspended Growth Process and Attached Growth Process.

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Register Number: **3538-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2008

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106. TRANSPORTATION OF WATER AND WASTE WATER

(Elective)

(Common with Part Time)

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE questions

1. a) What is meant by 'Design Periods'? (3)

   b) The population statistics pertaining to a town are given below. Estimate the population expected in 1980 by arithmetical and geometrical increase methods. (9)

Year	1930	1940	1950	1960	1970
Population	70,000	1,00,000	1,50,000	2,00,000	2,40,000

2. a) Write a short notes on *'Yield of a storage reservoir'*. (3)

   b) In an artesian aquifer, the drawdown is 1.2m at a radial distance of 10m from a pumped well after two hours of pumping. On the basis of Thies' non-equibrium equation, determine its pumping time for the same drawdown (ie 1.2m) at a radial distance of 30 from this well. (9)

3. a) What is meant by 'Pellicular Water'? (3)

   b) A 30 cm dia well penetrates 20m below the static water table. After 24 hours of pumping at 5000 litres per minute, the water level in a test well at 100m away is lowered by 0.5m, and in a well at 30m away the drawdown is 1m. What is the transmissibility of the aquifer? (9)

4. A pipe network consists of the following pipes.

Pipe	Length (m)	Diameter (cm)	Friction factor
AB	400	30	0.014
BC	600	30	0.010
AD	500	40	0.012
DC	500	25	0.011

Inflow at A is 1.0m^3/sec, while outflows at B, C and D are 0.3, 0.5 and 0.2 m^3/sec, respectively. Find the flow in each pipe taking only one trial. The pressure at A is 100m of water. Solve this problem by Hardy Cross method. (12)

5. a) Write short notes on Ryve's and Burge's formula for estimating drainage discharge of Indian catchments. (3)

   b) A population of 30,000 is residing in a town having an area of 60 hectares. If the average co-efficient of run-off for this area is 0.60, and the time of concentration of the design rain is 30 minutes, Calculate the discharge for which the sewers of a proposed combined system will be designed for the town in question. Make suitable assumptions where needed. (9)

6. a) Calculate the diameter and discharge of a circular sewer laid at a slope if 1 in 400 when it is running half full, and with a velocity of 1.9m/sec. (n=0.012). (6)

   b) Draw a neat sketch of a drop man-hole and indicate where it is used. (6)

7. Design a three barrel siphon for carrying sewage across a river stream. The total length of the siphon measured along the centre line including slopes is about 80m. The invert levels at the inlet and the outlet ends of the sewer are 202.38 m and 201.80m respectively. The average flow of the sewage is 180lps, and the maximum and the minimum flows are 250% and 40% of the average respectively. Assume the minor losses to be about 6cm. (12)

8. a) Write short notes on Grit Chambers. (3)

   b) The 3 days 15* C BOD of a sample of sewage is 150mg/l. Draw a graph of 5 day BOD as a function of temperature in the range 10*C to 30*C in steps of 5*C. Assume K_D at 20*C=0.1. (9)

Register Number: **3536**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2008

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. AIR POLLUTION CONTROL

(Common with part time)

Nov) (Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE FULL questions

1. Explain the various classification of Air Pollutants in detail along with their characteristics. (12)

2. a) Describe Plume behaviour from stacks under different atmospheric stability classes. (6)

   b) Explain the effects of air pollutants on Human Health. (6)

4. Estimate the minimum size of particulates that will be removed with 100 percent efficiency from a settling chamber for the following data:
   Gaseous Flow= $1.8m^3/S$.
   Width of Chamber = 4.0m.
   Height of Chamber=1.5m
   Density of particles = 2.0 gm/C.C
   Viscosity of gas = 2.1×10^{-5}Kg/m.s
   Also find the efficiency, if the particle size is reduced to 50% of the size estimated. (12)

4. a) Explain the different categories of Atmospheric Stability. (6)
   b) Also explain the plume dispersion pattern under different Stability Classes. (6)

5. a)Estimate the number of bag filters required to handle a gas flow of $10m^3/s$, if the filtering velocity is limited to 2.0m/minute and size of the bag is limited to 6.0m long and 0.3m diameter.
   Also explain the working principles of bag house with a neat sketch. (8)

   b) Write about Electro Static Precipitators. (4)

6. a) Explain the functioning of Adsorption Towers.(5)

   b) Explain the working principles of ESP with a neat sketch and solve the following problem.
   An ESP with drift velocity of 3×10^5 dp m/s is handling gas flow of 10 m^3/s. If the particle size is 0.5 micron, find the plate area required for 90% removal and 95% removal. (7)

7. Discuss the various Gaseous Pollution Control Methods with neat sketches. (12)

8. Explain the working principles of Wet Scrubers, Absorption Towers and Adsorption Column with neat sketch. (12)

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5. Maximize $f(x)=2x_1+3x_2$.
Subject to
$x_1 \leq 6$
$x_1+2x_2 \leq 10$
$x_1, x_2 \geq 0$

6. a) The sample mean and variance of a river data are calculated as X=67,500 and S_x=21,000. What are the 95% confidence limits on the mean assuming the sample is from a normal population. The number of samples is n=66. Use the t-distribution.

b) Assume a single observation is selected from a normal distribution with mean $\mu_1=7$ and variance $\sigma^2_0=9$. It is hypothesized that $\mu=\mu_0=5$. If the test s conducted at the 10% significance level, what is the probability of Type –II error?

7. Evaluate the constant 'a' in the expression $p_x(x)=ax^2$ so that the following can be considered a probability density function.
$p_x(x)=ax^2$, $0 \leq X \leq 5$; $p_x(x)=0$ elsewhere
What is the probability that a value selected at random from this distribution will
a) Less than 2? b) Fall between 1 and 3?
c) be larger than 4? d) be larger than or equal to 4?
e) Exceed 6?

8. Write short notes on any THREE of the following:
a) Skewness
b) Mean and Variance
c) Correlation
d) Regression
e) Stochastic variables

Year	1910	1920	1930	1940	1950	1960	1970
0		48.7	44.8	49.3	31.2	46.0	33.9
1	39.9	44.1	34.0	44.2	27.0	44.3	31.7
2	31.0	42.8	45.6	41.7	37.0	37.8	31.5
3	42.3	48.4	37.3	30.8	46.8	29.6	59.6
4	42.1	34.2	43.7	53.6	26.9	35.1	50.5
5	41.1	32.4	41.8	34.5	25.4	49.7	38.6
6	28.7	46.4	41.1	50.3	23.0	36.6	43.4
7	16.8	38.9	31.2	43.8	56.5	32.5	28.7
8	34.1	37.3	35.2	21.6	43.4	61.7	32.0
9	56.4	50.6	35.1	47.1	41.3	47.4	51.8

2. a) Calculate the sample mean, sample standard deviation, and sample coefficient of skewness of the data for annual precipitation recorded in a station.

Year	1970	1971	1972	1973	1974
Precipitation	33.9	31.7	31.5	59.6	50.5

1975	1975	1977	1978	1979
38.6	43.4	28.7	32.0	51.8

b) Describe the chi-square test for testing the goodness of fit of a probability distribution.

