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**B.Sc. (PCM)-17, B.A. (Math)-5**  
**3<sup>rd</sup> Year Examination, Calendar Batch 2015**  
**Mathematics-V**

Time : 3 Hours ]

[ Max. Marks : 100

*Note. Attempt any five questions. Each questions carry equal marks.*

**Q.1.** Obtain the analytic function  $f(z) = u + iv$ , whose real part  $u$  is  $e^x(x \cos y - y \sin y)$ .

**Q.2.** If  $A$  and  $B$  are two square matrices of same order, then  $\det(AB) = (\det A)(\det B)$ .

**Q.3.** Prove that  $\lim_{x \rightarrow 0}(1 + x)^{1/x} = e$ .

**Q.4.** Every monotonic function  $f$  is  $R$ -integrable.

**Q.5.** Find the area bounded by the curve  $y = 3x$ ,  $x$  axis and the ordinate  $x = 1$ ,  $x = 3$ .

**Q.6.** How many different words can be formed out of the letters of the word ALLAHABAD ? In how many of these will the vowels occupy the even places?

**Q.7.** Verify first mean value theorem for the function  $f(x) = \sin x$  and  $g(x) = e^x$  for  $x \in [0 \pi]$ .

**Q.8.** (A) An absolutely convergent series is convergent.

(B) Show that the series  $1 + \frac{1}{2!} + \frac{1}{3!} + \dots$  is convergent.