

FACULTY OF SCIENCE

B.Sc. III-Semester (CBCS) Examination, December 2017

Subject: Mathematics

Paper – III

Logic and Sets

Time: 1½ Hour

Max.Marks: 40

PART – A (2x5 = 10 Marks)**[Short Answer Type]****Note: Answer all questions. Each question carries equal marks.**1 a) Show that the statement $-(p \rightarrow q) \rightarrow -q$ is a tautology.**OR**b) Show that statements $p \wedge (-q \vee r)$ and $p \vee (q \wedge -r)$ are logically not equivalent.2 a) For any finite set A with $|A| = n \geq 0$ then prove that $|P(A)| = 2^n$.**OR**b) Express $\overline{A - B}$ in terms of U and $\bar{\cdot}$.**PART – B (2x15 = 30 Marks)****[Essay Answer Type]****Note: Answer all questions. All questions carry equal marks.**3 a) Let s and t be statements that contain no logical connective other than \wedge and \vee . If $s \Leftrightarrow t$ then $s^d \Leftrightarrow t^d$.**OR**b) **Hypothesis:** If I join OU then I will get best education. If I get best education then I will get job in USA. If I get job in USA then I will become a millionaire. I joined OU.**Conclusion:** I will become a millionaire. Give an argument using rules of inference to show that the conclusion follows from the hypothesis.4 a) Let S be the sample space for an experiment E. For events A, B, $C \subseteq S$

$$\Pr(A \cup B \cup C) = \Pr(A) + \Pr(B) + \Pr(C) - \Pr(A \cap B) - \Pr(A \cap C) - \Pr(B \cap C) + \Pr(A \cap B \cap C).$$

OR

b) A man alternatively tosses a coin and throws a die beginning with coin. Find the probability that he will get a head before he gets a 5 or 6 on the die.