3. Using the method of moments, fit a normal distribution to the annual precipitation at a station from 1911 to 1979 as shown in Table below: Divide the range for precipitation into 10 intervals. The first interval is P≤20 inches, the last interval is P>60 inches, and the intermediate intervals each cover a range of 5 inches.

Register Number: **3615-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-101. STATISTICS FOR ENVIRONMENTAL ENGINEERS

(For those admitted during 2009-2010 and after)

(Common to M.E. (Part Time) First Semester)

November] [Time: 3 Hours
Maximum: 60 Marks

Answer any FIVE full Questions
Each full question carries 12 marks
Use of Statistical Tables is permitted

1. a) Differentiate between the following;
i) Sample and population
ii) Event and Sample Space
iii) Posterior probabilities and prior probabilities

b) The values of annual precipitation in a station from 1911 to 1979 are shown in Table 1 below. What is the probability that the annual precipitation P in any year will be less than 35 inches? Greater than 45inches? Between 35 and 45 inches?

Year	1910	1920	1930	1940	1950	1960	1970
0		48.7	44.8	49.3	31.2	46.0	33.9
1	39.9	44.1	34.0	44.2	27.0	44.3	31.7
2	31.0	42.8	45.6	41.7	37.0	37.8	31.5
3	42.3	48.4	37.3	30.8	46.8	29.6	59.6
4	42.1	34.2	43.7	53.6	26.9	35.1	50.5
5	41.1	32.4	41.8	34.5	25.4	49.7	38.6
6	28.7	46.4	41.1	50.3	23.0	36.6	43.4
7	16.8	38.9	31.2	43.8	56.5	32.5	28.7
8	34.1	37.3	35.2	21.6	43.4	61.7	32.0
9	56.4	50.6	35.1	47.1	41.3	47.4	51.8

4. The concurrent average annual rainfall and the corresponding runoff of a watershed in millimeters for a period of 17 years are given below. Establish the dependence between rainfall and runoff by way of correlation coefficient between them. Also, obtain the regression line to predict the annual runoff based on the known values of annual rainfall from the data.

i	Rainfall x_i	Rainoff y_i	i	Rainfall x_i	Rainoff y_i
1	113	74	10	119	78
2	128	104	11	152	109
3	127	96	12	137	96
4	104	61	13	165	124
5	108	59	14	151	103
6	115	82	15	160	134
7	167	109	16	130	87
8	154	102	17	149	106
9	99	57			

Register Number: **3617-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-103. AIR POLLUTION METEOROLOGY AND DISPERSION MODELLING

(Common to M.E. (Part-Time) First Semester)

November] [Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE full questions

1. a) What are the sources and effects of air pollution? (6)

   b) Describe the atmospheric structure and dynamics. (6)

2. a) Write about atmospheric systems and pollutant transport. (6)

   b) Describe large scale inviscid flows and small scale viscous flows. (6)

3. a) What are the effects of meteorlogical parameters on transport and diffusion? Explain. (6)

   b) Describe the atmospheric chemistry of air pollution and the interrelationship between meteorlogy and air pollution. (6)

4. a) Write the gradient transport theories and explain them. (6)

   b) Explain mass conservation & diffusion equations. (6)

5. a) Describe molecular and turbulent diffusion. (6)

   b) Write about the limitations of gradient transport theories. (6)

6. Explain Lagrangian similarity theory for the neutral surface layer and for the stratified surface layer in detail and the limitations in the application of statistical theories on atmospheric dispersion. (12)

7. a) Write the basis and justification for Gaussian diffusion models. (6)

   b) Discuss the limitations of Gaussian diffusion models. (6)

8. Write short notes on the any THREE of the following: (12)

   a) Vertical distribution of winds in the PBL

   b) Air pollution surveys

   c) Constant K. theory

   d) Statistical theory of turbulence

   e) Gravitation settling of particles.

Register Number: **3618-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. PROCESS AND UNIT OPERATIONS FOR WATER TREATEMENT

(New Regulation)

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE questions

1. Describe in detail, the Chemical and Radiological characteristics of water.

2. With a sketch, describe the role of Clari-Flocculator in water treatment.

3. Design the approximate dimensions of asset of Rapid Sand Filters for treating water required for a population of 50,000. The rate of water supply being 180 litre/head/day. The filters are rated to work 5000 litre/hour/square meter. Assume whatever data necessary, and not given.

4. a) Describe the Ion exchange process for water softening in detail. (6)

b) Differentiate slow sand filter and rapid sand filter. (6)

5. a) Enumerate the operation and maintenance schedule for Clari-Flocculator. (8)

b) What are the factors affecting the optimization of treatment cost? (4)

6. a) Explain in detail the procedure adopted in the removal of iron and manganese from water. (6)

b) Draw the pressure filter for water treatment & explain the various components. (6)

7. Write a detailed note on different types of Disinfection methods. (12)

8. Write short notes on any THREE of the following:
   a) Hardness
   b) Micron filtration
   c) MPN index
   d) Different types of chlorination
   e) Particle Removal Efficiency of Slow and Rapid sand filter.

Register Number: **3619-B**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-105.PIPE LINE ENGINEERING

(New Regulation)

(Time: 3 Hours Nov.)

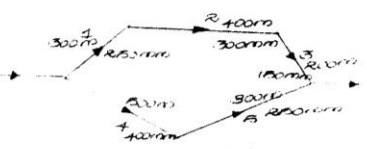
Maximum: 60 Marks

Answer any FIVE questions
All questions carry equal marks

1. A 200mm diameter, 3000m long new CI pipe conveys water at the rate of $0.1m^3$/sec.Determine the head loss in the pipe using Darcy- Weisbach, Manning, Hazen Williams and modified Hazen Williams head loss formulae.

2. A CI pipe to convey $0.1m^3$/sec between two points P and Q, 1000m apart. If the permissible head loss is 10m.Find the diameter of the pipe using Dary-Weisbach and Hazen Williams formulae.

3. Find the diameter of a 900-m –long equivalent pipe (CH_w=100) to replace the series-parallel system shown in fig-1.



The length, diameter and C_{HW} coefficient values of the pipes are:

Pipe 1: 300m, 250mm, 120
Pipe 2: 400m, 300mm, 130
Pipe 3: 200m, 150mm, 100
Pipe 4: 500m, 400mm, 100
Pipe 5: 300m, 250mm, 80

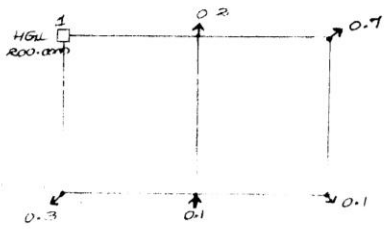
(12)

4. Derive the pipe head loss relationship for a pipe network. (12)

5. Derive the node flow continuity relationship for a steady incompressible flow pipe network. (12)

6. Derive path head loss and loop head loss relationship for a pipe network. (12)

7. Write down the general formulation Q equation and ΔH equation for single source looped network as shown in fig-2.



8. **Write short** notes on any THREE of the following:
   a) Hardy cross method. (4)
   b) Newton Raphson method. (4)
   c) Linear theory method. (4)
   d) Gradient method. (4)

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Register Number: **3621-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106. ENVIRONMENTAL BIO-TECHNOLOGY

(Elective)

(New Regulation)

November] [Time : 3 Hours

Maximum : 60 Marks

Answer any FIVE questions

1. Describe in detail about the biogeochemical role of soil microorganisms in nutrient development?

2. Discuss about the microbial activities in porous media with adequate illustrations?

3. Explain in detail the various steps involved in the Degradation of highly toxic halogenated organic compounds?

4. Mention briefly about pesticide degradation pattern and discuss the degradation process of the petroleum products.

5. What is bio remediation? Discuss the various methods of bio remediation in a detailed manner.

6. Bring out the role of Bio fertilizers in neutriants production and compare it with chemical fertilizers.

7. Explain in detail about the Biogas production technology mentioning the various processes involved with the aid of a flow chart.

