Total No. of Questions : 12]

SEAT No. :

P3161

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B.E. (Civil)

Statistical Analysis & Computational Methods in Civil Engineering (Elective - IV) (2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Find the mean, median, variance and standard deviation for the following data. **[10]**

Class interval	5-15	15-25	25-35	35-45	45-55	55-65	65-75
No. of observations	2	0	8	36	110	78	66

b) What do you mean by sample & population. Enumerate various methods of sampling. **[6]**

OR

Q2) a) The yearly rainfall for a period of 30 years is given the following table. Draw the histogram and determine mean, variance and standard deviation for this data **[10]**

Class interval	28-30	30-32	32-34	34-36	36-38	38-40	40-42	42-44	44-46	46-48
No. of observations	2	4	2	6	4	1	3	5	1	2

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b) Explain how statistics can be used in civil engineering. **[6]**

Q3) a) What do you mean by a standard normal distribution. State the properties of normal distribution. **[6]**

b) Find the following probabilities for the standard normal distribution Z: **[10]**

i) $P(-0.5 \le Z \le 1.1)$.

ii) $P(-0.38 \le Z \le 1.72)$.

iii) $P(0.2 \le Z \le 1.4)$.

iv) $P(-1.5 \le Z \le -0.7)$.

v) $P(Z \ge 1.6)$.

Use the standard normal distribution table.

Standard Normal Distribution Table

Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Area	0.000	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.258	0.2881	0.3159

Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641

Z	1.9	2.0	2.1	2.2	2.3	2.4	2.5
Area	0.4713	0.4772	0.4821	0.4861	0.4893	0.4918	0.4938

OR

Q4) a) If 2% of the items made by a factory are defective. Find the probability P that there are 3 defective items in a sample of 100 items. **[6]**

b) If the marks obtained by students are normally distributed with mean = 68 and standard deviation = 2.5. Find the percentage of students who have obtained marks. **[10]**

i) Between 66 and 71

ii) Between 69.5 and 70.5,

iii) At least 72.

Q5) a) Explain least square criteria for best fit curve. **[6]**

b) Find the correlation coefficient for the following data **[12]**

x	63	72	76	70	71	65	70	74	68	61
y	8385	8330	8325	8320	8330	8325	8280	8280	8300	8265

OR

Q6) a) Explain Linear and Multiple regression. **[6]**

b) Using interpolation formula, find $f(3.75)$ for the following data. **[12]**

x	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$	24.145	22.043	20.225	18.644	17.262	16.047

SECTION - II

Q7) a) Solve the following equations by Gauss elimination method. **[6]**

$10x-2y+3z=23; 2x+10y-5z=-33; 3x-4y+10z=41.$

b) Solve the following system of equations by Gauss-Seidel method. **[10]**

$28x+4y-z=32;\ x+3y+10z=24;\ 2x+17y+4z=35$

OR

Q8) a) Solve the following using Gauss - Jordan Method. **[6]**

$x+y+z=9; 2x-3y+4z=13;\ 3x+4y+5z=40$

b) Solve the following system of equations by Gauss-Seidel method. **[10]**

$8x-y+z=18; 2x+5y-2z=3;\ x+y-3z=-6$

Q9) a) Explain Secant Method. **[6]**

b) Using false position method, Find the positive root of $x^3-2x-50=0$. **[10]**

OR

Q10) a) Find the root of the following equation using bisection method. **[6]**

$x \log_{10} x = 1.2$ lying between 2 and 3.

b) Find the real root of $x.e^x - 2 = 0$ correct to three decimal places using Newton-Raphson method. **[10]**

Q11) a) Find the area under the curve using Simpson's $1/3^{rd}$ rule for the following data. **[9]**

x	0	300	600	900	1200	1500	1800
y	135	149	157	183	201	205	193

b) For the data given in Q.(11.a), find the area under the curve using Simpson's $3/8^{th}$ rule. **[9]**

OR

Q12) a) Find the value of the following integral by Gauss - quadrature formula

$$\int_1^2 \frac{dx}{1+x^3}.$$ **[9]**

b) Find the area under the curve using trapezoidal rule. **[9]**

x	0	0.125	0.25	0.375	0.5	0.625	0.75	0.875	1.0
y	1	0.888	0.8	0.727	0.666	0.615	0.571	0.533	0.5

Total No. of Questions : 8] SEAT No. :

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[4859]-234
B.E. (Petrochemical Engineering)
REFINERY PROCESS DESIGN
(2008 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt any three questions from each section.***
2) ***Answer to the two sections should be written in two separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of steam tables and electronic calculator is allowed.***
5) ***Make use of K Charts, LMTD correction factor curves and Gillil and curve given in the end wherever appropriate.***
6) ***Assume suitable data wherever necessary.***

SECTION - I

Q1) Vapor mixture leaving a distillation column consists of 75 Mol% n-butane, 20 Mol% n-pentane, and 5 Mol% n-hexane, Column pressure is 7 bar. Column employs a total condenser from which reflux is returned to the column. Calculate temperatures of vapor from the column top and reflux liquid, If reflux ratio is 3, calculate vapor and liquid compositions for two theoretical plates below the top plate. **[18]**

Q2) Feed to a C2 splitter is 40% vaporized liquid having 50% ethylene and 50% ethane (Mol%). The column operates at 7 bar pressure, Purities of both top and bottom products are expected to be 99.5%. Calculate minimum reflux ratio needed using Underwood equations. Assuming operating reflux to be 1.2 times the minimum, calculate the theoretical stages needed for the separation Assuming plate efficiency to be 70% and tray spacing to be 65 cm, calculate height of the tray column needed for the purpose. **[16]**

Q3) a) Discuss Packie Charts. **[8]**

b) Explain how coil outlet temperature (COT) is determined in ATU design. **[8]**

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