K15U 0162

Reg. No. : ..............................

Name : ..................................

# Third Semester B.Sc. Degree (CCSS–Supple./Imp.) Examination, November 2015
# Complementary Course in Statistics
# 3C03 STA (G&P) PROBABILITY THEORY AND PRACTICE
# (2013 & Earlier Admissions)

Time : 3 Hours Max. Weightage : 30

***Instruction :*** *Scientific calculators and Statistical tables are **permitted** in the examination hall.*

## PART – A

Answer **any 10** questions. Each carries weightage **1**. **(10×1 = 10)**

1. A problem is statistics is given to 2 students A and B. Whose chances of solving it are $\frac{1}{2}$ and $\frac{3}{4}$. What is the probability that the problem will be solved if A and B toy independently ?

2. If $\overline{A}$ is the complement of A, prove that $P(A)+P(\overline{A})=1$.

3. What is a random experiment ?

4. If $P(A) = 0.5$ $P(\overline{B})=0.6$ $P(A\cup B)=0.7$. Find P(B/A).

5. State and prove multiplication theorem.

6. If the probability mass function of a R.V is given by $f(x)=k^x \quad x=1, 2, 3, 4, 5$.
$= 0 \quad$ otherwise
Find : i) k ii) the distribution function.

P.T.O.

7. If $f(x) = kx(1 - x)$ $0 < x < 1$ is a p.d.f, find k.

8. Write down the distribution of the number of tosses required if an unbiased coin is tossed until a head appears.

9. Write a short note on marginal distribution.

10. If the joint p.d.f of X and Y is $f(x\ y) = e^{-(x+y)}$ $x, y \geq 0$. Examine whether X and Y are independent.

11. Define joint probability density function.

PART – B

Answer **any 6** questions. **Each** carries weightage **2.** **(6×2 = 12)**

12. A and B play a game by tossing an unbiased coin in turn and the one who toss head first will win the game. What is the probability of A winning the game ?

13. State and prove addition theorem for two events.

14. Explain independence of three events.

15. Suppose 8 men out of 100 and 30 women out of 10000 are colour blind. A colourblind person is selected at random. What is the probability that it is a male, assume male and female are equally probable ?

16. Distinguish between a discrete and continuous random variable.

17. If $f(x)\dfrac{3+2x}{18}$ $2 \leq X \leq 4$

    i) Show that f (x) is a p.d.f.

    ii) Find $P(2.5 < X < 3.5)$

18. If A and B are independent; prove that

    i) A and $\overline{B}$ are independent.

    ii) $\overline{A}$ and B are independent.

19. 3 unbiased coins are tossed. Find the distribution of the number of heads.

20. a) State the properties of p.d.f. of a R.V

    b) A R.V X has p.d.f $f(x) = k \quad 2 < x < 5$ find k.

## PART – C

Answer **any two** questions. **Each** carries weightage **4.** **(4×2 = 8)**

21. An urn contain 5 white 4 blue and 3 red balls. 4 balls are selected at random. What is the probability of getting ?

    a) all white
    b) 2 white and 2 red
    c) 1 white 1 blue and 2 red
    d) 3 red ball

22. a) State and prove Bayes theorem.

    b) State the properties of the distribution function.

23. a) Explain classical definition of probability. What are its limitations ?

    b) If P(A) = 0.2, P(B) = 0.16, P(C) = .14, P(AB) = .08, $P(B \cap C) = .04$, P(AC) = .05 and P(ABC) = 0.02. Find $P(A \cup B \cup C)$.

24. If X and Y are R.Vs with joint p.d.f

| (x, y) | (0, 0) | (0, 1) | (0, 2) | (1, 0) | (1, 1) | (1, 2) |
|---|---|---|---|---|---|---|
| f (x, y) | 1/12 | 1/6 | 1/4 | 1/3 | 1/12 | 1/12. |

Find the conditional distribution of X given

i) y = 0

ii) Are X and Y independent.