8. Write short notes on any THREE of the following:
   a) Decontamination of ground water system
   b) De-toxification using oxidation
   c) Protoplast fusion technology
   d) Genetically engineered organisms
   e) Ethical issues involved in Microbial technology.

Register Number: **3616-A**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2009

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-102. ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

(New Regulation)

November] [Time: 3 Hours

Maximum: 60 Marks

Answer any THREE full questions from each part

PART-A (Environmental Chemistry) ***(3×10=30)***

1. a) Define Been –Lambert's law and its limitations. (5)

   b) Discuss the essential components of a UV visible spectrophotometer. (5)

2. a) List out some important applications of gas chromatography. (5)

   b) Write a short note on smoke precipitator. (5)

3. a) Discuss the chemistry of hydrocarbon decay. (5)

   b) How is COD experimentally determined? (5)

4. a) Explain the sources from which salts are accumulated in the soil. (5)

   b) What are the methods to reduce the alkalinity of soil? (5)

PART-B (Environmental Microbiology) ***(3×10=30)***

5. a) Discuss about classification and identification of micro organisms. (5)

   b) Write about preservation and sterilization methods. (5)

6. a) Discuss about the tests for califorms. (5)

   b) Explain the defects due to algae in water supply. (5)

7. a) Describe the reproduction process of Metabolism. (5)

   b) Write a note on electron transport system. (5)

8. a) What is the role of microorganisms in wastewater treatment? (5)

   b) Distinguish between α-oxidation and β-oxidation? (5)

M.E. DEGREE EXAMINATION, 2010

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-102. ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

(Common with Part-Time)

~~May~~

[Time: 3 Hours

Maximum: 60 Marks

Answer any THREE full questions from each part

PART-A: ENVIRONMENTAL CHEMISTRY **(3×10=30)**

1. a) Derive Beer-Lambert's Law and discuss its applications.

   b) Give the basic principle of gas chromatography and mention its important applications.

2. a) Briefly explain the determination of dissolved oxygen by Winkler's method.

   b) Write the reductive dehalogenation reaction of DDT.

3. Draw the E^h–p^H diagrams and explain.

4. a) What is meant by acid rain? How it is formed? Mention the harmful effects of acid rain.

   b) What are the different type of methods adopted to reduce the alkalinity of soil?

PART-B: ENVIRONMENTAL MICROBIOLOGY **(3×10=30)**

5. Explain in detail about the Watson's model of DNA replications and add a note on the enzymes involved.

6. Give in detail the distribution of micro organisms in water, air and soil with their significance.

7. Explain with sketches the metabolic pathways of (a) Glucose to pyrocote conversion (b) Citric acid cycle.

8. Explain the biodegradation of toxic pollutants with suitable examples.

M.Sc. DEGREE EXAMINATION, 2010

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-103.AIR POLLUTION METEOROLOGY AND MODELLING

Nov
May) (New Regulation) (Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE questions

All questions carry equal marks

1. a) What are the types and sources of particulate matter causing air pollution? Briefly explain them. (6)

   b) Explain stable and unstable atmosphere and inversion of the atmosphere. (6)

2. a) Define the wind rose. Explain the importance of wind rose in air pollution studies. (6)

   b) Write about atmosphere systems and pollution transport. (6)

3. a) Enumerate the effects of meteorological parameters on transport and diffusion? (6)

   b) Describe in detail the atmosphere chemistry of air pollution. (6)

4. a) Explain in detail the gradient transport theories. (6)

   b) Explain in detail the diffusion equations. (6)

5. a) How are sampling stations located for an air pollution survey? (6)

   b) Explain how a short term air pollution survey is conducted in a city like Bangalore. (6)

6. a) Explain in detail Lagrangian similarity theory for
      i) Neutral surface layer
      ii) Stratified surface layer (6)

   b) What are the limitations while applying the statistical theory on atmospheric dispersion? (6)

7. a) Explain in detail Gaussian diffusion models. (6)

   b) What are the advantages and limitations of Gaussian diffusion models? (6)

8. Write short notes any three of the following: (3×4=12)
   a) Smog-Cause and effect
   b) Primary –and Secondary air pollutants.
   c) Stationary and mobile sources of air pollutants.
   d) Adiabatic Lapse rate.
   e) Constant K theory.

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Register Number: **8168**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2010

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. PROCESS AND UNIT OPERATIONS FOR WATER TREATMENT

(Common with Part-Time)

May] [Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE Questions

1. Describe in detail, the physical and biological characteristics of water.

2. Describe the screening process for the treatment of water with a neat sketch.

3. Design six slow sand filter beds from the following data:

Population	=	50,000 persons
Per capita demand	=	150 litre/head/day
Rate of filtration	=	180 litre/hour/square meter
Length of each bed	=	Twice the breadth

Assume Maximum demand as 1.8 times average daily demand. Assume that one unit out of that will be kept as stand-by.

4. Describe the Lime-Soda process in detail in connection with water treatment.

5. i) What are the factors affecting the optimization of treatment cost?

   ii) What are the monitoring and operating parameters?

6. With a neat sketch, describe the functions of Clari-Flocculator in water traetement.

7. Describe the theory of cross filtration and explain the NANO filtration.

8. Write short notes on any THREE of the following:
   a) MPN Index
   b) Types of disinfection
   c) Reverse Osmosis in water treatment
   d) HRT and SLR
   e) Break-Point chlorination with sketch.

M.E. DEGREE EXAMINATION, 2010

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106. ENVIRONMENTAL BIO-TECHNOLOGY

(Elective)

(Common with Part-Time)

~~May~~]

[Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE Questions

1. Explain how the concepts of environmental biotechnology are useful to the society and agriculture.

2. Write a detailed note on the processes involved in de-contamination of waste water with respect to health risks.

3. Discuss in detail about the rDNA technology and its applications.

4. Explain the role of extra cellular polymers in Agriculture.

5. Describe in detail about the mutualism and parasitism processes.

6. Discuss the microbial degradation of petroleum hydrocarbons.

7. Explain: Biodegradation of Solid waste.

8. Write short notes on any THREE of the following:
   a) Biological wastewater treatment
   b) Pesticide degradation pattern
   c) Bio transformation of metals
   d) Cloning of DNA
   e) Risk assessment

M.E. DEGREE EXAMINATION, 2010

(CIVIL ENGINEERING)

(FIRST SEMESTER)

(Common with Part-Time)

ENVC-101.STATISTICS FOR ENVIRONMENTAL ENGINEERING

Nov) (Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE questions
All questions carry equal marks
Use of statistical tables is permitted

1. Explain how the method of moments is used to describe the characteristics of sample data? How should we calculate the statistical parameters of the samples?

