

(For those who joined in December 2015)

Time : Three hours

Maximum : 100 marks

PART A — ( $4 \times 10 = 40$  marks)

Answer any FOUR questions.

1. Prove the following
- (a) Probability of the null set is zero; that  $P(\phi) = 0$
  - (b) For each  $C_1 \subset \xi$ ,  $P(C) = 1 - P(C^*)$
  - (c) If  $C_1$  and  $C_2$  are subsets of  $\xi$  such that  $C_1 \subset C_2$ , then  $P(C_1) \leq P(C_2)$
  - (d) If  $C_1$  and  $C_2$  are subsets of  $\xi$ , then  $P(C_1 \cup C_2) = P(C_1) + P(C_2) - P(C_1 \cap C_2)$ .
  - (e) For each  $C \subset \xi$ ,  $0 \leq P(C) \leq 1$ .
2. Let  $X$  and  $Y$  have the joint p.d.f
- $f(x, y) = 6(1 - x - y)$ ,  $0 < x, 0 < y, x + y < 1$  and zero elsewhere. Compute  $P(2X + 3Y < 1)$  and  $E(XY + 2X^2)$ .

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