

B. Sc. DEGREE (C.B.C.S.S) EXAMINATION, MARCH 2017
(2016 Admission – Regular & 2015 Admission – Supplementary/Improvement)
SEMESTER II - COMPLEMENTARY COURSE (STATISTICS)
ST2CMP02B – PROBABILITY AND RANDOM VARIABLES
(Complementary for Mathematics, Physics and Computer Applications)

Time: Three Hours

Maximum Marks: 80

Use of Scientific calculators and Statistical tables are permitted.

PART A**I Answer all questions. Each question carries 1 mark.**

1. Distinguish between Positive and Negative Correlation.
2. If $r = 0$, then the angle between two regression lines is -----
3. Write the Normal equations for fitting the curve $Y = aX + b$
4. Give the classical definition of probability.
5. Define Probability Density function.
6. Define conditional probability.

(6x1=6)

PART B**II Answer any seven questions. Each question carries 2 marks.**

7. Explain the Principle of least squares.
8. What is a scatter diagram?
9. Show that correlation coefficient is the G.M of two regression coefficients ?
10. Write the inferences when $r = +1, -1$, and 0
11. How can the two regression lines be identified?
12. If $P(A) = P_1, P(B) = P_2$ and $P(AB) = P_3$, find $P(A/B)$
13. If $P(A \cup B) = 5/6, P(A \cap B) = 1/3, P(A) = 1/2$. Check whether A and B are independent,
14. What are properties of p.d.f. of a discrete random variable?
15. For the density function $f(x) = k e^{-\theta x}; x \geq 0$ and $\theta \geq 0$ and 0 elsewhere, find the value of k
16. Let X be a random variable with P.d.f., $f(x) = x/4: -1 \leq x \leq 3$ and 0 elsewhere. Find the p.d.f. of $Y = 2X + 3$

(7x2=14)

PART C**III Answer any five questions. Each question carries 6 marks.**

17. Find the value of K so that the correlation between $X + KY$ and $X + Y$ is a maximum where X and Y are independent variables each with mean 0 and variance unity
18. Show that $\sigma_{x-y}^2 = \sigma_x^2 + \sigma_y^2 - 2r\sigma_x\sigma_y$.
19. Given the two regressions $4Y = 9X + 15$ and $25X = 6Y + 7$ Obtain the value of the correlation coefficient.
20. Find the angle between two regression lines.

21. State and prove addition theorem of probability.
22. What is the probability of getting
 - (a) 2 white balls (b) one of each colour when two balls are drawn from a box containing 3 white and 4 green balls,
23. Given $f(x,y) = C(x+y)$ for $(1,1)$, $(2,1)$, $(2,2)$, $(3,1)$ and 0 elsewhere. Find C and the marginal densities of x and y.
24. If the distribution function of a random variable X is $F(x) = 0$ if $x \leq 1$; $\frac{1}{16}(x-1)^4$ if $1 \leq x \leq 3$ and 1 if $x > 3$. Find the p.d.f of X.

(5x6=30)

PART D

IV Answer any two questions. Each question carries 15 marks.

25. (a) State and prove Baye's theorem.
 (b) Two classes A & B consists of 25 boys, 15 girls and 20 boys, 30 girls respectively. One student is selected at random and found to be a girl. Find the probability that she was from class B.
26. If the regression equations are $Y = 0.516x + 33.73$ and $X = 0.512y + 33.52$. Find
 - (a) mean values of x & y.
 - (b) Co-relation coefficient r
 - (c) Ratio of variances of x & y
 - (d) Ratio of coefficient of variation.
27. Find Pearsons Co-relation coefficient between x& y

X:	311	309	307	310	306	301	314	315
Y:	851	856	850	860	859	861	852	858
28. If $f(x, y) = (x + y)/21$; $x = 1, 2, 3$ and $y = 1, 2$ find
 - (a) $f(x/ y = 2)$ and $f(y/x= 1)$
 - (b) Distribution of $x + y$

(2x15=30)