2. Describe the method of least squares and discuss about the standard forms of equations used in the bivariate regression analysis.

3. The following information are recorded from a storm.

Time(min)	0-10	10-20	20-30	30-40
Rainfall intensity(cm/hr)	3	6	4	7

40-50	50-60
3	1

Calculate the first three moments of the data about the origin.

4. Describe the maximum likelihood estimate method and method of moments.

5. Explain the relationship between normal distribution and chi-square test, with a suitable example.

6. A chemical company purchases 3 types of raw materials A, B and C. and mixes them to make 3 different blends. Data regarding the blends are given below.

Blend No.	Specifications	Spelling price per litre
1.	Amount of A>60% and that of C<20%	Rs.13
2	Amount of C<60% and that of A>15%	Rs.11
3	Amount of C<50%	Rs.9

How will you maximize the profit?

7. Describe normal distribution and log normal distribution and the calculation of probability form the above distributions.

8. Write short notes on the following:
   1. Simplex method of optimization.
   2. Sampling analysis of variance.
   3. Multiple correlation.

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Register Number: **9235**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2011

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-101. STATISTICS FOR ENVIRONMENTAL ENGINEERING

May] [Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE Questions

1. Yearly maximum rainfall records for 100 years are given in 8 classes, with frequency. Find mean, mode, median, variance and skewness.

Class	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114
Frequency	9	12	15	12	19	20	11	2

2. Let an equation of the form $y=a+bx+cx^2$ be fitted to the data of n values of variable x and y. Calculate the parameters a, b, and c by the method of least square.

3. Describe the probability distribution and the usage of method of moments and method of maximum likelihood.

4. Explain the calculation of coefficient of variation, coefficient of skewness and their usage in log normal distribution to find the return periods.

5. The mean annual flood peak at a site is 2,80,000 liters/sec and the standard deviation is 40,000 litres/sec. What is the probability that a flood of 4,00,000 litres/sec occurring in the river in the next 15 years?

6. Objective of a firm is to maximize profit by producing medicine A and/or medicine B both of which have to be processed on two machines 1 and 2. Medicine A requires 2 hours on both machines 1 and 2. While medicine B needs 3 hours on machine 1 and only 1 hour on machine 2. There are only 12 and 8 hours available on machine 1 and 2 respectively. The profit per unit is estimated at Rs.6 and Rs.7 in case of machines A and B respectively. Find the optimum value of A and B for maximize the profit.

7. A random variable is said to be exponentially distributed when its probability distribution function is given by $f(x)=\lambda e^{-\lambda x}$, $x \geq 0$. Where λ is the parameters of distribution. Find the mean, median, the skewness co-efficient and kurtosis co-efficient for this distribution.

8. Write short notes on the following:
   a) Correlation and regression
   b) Method of moments
   c) Sampling distributions

Register Number: **9236**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2011

(ENVIRONEMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-102.ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

May) (Time: 3 Hours

Maximum: 60 Marks

Answer any THREE full questions
All questions carry equal marks

PART-A (3×10=30)

ENVIRONMENTAL CHEMSITRY

1. a) Explain the basic principles of green chemistry. (5)

   b) Discuss the applications of colloids. (5)

2. a) Explain the working of atomic absorption spectrometer. (5)

   b) Give an explanation of bio degradation of detergents. (5)

3. a) Give an account of formation reactions of copper with ammonia. (5)

   b) Discus the adverse effects of global warming. (5)

4. a) Write a note on clay minerals. (5)

   b) What are the characteristics of non-saline soils? (5)

PART-B (3×10=30)

ENVIRONMENTAL MICROBIOLOGY

5. a) How will you identify the presence of micro organisms? (5)

   b) Discuss about the staining techniques. (5)

6. a) Draw the five kingdom concept of being organisms and explain their modes of nutrition. (5)

   b) What are the problems created by algae? (5)

7. a) Distinguish between plant cell and animal cell.

   b) Write short note on Bio energetics. (5)

8. a) Discuss about Biodegradation of toxic pollutants. (5)

   b) Write a note on biological treatment process. (5)

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Register Number: **9237**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2011

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-103. AIR POLLUTION METEOROLOGY AND DISPERSION MODELLING

May] [Time: 3 Hours

Maximum: 60 Marks

Answer any FIVE Questions

1. a) Classify the air pollutants into different categories, indicating their sources. Describe each of them in detail. (6)

   b) Explain the cause and effects of "inversion of atmosphere". (6)

2. a) Explain the role of meteorological elements in the dispersion of air pollutants in the atmosphere. (6)

   b) Describe large scale inviscid flows and small scale viscous flows. (6)

3. a) List the meterological factors influencing air pollution. (6)

   b) Describe with neat sketches, how different atmospheric condition gives rise to different kinds of plumes. (6)

4. a) Explain in detail the gradient transport theories. (6)

   b) Explain in detail the mass conservation equations. (6)

5. a) Describe molecular and turbulent diffusion. (6)

   b) Explain the importance of establishing a control station during an air pollution survey. (6)

6. a) Explain in detail Lagrangian similarity theory for (i) Neutral surface layer (ii) Stratified surface layer. (6)

   b) What are the limitations while applying the statistical theory on atmospheric dispersion? (6)

7. a) Explain in detail Gaussian diffusion models. (6)

   b) What are the advantages and limitations of Gaussian diffusion models? (6)

8. Write short notes on any THREE of the following: (12)
   a) Point, Area and Line Sources
   b) Wind speed recorder
   c) Wind direction recorder
   d) Plume bebaviour
   e) Constant K. theory

Register Number: 0571

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106.ENVIRONMENTAL BIO-TECHNOLOGY

NOV ~~May~~]

[Time: 3 Hours

Maximum: 75 Marks

(Max: 60 marks those who joined before 2011-12)

Answer any FIVE questions
All questions carry equal marks

1. a) Discuss the role of microorganisms in the cycling of elements and matter in the environments.

   b) Enumerate the usefulness of bio-technology to mankind.

2. a) List out the toxic compounds and micro organisms used to treat them. Explain any two – detoxification methods.

   b) Describe the pesticide degradation pattern and explain how the petroleum products are degraded?

3. a) Explain how biotechnology can help in controlling pollution through treatment of industrial waste.

   b) With a neat sketch, discuss the uptake mechanism of nutrients by algae.

4. a) Discuss the recombinant DNA technology with reference to environmental biotechnology applications.

   b) Write an account on protoplast fusion technology.

5. a) Comment on the safety aspects of genetically engineered organisms in industries.

   b) Discuss the risks in environmental biotechnology.

6. a) Give an account on IPR with respect to microbial technology.

   b) Explain how genetically engineered microbes can be used for biodegradation of pesticides.

7. a) Discuss the biotransformation mechanism of polycyclic Aromatic Hydrocarbons.(PAH_s).

   b) Enumerate the various physicochemical and microbiological factors affecting composting.

