

B.Sc. DEGREE END SEMESTER EXAMINATION MARCH 2017SEMESTER – 2 : **STATISTICS FOR B.Sc. MATHEMATICS / B.Sc. COMPUTER APPLICATION**COURSE : **15U2CPSTA2-15U2CRCST2, PROBABILITY AND STATISTICS***(Common for Regular 2016 Admission / Supplementary 2015 Admission)*

Time: Three Hours

Max. Marks: 75

*Use of Scientific calculators and statistical tables permitted***PART – A***Answer all the questions. Each question carries 1 mark.*

1. Define sample space and write the sample space in an experiment of tossing two coins.
2. Give axiomatic definition of probability.
3. In terms of probability, write the condition of independence of two events.
4. State addition theorem for two events.
5. Define pdf of a continuous random variable.
6. Obtain the value of C, if pdf of X is given by $f(x) = \frac{cx^2}{2}$ $0 \leq x \leq 1$; $= 0$ elsewhere.
7. Define conditional distributions of a Bivariate random variable (x, y) .
8. If correlation between X and Y is γ , find the correlation between $\frac{x}{k}$ and $\frac{y}{l}$ where $k, l > 0$.
9. If the correlation coefficient is $\frac{2}{3}$ and if one regression coefficient is $\frac{7}{9}$, obtain the other regression coefficient.
10. If the variables are independent, what will be the angle between the regression lines?

PART – B*(Each question carries 3 marks. Maximum marks from this part is 15.)*

11. From a pack of cards 13 cards are drawn. Find the probability that there are exactly 5 spades among the selected cards.
12. Each of the three guns has a probability 0.7 for hitting a target. What is the probability that
 - (1) All will hit the target
 - (2) At least one will hit the target
13. Define distribution function and state its properties.
14. A random variable X has the probability density function $f(x) = \frac{k}{(1+x^2)}$, $-\infty < x < \infty$.
determine (1) k (2) $P(x \geq 0)$
15. The joint pdf of a random variable X and Y is $f(x, y) = e^{-(x+y)}$ if $x \geq 0, y \geq 0 = 0$ otherwise.
Find the marginal pdf's.
16. Show that the mean of two regression coefficients is greater than the coefficient of correlation if $r > 0$.
17. Show that independence of two variables implies non-correlation but not conversely.

PART – C

(Each question carries 5 marks. Maximum marks from this part is 20.)

18. For any two events A and B prove that $P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$.
19. Seven men are seated at random on 7 chairs around a round table. What is the probability that a particular pair to be seated adjacently?
20. If the pdf of X is

$$f(x) = \frac{3}{8} x^2 \quad 0 < x < 2$$

0 elsewhere

and if $y = x^3$, find the pdf of y and also find $P[3 < y < 6]$.

21. Give that $f(x) = k x^4 e^{-x} \quad x \geq 0$ is a pdf. Find k .
22. Find the values of k and examine whether X and Y are independent if the joint density function of X and Y is given by $f(x, y) = k(2x + 3)e^{-\frac{y}{2}} \quad 0 < x < 2, y > 0$.
23. If $u = ax + by, v = bx - ay$ where x and y measured from their respective means and if r is the correlation between x and y and u and v are uncorrelated, show that

$$\sigma_u \sigma_v = (a^2 + b^2) \sigma_x \sigma_y (1 - r^2)^{\frac{1}{2}}$$

PART – D

(Each question carries 10 marks. Maximum marks from the part is 30.)

24. There are 4 boys and 2 girls in Room No. 1 and 5 boys and 3 girls in Room No. 2. A girl from one of the room laughed loudly. What is the probability that the girl who laughed loudly was from Room No.2.
25. Given $f(x, y) = K e^{-x-2y} \quad x > 0, y > 0$
0 else where
where K is a constant is a density function. Obtain the marginal distributions.
26. From the observation given below.

(1) Find the regression of X_1 on X_2 and X_3

(2) Find x_1 when $x_2 = 65$ and $x_3 = 10$

x_1	64	53	71	55	67	77	58	56	57	51	76	68
x_2	57	49	59	51	62	55	50	52	48	42	61	57
x_3	8	6	10	8	11	10	7	6	9	6	12	8

27. The two regression lines are $x = 1.28y - 143.7$ and $y = 100.26 - 0.77x$. Find \bar{x}, \bar{y} and correlation between x and y .
