4E1206

B. Tech. IV - Sem. (Main) Exam., May - 2019

BSC Civil Engineering

4CE2 – 01 Advanced Engineering Mathematics - II

AG, CE, MI

Time: 2 Hours

Maximum Marks: 80

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

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PART – A

(Answer should be given up to 25 words only)   **[5×2=10]**

All questions are compulsory

Q.1 Define line of regression and also write equations of line of regression. [2]

Q.2 State addition law of probability. [2]

Q.3 Find the value of k so that $f(x) = k \cdot x (2 - x)$ may be a probability density function of a random variable x for $0 \leq x \leq 2$. [2]

Q.4 Define correlation. Also write Karl Pearson's coefficient of correlation and Spearman's rank correlation. [2]

Q.5 If x is the number of points rolled with a balanced die. Find the expected value of –

$G(x) = 2x^2 + 1$ [2]

PART – B

Q.1 Obtain the rank correlation for the following data - [10]

x	68	64	75	50	64	80	75	40	55	64
y	62	68	68	45	81	60	68	48	50	70

Q.2 If the coefficient of correlation between two variables x and y is 0.5 and the acute angle between their lines of regression is $\tan^{-1}\left(\frac{3}{5}\right)$, show that $\sigma_x = \frac{1}{2}\sigma_y$ [10]

Q.3 Find the coefficient of correlation and regression lines to the following data – [10]

x	5	7	8	10	11	13	16
y	33	30	28	20	18	16	9

Q.4 Employ the method of least square to fit a parabola $y = a + bx + cx^2$ in the following data – [10]

$(x, y) : (-1, 2) \ (0, 0) \ (0, 1) \ (1, 2)$

Q.5 A and B take turns in throwing of two dice, the first to throw 9 will be awarded prize. If A has first turn, show that their chances of winning are in the ratio 9 : 8. [10]

Q.6 Fit a Poisson distribution to the set of observations - [10]

x	0	1	2	3	4
y	122	60	15	2	1

PART – C

Attempt any two questions

Q.1 Two balls are selected at random from a box containing two red, three white and four

blue balls. Let (x, y) be a bivariable random where x and y denote the number of red and

white balls chosen –   [15]

   (i)   Find joint probability mass function of (x, y)

   (ii) Find marginal probability mass function of x and y.

   (iii) Conditional distribution of x given y = 1

Q.2 State and prove Bayes' theorem.   [15]

Q.3 (i)   Find the mean and variance of Binomial distribution.   [7]

     (ii) A coin is tossed 900 times and head appeared 490 times. Would you conclude that

           the coin is a biased one?   [8]