8. Write short notes on the following:
   a) Mutation b) Single Cell protein c) Biofertilizers

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Register Number: **0570**

Name of the Candidate:

M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. PROCESSES AND UNIT OPERATIONS FOR WATER TREATMENT

(Common with Part-Time)

May.] [Time: 3 Hours

Maximum: 75 Marks

(Max: 60 marks for those who joined before 2011-12)

Answer any FIVE Questions
All questions carry equal marks

1. Describe the pattern of pollution and self purification in a stream.

2. Describe the theory of Type I settling with a neat sketch of idealized settling tank.

3. Explain the heterotrophic microbiological metabolism with flow chart diagram.

4. Explain the different types of trickling filters and the flow diagrams of them.

5. Describe the different modes of Aerobic digestion of sludge.

6. Design a stabilization pond to treat a domestic sewage flow of 2MLD at a place, the latitude of which is 20°N. The 5 day 20°C BOD of the sewage is 200mg/l. Suitable other data may be assumed as per Indian conditions.

7. Explain different types of filtration used in advanced treatment process.

8. Describe the disinfection chambers working principles for membranes based plants.

Register Number: 13231003

~~0567~~ 3419

Name of the Candidate: K.S. Dhivya

M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-101. STATISTICS FOR ENVIRONMENTAL ENGINEERS

Nov/May]

[Time : 3 Hours

Maximum : 75 Marks
(Maximum : 60 marks those who joined before 2011-2012)

Answer any FIVE questions
All questions carry equal marks
Statistical tables are permitted

1. a) Calculate the correlation coefficient for the following data. (10)

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

b) Two lines of regression are $8x-10y+66=0$, $40x-18y-214=0$. Find (i) the mean values of x and y (ii) correlation coefficient between x and y. (5)

2. A random variable x has the following probability function. (15)

x :	0	1	2	3	4	5	6	7
P(x) :	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Find k (ii) Evaluate $P(x<b)$, (iii) $P(1.5<x<4.5/x>2)$ (iv) Find the smallest value of λ such that $p(x\leq\lambda)> ½$.

3. Three Judges A, B, C give the following ranks. Find the which pair of Judges has common approach. (15)

Judge A	1	6.	5	10	3	2	4	9	7	8
Judge B	3	5	8	4	7	10	2	1	6	9
Judge C	6	4	9	8	1	2	3	10	5	7

4. a) A problem is given to 3 students whose changes of solving it are 1/2, 1/3, 1/4. What is the probability that (i) Only one of them solves the problem. (ii) The problem is solved. (10)

b) From 6 positive and 8 negative numbers, 4 numbers are chosen at random (without replacement) and multiplied. What is the probability that the product is positive? (5)

5. a) The following data give the number of aircraft accidents that occurred during the various days of the weeks. (8)

Day :	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	15	19	13	12	16	15

Test whether the accidents are uniformly distributed over the week.

b) The mean life time of a sample of 25 bulbs is found to be 1550 hours with an standard deviation of 120 hours. The company manufacturing the bulbs claims that the average life of their bulbs is 1600 hours. Is the claim acceptable at 5% level? (7)

6. In order to determine whether there is any significant difference in the durability of 3 marks of computers, samples of size 5 are selected from each make and the frequency of repair during the first year of purchase is observed. The results are as follows. (15)

A	B	C
5	8	7
6	10	3
8	11	5
9	12	4
7	4	1

In view of the above data, what conclusion can you draw?

7. In random sampling from Normal population N (μ,σ^2). Find the maximum like hood estimates for (i) μ,when σ^2 is known and (ii) σ^2, when μ is known. (15)

8. Solve the following LPP using Simplex method : (15)

Maximize $z = 6x_1 + 8x_2$

Subject to $5x_1 + 10x_2 \leq 60$, $4x_1 + 4x_2 \leq 40$, x_1 and $x_2 \geq 0$.

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M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING, WATER RESOURCES ENGINEERING AND MANAGEMENT)

(FIRST YEAR- SECOND SEMESTER)

ENVC-105/WREC-204. PIPE LINE ENGINEERING

November] [Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks those who joined before 2011-2012)

Answer any FIVE questions **(5×15=75)**

1. a) Explain the various types of Water Supply Systems (8)

   b) Discuss in detail about the network components and the network model. (7)

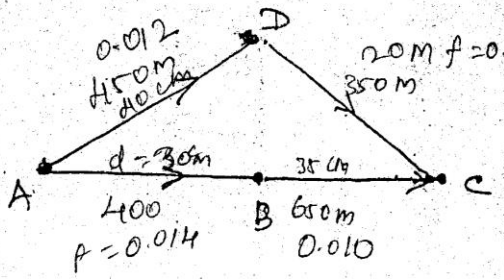
2. A water supply scheme is to be designed for serving a population of 4 lakhs, the storage reservoir is situated at 8km away from the city and the loss of head from source to the city is 16 metres. Calculate the size of supply main by using Darcy- Weigback formula and Hazen William's formula , assuming a maximum daily demand of 200litres per day per person and half the daily supply to be pumped in 3 hours. Assume co-efficient of friction for the pipe material as 0.012 in Weigback formula and C_H=130 in Hazen's formula. (15)

3. a) Explain the concept of single source and multi source networks. (6)

   b) A pipe line 0.60 metre diameter is 1.50km long. To augment the discharge, another pipeline of the some diameter is introduced parallel to the first in the second half of its length. Find the increase in discharge if f =0.04, and head at inlet is 30m. (9)

4. a) Explain the Hardy Cross method and Newton –Raphson method of analysis of pipe network. (6)

   b) A pipe network consists of the following pipes. (9)



For pipe AB-Length 400m, 30cm diameter, f =0.014

BC- Length 650m, 35cm diameter, f =0.010

AD-Length 450m, 40cm diameter, f =0.012

DC-Length 350m, 20m diameter, f =0.011

In flow at A is 1.50m^3/sec, while the out flows are B,C,D are 0.40, 0.50, 0.25m^3/sec respectively. Find the flow in each pipe taking only one trail. Assume the pressure at 'A' is 100m of water.

5. a) Explain in detail the iterative procedure and direct procedure of Dynamic Note Head analysis. (10)

   b) Discuss briefly about the practical application of Dynamic Analysis. (5)

6. a) Explain briefly about the Water Quality Modelling. (8)

   b) Discuss the various forms by which the chlorine can be applied in a distribution network. (7)

7. a) Explain in detail the various methods of calibration used in the pipe network analysis. (10)

   b) What are the various methods of layout adopted in the distribution system, planned for a municipal water supply scheme? (5)

8. a) Explain briefly about the sensitivity analysis and reliability analysis carried out in pipe network. (10)

   b) Discuss about the various software packages available in analysis of pipe networks. (5)

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M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-105. PIPELINE ENGINEERING

(Common with Part-time)

(Elective)

May] [Time : 3 Hours

Maximum : 75 Marks
(Maximum : 60 marks those who joined before 2011-2012)

Answer any FIVE questions
All questions carry equal marks
Draw sketches wherever necessary

1. a) Explain with neat sketches the various types of water supply system. (10)

   b) Write short notes on labeling of network elements. (5)

