Total No. of Questions : 12]

SEAT No. :

P1055

[Total No. of Pages : 4

[4659]-23
B.E. (Civil Engineering)
c-STATISTICAL ANALYSIS & COMPUTATIONAL METHODS IN CIVIL ENGINEERING
(2008 Course) (Elective-IV) (Semester-II)

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

Instructions to the candidates:

1) ***Write Q. No. 1 or Q. No. 2; Q. No. 3 or Q. No. 4; Q. No. 5 or Q. No. 6 in Section-I, and Q. No. 7 or Q. No. 8; Q. No. 9 or Q. No. 10; Q. No. 11 or Q. No. 12 in 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) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) The following data shows the height of 50 nano-pillars in a nano-technology setting. Determine mean, median, mode and standard deviation. **[8]**

X	206-245	246-285	286-325	326-365	366-405
Frequency	3	11	23	9	4

b) Define the following: **[8]**

i) Variance ii) Coefficient of variance

iii) Mean iv) Standard deviation

OR

Q2) a) The BOD concentration in a river is given in the following table. Determine mean, standard deviation and Pearson's first skewness coefficient for this data. **[8]**

X	0-1	1-2	2-3	3-4	4-5	5-6
Frequency	12	94	170	188	28	8

b) Explain utility of statistics in engineering applications. **[8]**

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Q3) a) The time required to assemble a piece of machinery is a random variable having normal distribution with $\mu = 12.9$ min. and $\sigma = 2.0$ min. What is the probability that assembly will take-

i) At least 11.5 min.

ii) Anywhere from 11.0 to 14.8 min. **[6]**

Use the standard normal distribution table given below:

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

Z	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
Area	0.3159	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554

Z	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5
Area	0.4641	0.4713	0.4772	0.4821	0.4861	0.4893	0.4918	0.4938

b) Test the goodness of fit for the following data for Poisson distribution at 5% level of significance with $\lambda = 3.2$. **[10]**

X	0	1	2	3	4	5	6	7	8	9
Frequency	9	43	64	62	42	36	22	14	6	2

Use the following chi-square distribution table for $\alpha = 0.05$.

ν	2	3	4	5	6	7
χ^2	5.99	7.8147	9.4877	11.07	12.59	14.067

OR

Q4) a) Explain what do you mean by a standard normal distribution. State the properties of normal distribution. **[6]**

b) Test the goodness of fit for the following data for normal distribution at 5% level of significance. **[10]**

X	<50	50-60	60-70	70-80	80-90
Frequency	2	7	10	15	9

Use the standard normal distribution table given in Q. 3a.

Use the Chi-square distribution table for $\alpha = 0.05$ given in Q. 3 b.

Q5) a) Fit a second degree parabola to the following data using the method of least squares. **[10]**

X	10	12	15	23	20
Y	14	17	23	25	21

b) Explain Newton interpolation formula. **[8]**

OR

Q6) a) If y(75) = 246; y(80) = 202; y(85) = 118; y(90) = 40; Find y(79). **[10]**

b) Explain single and multiple regression. **[8]**

SECTION-II

Q7) a) Solve the following by Gauss elimination method. **[8]**

$2x_1 + x_2 + 3x_3 = 1;$

$4x_1 + 4x_2 + 7x_3 = 1;$

$2x_1 + 5x_2 + 9x_3 = 3.$

b) Solve the following using Gauss-Seidel method (3 iterations). **[8]**

$2x_1 + 2x_2 + 4x_3 = 18;\ x_1 + 3x_2 + 2x_3 = 13;\ 3x_1 + x_2 + 3x_3 = 14.$

OR

Q8) a) Solve the following by Gauss-Jordan method. **[8]**

$x_1 + x_2 - x_3 = -3;\ 6x_1 + 2x_2 + 2x_3 = 2;\ -3x_1 + 4x_2 + x_3 = 1.$

b) Solve the following using Gauss-Seidel method (3 iterations). **[8]**

$2x_1 + x_2 - x_3 = 1;\ 5x_1 + 2x_2 + 2x_3 = -4;\ 3x_1 + x_2 + x_3 = 5.$

Q9) a) Explain: **[8]**

i) Bisection method.

ii) False position method.

b) Find the root of $x^3 - 4x + 1 = 0$ which lies between 0 and 1. **[8]**

OR

Q10)a) Explain: **[8]**

i) Newton Raphson method.

ii) Secant Method.

b) Find the root of $x^3 - x - 1 = 0$ using Bisection method. **[8]**

Q11)a) Explain: **[8]**

i) Trapezoidal rule.

ii) Simpsons 1/3rd rule.

b) Find area under the curve **[10]**

x	1	2	3	4
y	1	4	9	16

OR

Q12)a) Explain need and scope of numerical integration. **[8]**

b) Explain: **[10]**

i) Simpsons 3/8th rule.

ii) Gauss - Quadrature method.

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