2. Find the diameter of a 2km long cast iron pipe to carry water at a rate of $3m^3$/ min, if the permissible head loss is 20 m. Use (a) Darcy-weisbach formula with e=0.9mm (b) Hazzen Williams formula with C_{HW}=100. (15)

3. Explain in detail the following network analysis methods.

   a) Newton Raphson method. (5)

   b) Linear theory method. (5)

   c) Gradient method. (5)

4. Analyse a single looped pipe network as shown in the fig-1 for pipe discharges using Newton-Raphson method. Assume a constant friction factor f=0.02 for all pipes in the network. (15)

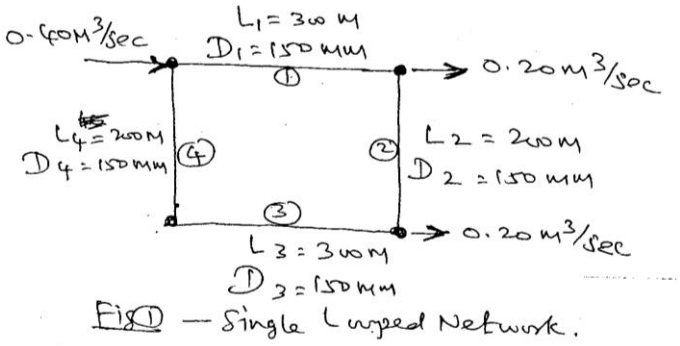

Fig 1 — Single Looped Network.

5. a) Explain the step by step procedure of Node flow analysis. (10)

   b) Discuss the practical applications of Node flow analysis. (5)

6. a) Explain briefly the various methods of calibrations adopted in the network analysis. (10)

   b) Write briefly the data collection procedures in the calibration of networks. (5)

7. Discuss briefly about the static and dynamic models used for the prediction of chlorine concentration. (15)

8. a) Discuss briefly about the various software packages used in the network analysis. (10)

   b) Write briefly about the interrelationships of Fuzzy logic parameters. (5)

Register Number: 13231003

Name of the Candidate: K.S. Dhivya

3422

M.E. DEGREE EXAMINATION, 2013

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. PROCESSES AND UNIT OPERATIONS FOR WATER TREATMENT

November] [Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks those who joined before 2011-2012)

Answer any FIVE questions (5×15=75)

1. Name the Physico-chemical parameters of concern in water quality management, identify their principal sources and discuss their impacts.
2. With a neat sketch, explain the four functional zones of a settling tank.
3. Clean water at 20°c is passed through a bed of uniform sand at a filtering velocity of 5.0m/h. The sand grains are 0.4mm in diameter with a shape factor of 0.85 and a specific gravity of 2.65. The depth of the bed is 0.67m and the porosity is 0.4. Determine the headloss through the bed.
4. Explain how water treatment can be achieved using reverse osmosis. Also, discuss its limitations.
5. Discuss in detail the operation and maintenance schedule for disinfection chambers.
6. Explain in detail the design steps for a slow sand filter in a water treatment plant.
7. Classify the mechanisms and discuss the four mechanism thought to occur during coagulation. Under what circumstances are lime and / or soda ash added to water during coagulation operations?
8. Describe in detail the theory of cross filtration with sketches.

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Name of the Candidate:

0533

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-103. AIR POLLUTION METEOROLOGY AND DISPERSION MODELLING

May]

[Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks for those who joined before 2011-2012)

Answer any FIVE questions
All questions carry equal marks

1. a) Explain briefly the various sources of air pollution. (8)

   b) Explain briefly the following
   i) Mesosale system
   ii) Microscale system (7)

2. a) Explain briefly the various composition and thermal structure of the atmosphere. (8)

   b) Explain briefly the following:
   i) Large scale inviscid flows,
   ii) Small scale visous flows (7)

3. a) Describe the effects of meterological parameters on transport and diffusion. (8)

   b) Briefly describe the interrelationship between meterology and air pollution. (7)

4. a) List the various meterological instruments used in weather monitoring. Briefly explain about the instrument used to measure wind speed. (8)

   b) Write a brief note on "Air pollution surveys". (7)

5. a) Briefly explain the Langrangian description of atmospheric turbulence. (8)

   b) Write short notes on:
   i) Molecular diffusion.
   ii) Turbulent diffusion. (7)

6. a) What are the various limitations of Gradient transport theories? Briefly explain. (8)

   b) Describe briefly about the applications of K- theories in Atmospheric dispersion. (7)

7. a) Define the term "Plume rise" with neat sketch. Explain briefly the various types of plume diffusion model. (8)

   b) What are the various applications of Air quality models? Explain briefly. (7)

8. a) Explain briefly the Gaussian Plume diffusion model. (8)

   b) What are the various applications of Air quality models? Explain briefly. (7)

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Register Number:
Name of the Candidate:

0534

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-104. PROCESSES AND UNIT OPERATIONS FOR WATER TREATMENT

May]

[Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks for those who joined before 2011-2012)

Answer any FIVE questions
All questions carry equal marks

1. Discuss the use of total coliform and fecal coliform tests in the measurement of pathogens. Discuss the membrane filter technique and how test results are reported when this technique is used.
2. Mention the factors that influence the head loss through the bar screen. Also, determine the buildup of head loss through a bar screen when 50 percent of the flow area is blocked off due to the accumulation of coarse solids. Assume the following conditions
   Approach velocity = 0.6 m/s
   Velocity through clean bar screen = 0.9 m/s
   Open area for flow through clean bar screen = $0.19m^2$
   Head loss Co-efficient for a clean bar screen = 0.7
3. With neat sketch, describe the activated carbon adsorption process. Also, discuss the design aspects of activated carbon systems for water treatment.
4. Explain how water treatment can be achieved using ion exchange process. Also, discuss its limitations.
5. Discuss in detail the operation and maintenance schedule for clariflocculators.
6. Explain in detail the design steps for a conventional settling tank in a water treatment plant.
7. Describe the characteristics of a good disinfectant. Also list commonly used disinfectants and discuss the advantages and disadvantages of each.
8. Define "breakthrough" as it relates to treatment of hardness and discuss what steps must be taken after breakthrough point is reached.

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Register Number:
Name of the Candidate:

0535

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-106. ENVIRONMENAL BIO-TECHNOLOGY

May]

[Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks for those who joined before 2011-2012)

Answer any FIVE questions
All questions carry equal marks

1. a) Discuss the role of biotechnology in preservation of natural resources with suitable example.

   b) Enumerate the recent development of bio-technology with respect to industrial applications.

2. a) Discuss in detail the mechanism of detoxification of microorganisms.

   b) Describe the biotransformation of metals by microorganisms.

3. a) Explain briefly about Biofertilizers. Also discuss the significance of its use for protecting the environment.

   b) Discuss in detail the bioremedial measures for the soil contaminated with hydrocarbons.

4. a) Explain in detail the concept of recombinant DNA technology.

   b) Write an account on construction of microbial strains.

5. a) Discuss the importance and the role of genetically engineered organisms in industries.

   b) Comment on the ethics of microbial technology.

6. a) Discuss the various factors which affect the compositing.

   b) Elucidate the cellular and metabolic aspects of biotechnology.

7. a) Discuss in detail the methods for decontamination of ground water systems.

   b) Explain how abiotic systems affect biotechnology. Also list the factors influencing the risk of genetically modified microorganisms.

8. Write short notes on the following:
   a) Cloning of DNA
   b) Algal biotechnology
   c) IPR

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Register Number:
Name of the Candidate:

3418

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-102. ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

November] [Time : 3 Hours

Maximum : 75 Marks

(Max:60 marks for those who joined before 2011-2012)

Answer any THREE FULL questions from each part

All full questions carry equal marks

PART-A
ENVIRONMENTAL CHEMISTRY

(3×12½=37½)

1. Explain briefly the principles and working of Atomic absorption spectroscopy. (12½)
2. a) Explain the principles of Green Chemistry. (6½)
   b) Define the terms (6)
      i) Dissolved oxygen
      ii) B.O.D and C.O.D
3. Explain briefly about the biodegradation of food Stuffs (12½)
4. a) Describe briefly, the acid base and ion exchange reaction in soil. (8)
   b) Write short notes on Acid rain. (4½)

PART-B
ENVIRONMENTAL MICROBIOLOGY

(3×12½=37½)

5. a) Explain briefly the various classification of micro organisms. (6½)
   b) Write a note on : i) DNA (6)
      ii) RNA
6. a) Describe briefly about the various distribution of micro organism in water, air and soil. (8)
   b) Write a note on M.P.N index. (4½)
7. Explain in detail the carbohydrate metabolism in microbes. (12½)
8. a) Explain briefly about the bio degradation of toxic pollutants. (6½)
   b) Write a note on eutrophication. (6)

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Register Number:

Name of the Candidate:

3420

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENAL ENGINEERING)

(FIRST SEMESTER)

ENV-104.PROCESSES AND UNIT OPRATIONS FOR WATER TREATEMENT

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any FIVE questions ***(5×15=15)***

Draw sketches wherever necessary

1. Discuss briefly about the physical, chemical and biological characteristics of water with reference to water quality. (15)
2. Describe briefly the analysis methodology to find PH, Turbidity, Hardness and salinity of water. (15)
3. Explain the four functional zones of settlings tank with neat sketch. (15)
4. a) Describe briefly the bar screens and fine screens used in primary treatment process. (8)
   b) Write short notes on "Coagulants". (7)
5. Describe briefly with neat sketch, the Rapid sand filter. (15)
6. a) Discuss briefly various methods of Chlorination. (8)
   b) Write short notes on "Isotherms ". (7)
7. Discuss briefly the operation process of reverse of osmosis(R.O) in water treatment plant. (15)
8. Describe briefly, the (OEM) Operation and maintenance schedule for a clasiflocculator. (15)

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Register Number:

Name of the Candidate:

3421

M.E. DEGREE EXAMINATION, 2014

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

(Common with Part-Time)

ENVE-106. ENVIRONMENTAL BIO-TECHNOLOGY

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any FIVE questions ***(5×15=15)***

1. Discuss briefly about the process of Detoxification of environmental pollutants. (15)

2. a) Explain briefly the degradation process of petroleum products. (7½)

   b) Write short notes on "Biotransformation of metals" (7½)

3. a) Discuss briefly about the process of biodegradation of solid wastes. (7½)

   b) What do you understand by the term "decontamination of ground water systems"? Briefly explain. (7½)

4. Describe briefly the following terms (15)

   a) Bio Fertilizers and its uses.

   b) Odour management in waste water treatment process

5. a) Discuss the role of extra cellular polymers used in waste water treatment. (7½)

   b) What do you understand by the term "algal biotechnology"? Explain briefly its applications in agricultural usage. (7½)

6. a) Draw the cross section of a biomethane gas generation tank and name its parks. (7½)

   b) Briefly the concept of Recombinant DNA technology. (7½)

7. a) Discuss briefly about the safety aspects of genetically engineered organisms in industries. (7½)

   b) Write short notes on "Radioactive probes". (7½)

8. a) Discuss briefly the risk assessment methodologies of environmental biotechnology. (7½)

   b) Brief the details of protoplast fusion technology. (7½)

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Register Number: 15 2 31008

Name of the Candidate: P.HEENA KSHI

3518

M.E. DEGREE EXAMINATION, 2015

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC - 101: STATISTICS FOR ENVIRONMENTAL ENGINEERS

November] [Time : 3 Hours

Maximum : 75 Marks

(Max: 60 marks for those who joined before 2011-12)

Answer any FIVE questions **(5 × 15 = 75)**

1. a) Find the mode and the median for the following distribution. (8)

Variable:	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency:	2	5	7	13	21	16	8	3

b) Find the coefficient of correlation between industrial production and export from the following data. (7)

Production X:	55	56	58	59	60	60	62
Export Y:	35	38	37	39	44	43	44

2. a) **Prove that for the binomial population with density function.** (8)

$f(x, p) = nC_x p^x q^{n-x}, x = 1,2.....n$ the maximum likelihood estimator for P is $\frac{x}{n}$

find its variance.

b) An observed random sample of size 9 from a N(μ,σ=2) has a mean 50, obtain a 95% confidence internal for μ (7)

3. a) A machinist is making engine parts with axle diameters 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D of 0.04 inch. compute the statistic you would use to test whether the work is meeting the specification. (8)

b) The number of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period. (7)

4. The following table gives monthly sales (in thousand rupees) of a certain firm in three states by its four salesmen. (15)

	Salesmen			
States	I	II	III	IV
A	6	5	3	8
B	8	9	6	5
C	10	7	8	7

Setup the analysis of variance table and test whether there is any significant difference (i) between sales by the firm salesmen and (ii) Between sales in the three states.

5. **Solve** by Simplex method. (15)

Maximize $Z = 30x+40y$

Subject to the constraints $x+y\leq 6$; $2x+4y\leq 21$, $x, y \geq 0$

6. a) Find the feasible solution of the following transportation problem by vogel's approximation method. (8)

		To				
		W1	W2	W3	W4	Supply
From	F1	14	25	45	5	6
	F2	65	25	35	55	8
	F3	34	3	65	15	16
Demand		4	7	6	13	

b) Find the optional assignment for the assignment problem with the following cost matrix. (7)

	a	b	c	d
1	10	24	30	15
2	16	22	28	12
3	12	20	32	10
4	9	26	34	16

7. a) For the following density function $f(x)$ $ae^{-|x|}$, $-de<x<de$, find (8)
i) the value of 'a' ii) mean and variance.

b) Find the m.g.f. of a random variable 'x' whose probability function is $p(x) \frac{1}{2x}$, (7)
$x=1,2,3\ldots\ldots$ Hence find its mean.

8. a) If the pdf of x is $f_x(x) = e^{-x}$, $x>0$. Find the pdf of $y=2x+1$ (7)

b) The regression equation of x and y is $3y-5x+108=0$. If the mean value of y is 44 and the variance of x were $\frac{9}{16}$th of the variance of y. find the mean value of x and the correlation coefficient. (8)

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Register Number: 15231008

Name of the Candidate: P.MEENAKSHI

3519

M.E. DEGREE EXAMINATION, 2015

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC-102: ENVRIRONMENTAL CHEMISTRY AND MICROBIOLOGY

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any FIVE questions (5 × 15 = 75)
Answer any THREE full questions in any ONE Section

SECTION - A

1. a) Enlist the factors affecting the primary change on a colloid.
   b) Explain the working principle of an atomic (AAS) absorption spectroscopy. (8)

2. a) Classify the synthetic detergents with examples. Also, describe the degradation of detergents. (8)
   b) Write a note on risk evaluation of chemicals (7)

3. a) Provide the general steps involved in solving equilibrium problems involving complexes. (8)
   b) Write the reaction that explains the key species involved in the formation of photochemical smog. Also, list the effects due to photochemical smog. (7)

4. a) Discuss the remedial measures for soil affected due to salinity (8)
   b) Write briefly about the [illegible] reactions in soil. (7)

SECTION - B

5. a) Explain the application of Microorganisms in pollution abatement. (8)
   b) Write a brief note on staining techniques (7)

6. a) What is an indicator organism? Discuss the characteristics of the ideal pathogen indicator. (9)
   b) Discuss in detail the problems due to the presences of algae in water supplies. (6)

7. a) With a neak sketch, explain the growth phases of microorganisms. (7)
   b) Write a note on Kreb's cycle. (8)

8. a) Discuss the role of microorganisms in wastewater treatment. (8)
   b) Briefly describe the eutrophication process. (7)

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Register Number: 15231008 **3520**

Name of the Candidate: P.NEENAKSHI

M.E. DEGREE EXAMINATION, 2015

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC – 103. AIR POLLUTION METROLOGY AND DISPERSION MODELLING

November] [Time: 3 Hours

Maximum: 75 Marks

Answer any FIVE questions **(5 × 15 = 75)**

1. Explain in detail on the transport and dispersion of air pollutants. (15)

2. Describe the following:

   a) Accuracy and Utilization in air quality modeling (7½)

   b) Air pollution surveys. (7½)

3. Discuss about the modeling for non-reactive pollutant. (15)

4. Explain the mechanism involved in mass transport of solids. (15)

5. Explain in detail the wind rose diagram and the significance of wind rose information in industries. (15)

6. a) Compare the plume behaviour under different conditions of atmospheric stability. (7½)

   b) Briefly describe the various sources of metrological data. (7½)

7. a) Discuss in detail sampling train function. (5)

   b) How the location of site and sampling period are decided. (10)

8. Explain briefly the Lagrangian simulation theory for the neutral surface layer. (15)

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Register Number: 15231008 **3521**

Name of the Candidate: P·MEENAKSHI

M.E. DEGREE EXAMINATION, 2015

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVC – 104. PROCESSES AND UNIT OPERATIONS FOR WATER TREATMENT

(Common with Part-Time)

November] [Time: 3 Hours

Maximum: 75 Marks

Answer any FIVE questions **(5 × 15 = 75)**

Draw sketches wherever necessary

1. Briefly explain the physical and bacteriological characteristics of water with their WHO latest standards. (15)

2. Briefly explain the measurement of organic content. (15)

3. Discuss the constituent of clariflocculator. (15)

4. Explain the type of setting zones with neat sketches. (15)

5. Discuss briefly about the following terms:

   a) Filter materials (5)

   b) Back washing (5)

   c) Formation of mud balls. (5)

6. Briefly explain the iron and manganese removal methods. (15)

7. Explain the working principles of lime soda process and ion exchange process and give the application. (15)

8. Briefly discuss the operating parameters and instrumentation facilities required for filters and disinfection chambers. (15)

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M.E. DEGREE EXAMINATION, 2015

(WATER RESOURCES ENGINEERING MANAGEMENT)

(FIRST SEMESTER)

WREC-204/ENVC-105. PIPE LINE ENGINEERING

(Common with Environmental Engineering)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any FIVE questions

1. a) Discuss the basic hydraulic principle adopted in the water supply system. (10)

   b) Brief the labeling procedure of network elements. (5)

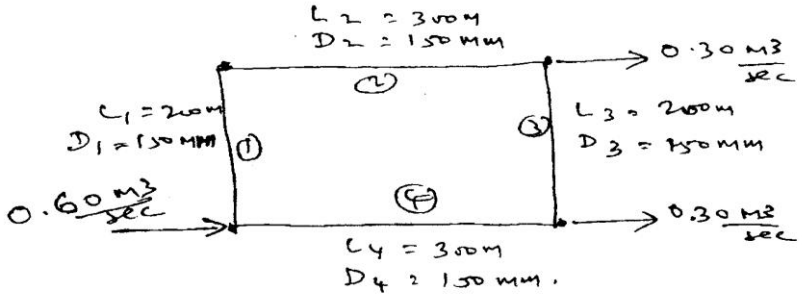
2. Explain the following network analysis methods with sketches. (3×5=15)

   a) Newton Raphson method

   b) Linear Theory method

   c) Hardy cross method

3. Analyse a single looped pipe network as shown in fig(1) for pipe discharges using Hardy Cross method. Assume a constant friction factor f-0.02 for all the pipes in the network. (10)



4. Find the diameter of a 3Km long cast iron pipe, to carry water at a rate of $3m^3/min$, if the permissible hard loss is 20m.Use. (15)

   a) Darcy –Weisbach formula with e =0.90

   b) Hazzen William's formula with C_{HW} =100

5. a) Discuss the interactive method and direct method of dynamic analysis used in the pipe network analysis. (10)

   b) Discuss the Head dependent analysis and its practical applications. (5)

6. Discuss with neat sketches, the step by step procedure of node flow analysis with its practical applications. (15)

7. Discuss briefly about the static and dynamic models used for prediction of chlorine concentrations. (15)

8. a) Briefly describe, the network calibration methodology. (10)

   b) Write in details, the various software packages used in network analysis. (5)

Register Number: 15231008

Name of the Candidate: P. MEENAKSHI

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M.E. DEGREE EXAMINATION, 2015

(ENVIRONMENTAL ENGINEERING)

(FIRST SEMESTER)

ENVE-106. ENVIRONMENTAL BIOTECHNOLOGY

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any FIVE questions (5 × 15 = 75)

Draw neat sketches if needed

1. State and explain the chemical and biological factors influencing the biodegradation of toxic pollutants. Explain the profile of growth phase of bacteria under [illegible] transformation system. (15)

2. Explain the essential steps in the nitrification and denitrification of organic pollutants. Support your answer with a neat flow diagram and sketch. (15)

3. Write short notes on

   a) Biodegradation of solid waste (7½)

   b) Production of proteins (7½)

4. a) Explain the composting with a neat sketch (7½)

   b) State and explain the microbial factors influencing the composting. (7½)

5. Explain hydrolysis and methanogenesis process with a neat sketch. (15)

6. Explain coliform, e-coli, streptococcus and clostridium in detail with a neat sketch. (15)

7. a) Discuss briefly about the ethics of microbial technology. (7½)

   b) Define patents and explain the procedure for getting the same in our country. (7½)

8. Write short notes on: (3×5=15)

   a) Safety of genetically engineered organisms

   b) Construction of microbial strains

   c) Applications of protoplast fusion tehcnology
